TAMIL NADU IRRIGATED AGRICULTURE MODERNIZATION PROJECT

PROJECT IMPLEMENTATION PLAN

October 2017

Multi-Disciplinary Project Unit
WATER RESOURCES DEPARTMENT
PUBLIC WORK DEPARTMENT
GOVERNMENT OF TAMIL NADU

Acronyms/Abbreviations

ABPF	Agriculture Business Promotion Facility
ADH	Director of Horticulture
AE	Assistant Engineer
AEC	Agriculture Extension Centre
AED	Agricultural Engineering Department
AHD	Animal Husbandry Department
ARAI	Authority, Responsibility, Accountability Issues
ATMA	Agricultural Technology Management Agency
ASCI	Administrative Staff College of India
AWD	'Alternative Wetting and Drying'
CAG	Comptroller and Auditor General of India
CBIGO	Community based Interest Group Organization
CCWM	Community Collaborative Water Management
CEC	Centre of Excellence for Change Management
CeSA	Centre for Sustainable Aquaculture
CIDR	Controlled Internal Drug Release
CQ	Selection based on Consultant's Qualification
CSO	Civil Society Organization
DC	Direct Contracting
DDH	Deputy Director of Horticulture
DDO	District Development Office
DIGs	Dairy Interest Groups
DLCC	District Level Coordination Committee
DoA	Department of Agriculture
DoF	Department of Fisheries
DPR	Detailed Project Report
EA	Environmental Assessment
EIMS	Enterprise information management system
E-in-C	Engineer in Chief
EMP	Environment Management Plans
ESA	Environmental and Social Assessment
ESMF	Environmental and Social Management Frame Work
FA	Force Accounts
FAO	Food and Agriculture Organization
FCSCs	Farmer Common Service Centers
FIGs	Farmers Interest Groups
FOs	Field Organizers
FPO	Farmer Producer Organization
FTC	Farmers Training Centers
GHG	Green House Gas
GIS	Geographic Information Systems
GO	Government Order
GOTN	Government of Tamil Nadu

GRS	Grievance Redress Service
IAMWARMP	Irrigated Agriculture Modernization and Water-bodies Restoration and Management Project
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
ICR	Implementation Completion Report
ICT	Information and Communication Technology
IMTI	Irrigation Management Training Institute
IPF	Investment Project Financing
IPM	Integrated Pest Management
IWS	Institute for Water Studies
JDA	Joint Director of Agriculture
JDH	Joint Director of Horticulture
LCS	Least Cost Selection
MAITRI	Multipurpose Artificial Insemination Technicians of Rural India
MDPU	Multi-Disciplinary Project Unit
MI	Micro irrigation
MIDH	Mission for Integrated Development of Horticulture
MIDH	Mission for Integrated Development of Horticulture
MIS	Management Information System
MSMEs	Micro, Small and Medium Agri Based Enterprises
MTS	Mobilization and Training Specialists
NABARD	National Bank for Agriculture and Rural Development
NCB	National Competitive Bidding
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
OFD	On Farm Development
PCU	Project Co-ordination Unit
PDO	Project Development Objective
PIM	Participatory Irrigation Management
PIMW	Participatory Irrigation Management Wing
PMSKY	Pradhan Mantri Krishi Sinchayee Yojana
PPP	Pubic Private Partnership
PRA	Participatory Rural Appraisal
PSC	Project Steering Committee
QBS	Quality-based Selection
QCBS	Quality and cost based selection
S	Shopping
SAR	Synthetic Aperture Radar
SBDP	Sub-Basin Development Plan
SFB	Selection under a Fixed Budget
SFAC	Small Farmers Agri Business Consortium
SG&SWRDC	State Ground Water and Surface Water Resources Data Centre
SMP	Social Management Plans
SMS	Short Message Services

SRI	System of Rice Intensification
SS	Single Source Selection
SSI	Sustainable Sugarcane Initiative
SWaRMA	State Water Resources Management Agency
SWIKCs	'Single Window Information and Knowledge Centers'
TANUVAS	Tamil Nadu Veterinary and Animal Sciences University
TC	Territorial Constituency
TFL	Truth Fully Labeled
TIP	Technical Input Provider
TNAU	Tamil Nadu Agricultural University
TNFMIS	Tamil Nadu Farmers Management of Irrigation System
TNFU	Tamil Nadu Fisheries University
TNIAMP	Tamil Nadu Irrigated Agriculture Modernization Project
TNIMTI	Tamil Nadu Irrigation Management Training Institute
WRD	Water Resources Department
WTC	Water Technology Center (TNAU)
WUA	Water User Associations

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Chapter 1: Introduction

1.1 About the State of Tamil Nadu

Tamil Nadu is the 11th largest state in India having a total geographical area of 130.33 Lakh hectares (4 percent of the land area of India) and is home to 72.14 million people (2011 census) which is 5.96 percent of India's population. Located in the extreme south of Indian sub-continent, the state is bounded by Indian Ocean to the east and south, the state of Kerala to the west, Andhra Pradesh to the north and Karnataka to the north-west. The literacy rates are 80.09 percentages with a lower female literacy at 73.45. The density of population in the state is 555 per square kilo meter, higher than the national average. The share of people living in rural areas is 51.60. Tamil Nadu is the second largest state economy in India, the GSDP growing at a faster pace of 9.2 percent per annum over the past 3 years. The share of agriculture and allied sectors is 11 percent of the GSDP. The average capita income of the state is INR 61,500 (at 2010-11 constant prices) which is 42 percent higher than the national average.

1.2 Water Resources Scenario

Tamil Nadu is one of the water starved states in India endowed with only 3 percent of the water resources in India. The state located in the rain shadow region of the Western Ghats is receiving limited average annual rain fall of about 925 millimeters, lower than the national average 1200 millimeters. The per capita availability of water in the state is about 750 cubic meters per annum compared to the national average of 2100 cubic meters.

There are 17 major river basins, 89reservoirs, about 41,948 tanks and about 3 million wells. The total surface of water potential of the state is 24,864 MCM which has already been heavily taped primarily for irrigation. 24 lakh hectares are irrigated by surface water which is about 90 percent utilization. The utilizable ground water recharge is 22,423 MCM and the current level of utilization is about 60 percent. There has been a general decline of the ground water level owing to complete desaturation of shallow aquifers. The total irrigated area is 3 million hectares which is 54 percent of the total cropped area. Irrigation canals supply water to 30 percent of irrigated area, tanks provide 21 percent and the wells irrigate 49 percent.

1.3 Agro Climatic Features

The states Agro climatic conditions range from hot tropical through sub-tropical to temperate climate. The major soil types are red, black, alluvial, loamy and sandy loam, highly suitable for growing a variety of crops. There are 7 agro climatic regions in the state based on rainfall distribution, soil characteristics cropping patterns and other physical- ecological characteristics.79 percent of the land area is suitable for cultivation.

1.4 Characteristics of Agriculture Sector

Agriculture provides livelihood to nearly 40 percent of the people. The total cultivated area is 5.57 million ha while the net areas sown is around 4.82 million ha (2009-10) and the cropping intensity is 114%. (Thegross cropped area is 5.57 million ha).Agriculture still employs 40 percent of the workers in the state. In recent years the state's agriculture sector has grown modestly at less than 3% per annum compared with 6-9% growth of the state's economy. The performance of agriculture sector below its potential is due to multiple factors including increasing water shortages, stagnant crop yields, low level of diversification, rigid mindset of the farmers in refusing to accept the improved technologies, weak market development, high rates of post- harvest losses, and increasing climate change threats.

A wide range of crops such as cereals, pulses, oil seeds, fruits, vegetables and other crops are cultivated under varied agro-climatic conditions in the state. The state accounts for nearly 6 percent of area under fruits and 4 percent of the area under vegetables in India. The livestock population is sizable and there is good potential for boosting production of milk and

meat in the state. The raising of crops mainly depends on successful monsoons and the low and uncertain rain fall including skewed most often affect production and productivity. There are large number of marginal and small farms challenging full adoption of scientific farming and production techniques. Nearly 75 percent farms are smaller than one hectare. Diversification of agriculture has huge potential to enhance farm incomes. Rice accounts for about a third of total gross crop and nearly 60 percent irrigated area in Tamil Nadu. The state is endowed with 4 percent of inland fish production in India.

1.5 Status of Irrigation

Agriculture is the single largest consumer of water in the state, using 75% of the state's water. Out of 40000 tanks only 14098 Tanks are under the maintenance of the Water Resources Department with the rest under the Panchayat unions. Irrigation through a combination of canals, wells and tanks increases the reliability and availability of water for farming and is essential for cultivating crops in much of state. About 3 million ha of land (54 percent of the total crop land) is under irrigation.

An Expert Committee on "Development and Management of Water Resources" observed that bringing additional area into cultivation is remote but the challenge is how best to bridge the gap in cultivation by reducing demands, by effective water management and by adoption of modern agricultural techniques (Micro Irrigation etc.) The Committee recommended Integrated Water Resources Management & convergence of various Departments for development and management of water resources in Tamil Nadu.

With Agriculture sector facing major constraints due to dilapidated irrigation infrastructure, coupled with water scarcity (both quantity and quality) and growing demands from industry and domestic users, long term growth in agriculture and rural income depends in large part on increasing efficiency and effectiveness in the use of water. Concomitantly increased agricultural diversification and private investments in higher value processing are likely to generate new rural non-farm employment opportunities and raise rural incomes. Increased availability of water and greater efficiency of water use through improved water management and widespread adoption of drip and sprinkler irrigation could enable cultivation of crops over larger area, year round, providing employment in agricultural production and processing, benefiting the rural poor.

It is important to ensure that the ultimate outcome of irrigated agriculture is food security and improved farm incomes.

The four major areas of focus present themselves:

(i) Improved infrastructure
(ii) Crop diversification
(iii) New technologies for productivity
(iv) Market participation

It is, with this back ground, the Irrigated Agriculture Modernization (IAMP) Project is prepared through the convergence of all Line Departments.

1.6 Scope of Project Implementation Plan:

PIP is a dynamic document to be reckoned for Guidance and Implementation mechanism. As the project is extending for 7 years, it should not be rigid and changes will be inevitable owing to the prevalence of different Agro-climate conditions in the State and the possible mind set changes of the farmers in acceptance of the new technologies. However in line with overall objective of the project remaining unaltered, changes in subcomponents can be carried out in field level implementation and design by the respective implementing agencies only in consultation with MDPU. For any significant changes that can negatively affect the implementation of the project World Bank will be consulted through MDPU.

Chapter 2: Project Description

2.1 Project Development Objective

The Project Development Objective (PDO) is to: "*enhance productivity and climate resilience of irrigated agriculture, improve water management and increase market opportunities for farmers and agro-entrepreneurs in selected sub-basin areas of Tamil Nadu.*"

2.2 Key Results Indicators

The key results indicators to assess project outcomes are:

(i) Area provided with improved irrigation and drainage services[1] (resilience, water productivity);
(ii) Increase in agricultural productivity (productivity);
(iii) Increase in areas cultivated by non-paddy crops (diversification and value added);
(iv) Area under climate-resilient technologies and practices (resilience);
(v) Share of selected commodities sold through new marketing channels (increased market opportunities); and
(vi) Total number of project beneficiaries (including number of female beneficiaries).

2.3 Project Beneficiaries

The main project beneficiaries are farmers, water users associations, farmer producer organizations and other entrepreneurs.

2.4 Project Scope and Area

The project will cover rehabilitation of about 4778 tanks in 66 sub basins. The total command area to be covered will be 5, 43,000 hectares. The number of tanks to be covered and command area to be achieved is shown in table 2.1.

Table 2.1: Number of tanks and command areas to be achieved

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total
Number of Tank Systems to be covered	150	200	750	900	1000	1000	800	4800
Command area benefited(ha)	17047	22729	84244	102281	113646	113646	88417	543000

The detailed map showing the sub basins to be covered under the project is given in Attachment 2.1. The list of Project sub basins are given in Attachment 2.2.

2.5 Project Components

The project activities are grouped into three components:

(A) Irrigation and Water Management;
(B) Agriculture Productivity Enhancement, Diversification, Improved livelihoods, Marketing and Value Addition; and
(C) Project Management Support.

The individual components are described in detail below.

Component A: Irrigation and Water Management

The objective of this component is to address irrigation and water management, covering both supply and demand aspects. It consists of four inter-related sub-components: (i) Institutional strengthening and capacity building for water management ;(ii) Irrigation systems modernization; (iii) Participatory irrigation management; and (iv) Convergence for improved service delivery. The support envisaged under the project would cover policy and institutional strengthening.

[1] Reduction in partially irrigated and Gap areas

Component B: Agriculture Productivity Enhancement, Diversification, Improved Livelihoods, Marketing and Value Addition

Component B activities will be spatially linked with investments under Component A for improving productive use of water. Agriculture interventions will form an integral part of sub-basin WRD DPRs for rehabilitation and modernization of tanks and irrigation water delivery systems. Commodity groups of farmers anchored in WUAs will be mobilized and federated as producer association/companies for undertaking commercial activities. These groups will be the focal points for dissemination of improved technologies for increasing crop, horticulture, livestock and fish productivity.

The component consists of 3 sub-components: (i) Agriculture Intensification; (ii) Improving alternative livelihood sources through livestock and inland aquaculture; and (iii) Agriculture Marketing, value-addition and post-harvest management. The implementing agencies are Departments of Agriculture, Horticulture, Agriculture Engineering, Animal Husbandry, Fisheries and Agricultural Marketing, Tamil Nadu Agricultural University (TNAU), Tamil Nadu Fisheries University (TNFU), and Tamil Nadu Veterinary and Animal Sciences University (TANUVAS).

Component C: Project Management Support

The Multi-Disciplinary Project Unit (MDPU) established under the IAMWARMP will serve as the management and coordination unit for the project, with need-based modifications. The MDPU will be coordinating for preparation and catalyzing departments in implementing of respective project budget, sub basin development plans and implementation project supports. The MDPU will provide knowledge support on M&E, social, environmental safeguards, procurement and fiduciary related actions of the departments/implementing agencies involved in the project besides capacity building exercises of the staff of MDPU and organizing orientation trainings to update field officers on various Project issues.

2.6 Project Financing

The project will be financed through Investment Project Financing (IPF) over the period of seven years. The total project cost is expected to be around US$455.75 million, of which the Bank will finance $318.00million (70% of total project cost) through IBRD loan and the GoTN will finance the remaining US$ 136.73 million. An IPF was selected as the lending instrument given that the investment is well-defined and will be implemented over a finite time period. The project will also finance on retroactive basis, ESMF study, rehabilitation and modernization of tanks and other irrigation infrastructure damaged by November/December 2015 floods, project consultancies, MDPU operating cost (including staff) and also other activities associated with agribusiness development for the projects. The Component wise project cost and financing are given in Table 2.2. The detailed cost tables are given in Attachment 2.3

Table 2.2 Component wise Project Cost and Financing (including Physical and Price Contingency)

Project Costs By Components (INR in Crores)					In Million Dollar		
Sl. No.	**Component**	**Outlay**	**IBRD**	**GOTN**	**Outlay**	**IBRD**	**GOTN**
1	**A. Irrigation and Water Management**						
	A1- Inst Strengthening &Capacity Building on Water Management	52.00	36.40	15.60	7.88	5.516	2.364
	A2- Irrigation System Modernization	2165.00	1515.50	649.50	328.03	229.621	98.409
	A3-Participatory Irrigation Management	81.79	57.25	24.54	12.39	8.673	3.717
	A4- Institutionalizing the Convergence (Converged Service Delivery at Grass Root level and ICT on Water Management	30.55	21.39	9.17	4.63	3.241	1.389
	Sub Total of Component A	**2329.34**	**1630.54**	**698.80**	**352.93**	**247.05**	**105.88**
2	**Agriculture Productivity Enhancement, Diversification Improved Livelihoods, Marketing and Value Addition**						
	B1- Agriculture Intensification						
	1. Agriculture	87.91	61.54	26.37	13.32	9.324	3.996
	2.Horticulture	220.46	154.32	66.14	33.40	23.38	10.02
	3.TNAU	88.85	62.20	26.66	13.46	9.422	4.038
	4. AED	15.77	11.04	4.73	2.39	1.673	0.717
	B2- *Improving Alternate Livelihood through Livestock and Inland Fisheries*						
	5. AHD	41.59	29.11	12.48	6.30	4.41	1.89
	6. Fisheries	43.57	30.50	13.07	6.60	4.62	1.98
	B3 Agriculture Marketing, Value addition and Post-Harvest Management						
	7. Agri-Marketing	130.98	91.69	39.29	19.85	13.895	5.955
	Sub Total for Component B	**629.13**	**440.39**	**188.74**	**95.32**	**65.8**	**28.596**
	C. Project Management						
3	MDPU	49.48	34.64	14.84	7.50	5.25	2.25
	Sub Total for Component C	**49.48**	**34.64**	**14.84**	**7.50**	**5.25**	**2.25**
	Total of Components A,B,& C	**3007.95**	**2105.57**	**902.39**	**455.75**	**318.00**	**136.73**

Chapter 3: Component A: Irrigation and Water Management

3.1 Component Objective

The objective of this component is to improve irrigation and water management, covering both supply and demand aspects. It consists of four inter-related sub-components: (i) Institutional strengthening and capacity building for water management; (ii) Irrigation systems modernization; (iii) Participatory irrigation management; and (iv)Convergence for improved service delivery. The support envisaged under the project would cover policy and institutional improvements, capacity building and investments in irrigation infrastructure.

3.2 Sub-component A.1: Institutional Strengthening and Capacity Building of Water Management

This subcomponent aims to assist the GoTN in addressing the need for: (i) integrated water resources planning, decision making and management in a basin context; (ii) enhancing knowledge base and (iii) improving sustainability of water sector assets. This will be achieved by strengthening Water Resources Department (WRD) and related agencies for water resources management, including the State Water Resources Management Agency (SWaRMA), Institute for Water Studies (IWS) and State Ground Water and Surface Water Data Center (SG&SWRDC), this will include technical assistance equipment, services and institutional infra-structure to support data collection and analysis, building a modern knowledge base development of modern ICT enabled knowledge products and services, training, policy analysis and partnerships to support awareness building, institutional synergy and decision support. This will include modernizing Sub basin development planning and scenario analysis to be used in the design, preparation and monitoring of multi sectoral investments under the projects. The activities will build upon the earlier IAMWARMP investments, local and global innovation in ICT and analytical tools and the strong local expertise available to support these aspects. An e-WRD App will be developed to facilitate customized access for technical staff, WUA and public access to relevant data services documents and mapping services that draw upon curated data and real-time information from in-situ monitoring and earth observations. A pilot for monitoring services will be implemented to support improved water resources and irrigated agriculture management.

3.2.1 Strengthening of Water Resources Department (WRD).

The project will enhance technical capabilities of WRD, including the design capabilities and implementation of enterprise information management system (EIMS) within WRD.

This sub-component focuses on institutional strengthening and capacity building of various organizations associated with Water Resources Department (WRD) with a view to strengthen the state's capacity for multi-sectoral planning, development and sustainable management of water resources. The design of this component recognizes the fact that the institutional strengthening and capacity building of any institution is a continuous process, and should be supported to enable the institution to carry out its mandated functions in an efficient and effective manner.

The interventions include: (i) expert consultants, and support staff; (ii) goods and equipment required for labs and technical tools, including hardware and software, and introduction of new technologies; (iii) field activities related to targeted research and studies; (iv) civil works related to up gradation of labs and setting up new labs, renovation of office facilities; (v) conducting field surveys, using remote sensing and GIS techniques; (vi) preparation of technical reports such as basin and sub-basin reports; (vii) trainings/workshops/study tours; (viii) mobility improvement through vehicles; and (ix) incremental operating expenses.

3.2.1 A: O&M by WRD and WUA:

By WRD:

O&M of irrigation infrastructure till the sluice is the responsibility of the WRD while O& M of distribution systems after the sluice is the responsibility of the WUAs. The project will improve the information and analytical tools and capacity for system operation through improved system monitoring, use of forecasting information as supported by the National Hydrology Project and other activities, and tools to enhance decision support as well as improved maintenance, including improved budgeting in the EIMS, timely repair/modernization of systems, and enhanced PIM under Subcomponent A.3 to sustain the service delivery. For the maintenance of the tank system (till the sluice), the GoTN allocates maintenance funds for it. The GoTN has increased the allocation from INR 50 crores to INR 100 crores per year in 2015–2016, which is considered a sufficient amount. The project will support the updating of norms for O&M, improved estimation of O&M real needs with actual allocations, and systems to improve O&M benchmarking under this subcomponent.

The following are the critical items requiring attention of WRD and with the fund available the items may be prioritized and maintenance work can be taken up:

- Top of bund to be kept at designed level
- Longitudinal and Transverse cracks to be treated properly
- Deficient slopes due to wear and tear shall be brought to standards
- Removing wild bushes and dense vegetation in the slopes
- Removing the trees with girth less than 30 cms
- Replacing grass turfs if any damaged
- Removing and replacing the damaged revetments
- Any leakage of water in rear slopes shall be treated well
- Any Sluice found leaky shall be replaced with suitable shutters and made leak proof
- Provide selective lining in downstream of the sluice if is not there
- Providing new measuring device in place of damaged devices
- Any leakage through Caligula / surplus weir to be addressed properly with skin wall if required
- Any defects in the solid aprons shall also be attended to
- Periodical Capacity Building exercises to be given to WUA Members on proper Water management and Maintenance of O.K. Cards etc

By WUA:

A brief guideline for O&M by WUAs is as below:

1. WUAs shall assist the Revenue Department in making assessment of demand for water charges and collection of water charges from its members as per the rates notified by GoTN from time to time
2. Undertake management and O&M works of the tank system from the water charges collected as per the provisions of the TNFMIS Act (2000) covering the following activities with estimation taking the advice of the Competent Authority if needed;:
    I. Desilting (feeder channels, irrigation channels)
    II. Jungle clearance in the tank system
    III. Minor repairs for the embankment of the distributary channel
    IV. Cleaning and oiling of screw gears and gate groves
    V. Emergent breach closing works

3. Mobilize community contribution for the project from among the tank users at the rate agreed during the General body meeting. Contribution in cash will be deposited in the WUA O&M Account for future O&M activities
4. Prepare a Tank Improvement and Management Plan to carry out restoration and revival of the tank system
5. Supervise and actively participate the TNIAMP implementation by signing OK cards
6. Organize WUA members meeting to discuss about distribution of water among all the tank users equitably
7. Create an awareness on economic use of water and promote efficient water use technologies & practices among the tank users
8. Collectively prepare water use and agricultural plans for each irrigation season
9. Arbitrate and resolve any disputes over distribution of water among the tank users
10. Protection of tank system from encroachment
11. Open and operate joint bank account in any Nationalized Bank and maintain regular ledgers
12. Every farmers organization shall extend such co-operation or assistance, as may be required by the competent authority, for carrying out O&M activities.

The project will also assist WRD in pilot-testing the sensor-based big data analytic platform for automated irrigation management and canal automation. The project will adopt an integrated approach to planning and management of water resources for multiple sectors, including incorporation of environmental management practices. To perform this task, relevant ICT-based modern technologies will be studied and if useful piloted to review data pertaining to from amongst basin hydrology, agro-climatic conditions, soil profile characteristics, reservoir levels, inflows into reservoirs, outflows from reservoirs, canal releases, and analyze them for decision-making. The new IOT framework has now made available multiple weather proof sensors based systems and data analysis tools that can help solve the above problems. It is proposed that innovative ICT based tools and canal automation System (SCADA) will be studied for suitability of deployment, and piloted in select locations to test their viability for enhancing efficiency.

3.2.2 Strengthening State Ground and Surface Water Resource Data Centre (SG&SWRDC)

The project will enhance capacity of the State Ground and Surface Water Resource Data Centre in maintaining data base for ground and surface water quantity and quality, the project will support technical interventions hitherto not being proposed in the department under any other program like the assessment of artificial recharge wells constructed under IAMWARM and pilot Runoff models etc. Related to the above activities, the project will finance the requirements of subject matter experts/support staff, goods and equipment; consultancies/studies/trainings; field research, civil works, and incremental operating costs to a limited extent

3.2.3 Strengthening Institute for Water Studies (IWS)

The project will assist IWS and other wings in producing quality project related outputs not restricted to

i). Analyzing meteorological, hydrological, socio economic and surface & ground water data and creation of river basin-wise database
ii). Decision Making (DSS) and design inputs
iii). Assessing present and future sectoral water demand and availability
iv). Preparing river basin master plans
v). applying remote sensing and GIS technologies for water resources planning
vi). Preparing background documents related to state water policies.

3.2.4 Strengthening SWaRMA

To enhance the state water policy objectives through state level institutions for multi-sectoral planning allocation and manage the state's water resources in a river basin framework, the project will support mainstreaming SWaRMA into the regular structure of the GoTN and further strengthen its activities. The project will support SWaRMA to carry out the following key functions (in addition to its broader mandate):(i) advise GoTN on water policies for the state, including resource development, regulation and management in a holistic river basin/sub-basin frame work; (ii) formulate water tariff systems and provide recommendation to the government for implementation; (iii) advise the government on inter-state water issues; (iv) develop and maintain a state water allocation database; (iv) consolidate river basin master plans prepared by IWS ; and (v) appraise and recommend clearance for construction of newly formulated projects in the context of river basin plans, based on the availability of surface water. SWaRMA will be mainstreamed as a regular organization of WRD with assured financing under the state budget, not linked to the life of the project.

3.2.5 Strengthening Tamil Nadu Irrigation Management Training Institute

The project will also support strengthening of Irrigation Management Training Institute(IMTI) based in Tiruchirapalli for organizing needs-based training for staff of WRD, agriculture and related departments, farmers and WUAs in areas of irrigation systems, PIM, crop productivity, crop diversification etc.

Results Indicators for Sub-Components A1

The main results Indicator for sub components A1 are (i) staff training in water resources planning and management, improved service delivery within WRD, allied departments and agencies; and (ii) sub basin development plans jointly prepared, agreed and under implementation by multiple agencies.

3.3 Sub Component A 2: Irrigation System Modernization

3.3.1 Modernization at tank level and in command area

This sub-component will modernize irrigation infrastructures, including tanks, anicuts and irrigation canals. The modernization of irrigation infrastructure will focus on improving the irrigation systems through rehabilitation and modernization of about4,800 tanks, and 477 anicuts and improving water use efficiency at farm level covering about 5,43,000 ha of land in 66 sub-basins out of 127 sub-basins. Activities under this sub-component will be carried out based on individual sub-basin DPRs and development plans specifically developed and tailored to local conditions, and will aim to revive traditional water bodies (tanks) including supply channels improvement, sluice and weir repairs, and bund strengthening by partially borrowing suitable soils from the tank. Rehabilitation of tank systems will be supplemented by on-farm development (OFD) works, that are either part of or outside the state's irrigation systems network (System or Non-system tanks). The aim is to improve irrigation water delivery to farmers to the tail end of the distribution system by empowering WUA farmer members to directly participate in executive the OFD works. The sub-component will finance civil works, equipment, consultancies, training and incremental operational costs associated with modernization of the schemes, and the work will be carried out by WRD, and as required with direct involvements of WUAs.

The expected works will include modernization of control structures (diversion weirs), supply channels, cross-masonry structures, construction of recharge well structures and strengthening and up gradation of tank bunds, installation of flow measurement, up gradation of distribution systems(OFD), and improvements of irrigation and drainage canals, and introduction of modern quality testing devices to determine soil compaction parameters

as well as the modern quality testing devices for meticulously maintaining the specified cover to reinforcement steel in the construction of reinforced concrete structures for the long term durability.

Besides, for environmental water quality monitoring provisions are included.

Under this sub-component, irrigation tanks and structures damaged by floods occurred in November-December 2015in Kancheepuram, Tiruvallore, Cuddalore and Tiruvannamalai districts of Tamil Nadu will be rehabilitated and modernized on a priority basis.

3.3.2 On Farm Development (OFD) Work

The main aim of the OFD works is to improve irrigation water delivery to farmers, to the tail end of the distribution system by empowering WUA farmer members to directly participate in executing works. The works will be carried out either through WRD or by the qualified WUAs under Direct Contracting arrangements. A majority of the work that will be executed by OFD contract is at the entry point, where a WUAs responsibility with in an irrigation system in their command area begins and the WRD jurisdiction ends for operational maintenance of the tank system. Therefore the WRD aims to entrust these works to selected WUA's who volunteer to implement the construction works. WUA's that meet an agreed performance criteria will be selected to participate in this program. The purpose of this activity is to encourage WUAs to take ownership and work in partnership with the WRD to supply irrigation services below the head sluice to farmers in the command area without incurring water losses and to understand the need for regular upgrading and maintenance as well as to increase knowledge of WUA farmers on the amount of water available in seasonal irrigation cycles. These improvements will be combined with WRD's efforts to improve water management, rehabilitation of existing infrastructure, and improvements in O&M practices including timely water distribution in the tank systems.

Eligibility Criteria for Participating WUAs:

WUAs who volunteer to participate and enter into a direct contract with WRD to carry out OFD works are required to meet the following eligibility criteria:

- All WUA operating positions should be filled and all four of the WUA sub-committees should be active and functioning with key office bearers' performing their roles and responsibilities as stipulated in the TNFIMIS act.
- WUA president, Territorial Constituency members and a percentage of the general body members have undergone initial orientation training as well as intensive water management and O&M training.
- A minimum of 50% of the WUA members are contributing membership fees as per the provisions of the TNFMIS act.
- WUA's works and water sub-committees are active in carrying out O&M practices in their command area including WUAs preparing and Implementing Rotational Water supply plan, conducting regular water distribution, participating in joint walk through, preparing asset maintenance budget and collecting membership fees to execute regular asset maintenance activities.
- WUA is conducting regular financial and social audits.

Scope of Work:

The OFD contracts will comprise constructing concrete lining of irrigation channels in a short reach downstream of the irrigation sluice, desilting irrigation channels, construction in concrete of a measuring device of cut-throat flume type, concrete lining of the channel in a short reach beyond the measuring device and in short reaches of the main and off-taking

channels at the off-take locations as well as in the vulnerable reaches restricting the total lined length to about 35 meters.

OFD Direct Monitoring Program:

The Competent Authority will monitor progress of the agreed works of each respective WUA regularly on a designated day at every stage of the work in partnership with the WUA President and Works Sub-Committee Convener. The Competent Authority shall hold a meeting once in a month preferably during the WUA Managing Committee meeting where the WUA President or the designated member of the Works Sub-Committee will submit the latest information including progress report duly counter-signed by the President of the WUA. The regional PIM wing social scientists will also regularly monitor progress of the works including submitting regular monitoring reports to the PIM wing at the E-in-C office. WUA members participating in the program will be given access to ICT tools to both submit feedback on the progress and also raise any grievance or issues directly with the regional PIM wing staff.

Steps to Operationalize OFD Contract:

Step 1: Once TNIAMP WUAs have been elected in the first phase and tank rehabilitation works have been completed upstream of the head sluice, and IMTI in partnership with CEC has completed the initial orientation and intensive O&M and water management trainings of the 800 WUAs, then the PIM wing will carry out a WUA performance assessment of all WUAs in the first phase. Based on the results of the first performance assessment, WUAs will be selected to participate in this program. Only WUAs who meet all of the eligibility criteria will be invited to participate in this program. Step one will be implemented in year 3 or 4 of the TNIAMP, depending on progress made on the rehabilitation works on the tanks and the trainings for the WUAs. Subsequently other phases will follow the same procedure and steps as phase one WUAs.

Step 2: WRD will approach selected WUAs to offer them the opportunity to participate in the activity. WUAs that agree to enter into an agreement with WRD will be signatories to the direct contract to execute the agreed works. The format for a sample WUA contract is given in Attachment 3.1.

Step 3: The respective WRD Competent Authority for the WUAs that have signed direct OFD contracts with the farmers will provide the farmers all of the required documents, technical drawings and specifications of the works to be carried out including providing guidance notes on specific engineering procedures to complete the works.

Step 4: The WUA works sub-committee convener head and committee members will begin by marking the works detailed in the OFD works with the assistance of the competent authorities and conducting a joint survey.

Step 5: The WUA will execute the agreed works as per the specifications detailed in the contract based on the agreed timeline of execution as well as the agreed schedule of payments to the WUA for completing the activities.

Step 6: After completion of the works by the WUA, the WRD Competent Authority will engage in quality checks of the works and ensuring agreed works are completed according to requirements. The WRD will assist the WUA President to prepare bills for making payments for the agreed works and submitting necessary bills to the WRD for reimbursement against the agreed schedule of payments as detailed in the OFD contract.

Step 7: Upon successful submission of bills and satisfactory quality check reports, the WRD will transfer final payments to WUA bank accounts.

Results Indicators for Sub Component A2

The main results indicators for the sub component A2 are: (i) tank irrigation system modernized; (ii) WUAs undertaking OFD works; and (iii) WUAs conducting rotational water supply or other water management practices.

3.4 Sub-Component A3 Participatory Irrigation Management

Building on the achievements of TN IAMWARMP, the project will work with the WUAs to strengthen the decentralized irrigation service delivery by improving farmer's participation in irrigation management focusing on operations, water management and minor maintenance. The project will finance equipment, expert consultants, consultancies, training and operating cost in order to support: (i) Mainstreaming of PIM approach within WRD; and (ii) Establishing new WUAs under TNIAMP and strengthening their capacities.

3.4.1 Intervention 1: Establishing Central and Regional WRD PIM Wings

The main vision and aim of the WRD PIM wing as a permanent division within the WRD is to monitor, manage, and support the development of Water User Associations throughout the state of Tamil Nadu. This wing will lead PIM activities in the state beyond the scope of the project and ensure operational and successful WUAs throughout the state. The PIM wing will be instrumental in coordinating the TNIAMP activities including serving as the nodal with to monitor and report on the implementation progress of all TNIAMP interventions.

Steps for Operationalizing the PIM Wing:

Step 1: Approval of Government Order for establishing the permanent PIM wing at the Engineer-in-Chief office by allocating responsibilities related to PIM to specific staff based on the Figure given in Attachment 3. 2.

Step 2: Development of detailed roles and responsibilities for each staff member in the PIM wing at the E-in-C office and the four regional WRD offices as well as finalizing the Terms of Reference for hiring the contract staff for the PIM wing. The detailed roles and responsibilities of contract staff within PIM wing is given in Attachment 3.3.

Step 3: Recruitment of contract staff for the PIM wing for the duration of the TNIAMP based on detailed Terms of Reference for 2 social development specialists at the E-in-C office, and 4 social development specialist (1 for each of the 4 regional WRD offices). In addition, 6 data entry operators will behired (2 for the E-in-C office and 1 for each of the regional offices). These staff will be hired for a 7 year contract based on an agreed Terms of Reference. The Engineer-in-Chief will assume overall responsibility for ensuring that all recruitment is carried out in a timely and efficient manner. Each of the regional offices, respective Chief Engineers will be responsible for the recruitment for the PIM staff to be hired.

Step 4: Procurement of vehicles, computers and scanners for the PIM wing at the E-in-C office and the 4 regional offices. Procurement rules of the World Bank will be followed and the PIM wing staff will oversee the purchasing and utilization of these items.

Step 5: PIM wing to create a detailed WUA performance and monitoring program to be implemented by the PIM wing staff during the TNIAMP. This program should include key parameters for measuring performance, inclusion of IT/mobile tools for measuring performance, how results will be monitored, timelines, and roles and responsibilities for nodal officer for performance and monitoring.

Step 6: Social Development and Social Safe Guard activities will be carried out periodically during the entire project period.

Step 7: IMTI and CEC to conduct 1 day PIM staff orientation training of new social development specialists and all PIM wing WRD staff at IMTI on their roles and responsibilities, their reporting responsibilities and their Terms of Reference for the PIM activities related to PIM.

Step 8: PIM wing to coordinate 2-day training for all data entry officers on how to use the EIMS platform to enter data on WUA performance assessments, PIM staff reporting, etc.

Step 9 Conduct training of WRD authorities, Competent Authorities, PIM WRD staff who will be a core group of WRD activities who are aware of PIM activities and the TNFMIS Act, etc. In order to conduct the training of the WRD officers, PIM wing should obtain the required Government Order for sanctioning the trainings and providing adequate funding support for the trainings.

Step 10: Hiring of field-level officers for WUA for other TNIAMP related activities. See activity 3 details.

Budget for Intervention 1:

The total cost required for the intervention is Rs.796.80 lakh

3.4.2 Intervention 2: Conducting Election for Existing WUAs & Pilot on Empowering WUAs on Water Management and O&M Practices

Intervention objective:

This activity will focus on conducting elections for WUAs that were formed under the TNIAMWARM project but whose tenures have expired. This activity will also aim to launch a pilot for existing WUAs to undergo intensive training on asset maintenance, operation and management of canals within their command areas. This pilot is important to ensure sustainable WUAs that focus on operation and maintenance of their canals including secondary and tertiary canals as well as incorporating their traditional practices of asset maintenance with new approaches to water management and O&M. This pilot will serve as a model for building the capacity of WUAs to autonomously ensure sustainable operation and maintenance of the irrigation systems below the sluice within their command areas in Government of Tamil Nadu PWD irrigation tanks. These 12 WUAs will eventually be selected and trained to become champions as well as peer trainers of new WUAs that will be formed in the TNIAMP areas.

Steps for Operationalizing Intervention 2:

Step 1: PIM wing staff at the E-in-C to prepare a Government Order (GO) for conducting elections for 2800 WUAs formed under the TNIAMWARM project. The WRD E-in-C is responsible for obtaining the GO from GoTN. The GO will provide administrative sanction will allocate funds for conducting the elections.

Step 2: E-in-C to request regional WRD Chief Engineers to complete preliminary activities and obtain required forms from the WUA Competent Authorities at each of the sub-basin offices of the WRD.

Step 3: Each of the regional WRD offices should be responsible for hiring local field-level support for conducting the elections. The regional PIM staff especially the regional social development specialists and the Assistant Engineers should support the hiring of local staff and monitoring the progress of conducting the elections for 2800 WUAs. 2400 WUAs will be elected in the first and second years of the project and a balance 400 will be elected in the third year.

Step 4: IMTI in partnership with Center of Excellence for Change Management (CEC) to conduct classroom orientation training for newly formed WUA management committee members for 3 days on PIM activities. This will include their roles and responsibilities in the WUA. This will include 1 WUA president and 4 sub-committee members who will attend the training. A total of 2800 WUAs will be provided this orientation training. This will occur over three years as each of the WUA members once they are elected will attend this training in conjunction with the time they get elected.

Step 5: The PIM wing at the E-in-C office should request each of the regional PIM wings to select three high performing WUAs in each of their regions to participate in the water management and O&M pilot. There will be a total of 12 WUAs that will be part of the water management and O&M pilot.

Step 6: Regional PIM wings to conduct a baseline WUA assessment to understand the status of WUA operations and activities of the 12 WUAs that will participate in the pilot. This baseline WUA assessment report will be prepared for each of the 4 regional PIM offices (3 WUAs per region) and shared with the E-in-C office for sharing with GoTN and the World Bank.

Step 7: The 12 selected WUAs will be provided technical training on water management, O&M for three days by IMTI/CEC. On an average 25 WUA members (1 president and All Territorial Committees and sub-committee members) will be selected from the WUA to participate in the training. The target group will be given 2-day classroom and 1-day field training on specific technical aspects related to water distribution, rotational water supply plan, joint transact walk, preparing O&M budget, collecting WUA subscription fees, carrying out maintenance activities on command area. Following the trainings, e-groups will be created using farmer mobile devices and using ICT mobile app for sharing videos for WUAs to learn best practices around water management and operation and maintenance. Subsequently, farmers from the pilot group of WUAs will be utilized to share best practices with farmer members of WUAs in the newly formed WUAs under TNIAMP tank areas.

Step 8: The regional PIM wing social development specialists should conduct WUA performance assessment exercise of the 12 WUAs that participated in the pilot to assess the results of the pilot and determine whether WUAs have improved from the baseline assessment and are now engaging in O&M and water management activities. Specific indicators to conduct this assessment should be developed by the regional and central PIM wing staff.

Step 9: Selection of lead farmers from the 12 WUAs to take on role as champion Peer Trainers for training new WUAs on O and M practices. Also the top 3 best performing WUAs out of the 12 are selected to present awards utilizing funds from the ‘Kudimaramath’ Government Order or other appropriate awards from PIM wing.

Budget for Intervention 2:

The budget requirement for the intervention is Rs. 760.00 lakh

3.4.3 Intervention 3: Formation & Capacity Building of new WUAs in TNIAMP Tanks

Intervention objective:

This intervention will aim to conduct elections to form 3200 new WUAs in the TNIAMP tank areas. This intervention will include capacity building of these 3200 WUAs adopting a new WUA Peer Training Model to build the capacity of these WUAs to conduct water management and take ownership of operation and maintenance of the field channels below the sluice(in the command area). This intervention will also adopt an On-Farm Development contract that will allow the newly formed WUAs to take ownership of lining field channels up to 35 meters from the sluice and for providing measuring devices as part of the On-Farm Development works.

Steps for Operationalizing:

Step 1: PIM wing staff at the E-in-C to get the Government Order (GO) for conducting elections for 3200 WUAs formed under the TNIAMWARM project. The WRD E-in-C is responsible for obtaining the GO from GoTN. The GO will provide administrative sanction that will allocate funds for conducting the elections of new the WUAs. The elections will be conducted in a phased manner. From the second year to the fifth year of the project 800 WUAs will be elected for a total of 3200 WUAs.

Step 2: Hiring of Mobilization and Training Specialists (MTS) and Field Organizers (FOs) to support WRD Competent Authorities in conducting elections for formation and capacity building to WUAs. A total of 160 MTS and 640 FOs will be hired for assisting the four regional PIM wings to elect, form and implement the WUA Peer training model for the 3200 WUAs.

Step 3: Providing capacity building to MTSs and FOs through IMTI and CEC at IMTI on their roles and responsibilities, their reporting responsibilities as per their Terms of Reference for the PIM activities related to PIM in implementing' Peer Model'.

Step 4:-MTSs and FOs to identify one potential 'Peer Trainer' for each WUA based on the stipulated criteria. Additional Peer Trainer farmers from the 12 WUAs that participated in the intensive O&M to be reviewed and also assessed for participated as 'Peer Trainers'.

Step 5 :- Providing capacity building T.O.T training to selected Peer Trainer Farmers through IMTI and CEC at IMTI for providing regular WUA capacity building training to farmers. The Peer Trainers will also undergo intensive water management training including how to teach other farmers about O&M, asset maintenance, water management, fee collection, etc.

The Peer Trainers will provide a number of trainings to WUAs once they have completed their WUA Peer Farmer training program. The details are summarized in Table 3.1.

Table 3.1. Peer Training to WUA

Year	Number of trainings	Trainees
Year 1	24	Peer trainer to WUA President, all Territorial Constituency members, and at least 50% of General Body members
Year 2	12	Peer trainer to WUA President, all TC members, and at least 50% of General Body members
Year 3	12	Peer trainer to WUA President, all TC members, and at least 50% of General Body members
TOTAL	48	

Step 6:- CEC in partnership with IMTI will provide two rounds (2 days + 1 day) of intensive trainings to WUA President and Conveners of 4 Sub-Committees on Water Management particularly on preparation of 'Rotational Water Supply Plan ' and on 'Operation and Maintenance'. In order to continue this training, the Peer Trainers will incorporate this training (including some champion farmers from the 12 WUAs) into their regular WUA trainings. For this operational guidelines will be developed by CEC on O&M practices for WUAs and also on asset maintenance that Peer Trainers can give to farmer members.

Budget for Intervention 3

The budget requirement for carrying out the intervention is Rs. 4452 lakh.

3.4.4 Intervention 4: Reform of TNFMIS Act

Intervention 4 Objective:

The TNFMIS Act has been enacted during 2001 and Rules have been framed during 2002.The WUAs have been formed as per the Act only during 2004.While implementing certain provisions of the Act ,difficulties were experienced which necessitates revisit of the provisions of the Act and to bring in amendments in order to provide more clarity and to suggest appropriate actions .Hence it is proposed to prepare the requisite amendments to make the ACT more clear and incorporate the learning's to get over the shortcomings.

Steps to Operationalize Intervention 4:

Step 1: PIM wing to arrange exposure visits for a core group of officials from the PIM wings to other Indian states which are implementing similar Acts and to collect first-hand information on how they are implementing the Acts in their respective states. A local consultant can be hired from Tamil Nadu or other states to advise the PIM wing on the appropriate amendments to be made in the Act.

Step 2: Arrange for a stakeholder meeting within the four regional PIM wing offices and to obtain feedback from Competent Authorities and other officials of WRD including water users to ensure a collaborative process of implementing reforms.

Step 3: Prepare the detailed amendments based on learning from exposure visits, stakeholder meetings and inputs from WRD officials. Consultant will lead efforts to prepare all new articles to be submitted to the Government for approval and incorporation into the new and revised TNFMIS Act.

Budget for Intervention 4

The total cost for the intervention is Rs. 25 lakh

3.5 Sub Component A 4: Convergence for Improved Service Delivery:

3.5.1 Objective

For efficient and effective service delivery to farmers in the project, interventions of eight participating line departments and agencies will converge not only at the top level, but also at the grassroots level. The departments involved in the water sector need to collaborate for effective service delivery to farmers. Model villages will be established in each sub basin for focusing convergence of 8 Departments on Project Interventions and Other Government schemes in operation for the benefit of the farmers. This convergence for service delivery will be promoted through establishing and strengthening 'Single Window Information and Knowledge Centers' (SWIKCs), and facilitating 'Community Collaborative Water Management (CCWM) at village level'.

3.5.2 Steps to operationalize

Step 1:-Formation of Model Villages:

Identifying and forming the Model Villages through 'Entry Point Activities' taking into consideration the presence of multi -departmental interventions under the project and which requires convergence for effective service delivery to the farmers.

The Model villages are identified and selected in a phased manner (250 Villages/Phase) as and when the new WUAs are formed. The interventions of multiple departments are essential in order to take up 'Community Collaborative Water Management'. For this, the interventions of WRD who are the provider of water and the consumer of water viz., Agricultural Departments' interventions are very much essential. The scope of the agriculture and related departmental interventions vary as per the field conditions of the village. Similarly the livelihood departments including the Animal husbandry and the Fisheries will implement their interventions in these model villages subject to field

conditions. The targeted farmers in these model villages will be the water users of WUAs. The total target of farmers will be the entire water users of 3200 WUAs. Since the formation of WUAs will take place in a phased manner during 2018 to 2021, the interventions of the line departments will be after the formation of WUAs.

Step 2:- Establishment of SWIKC:

In the selected model villages, a place for convergence of officials and the community need to be identified and established which will function as 'Single Window Information and Knowledge Centre (SWIKC).The SWIKC building will be on rental basis and the rent will be paid from the project. The names of the model villages cannot be identified at the first instance, as the identification and selection of model villages are possible only after the 'Entry Level' Activities' have been completed. Similarly the total target numbers of farmers are also based on the number of WUAs (General Body Members)

Step 3:-Implementation of Community Collaborative Water management (CCWM):

CCWM will sensitize the community about the water situation in their local village and enable them to draw up a community level plan for optimum use of water and equitable distribution of water in their villages for all water users. The Competent Authorities (AES/JES) of WRD will be in charge of the above trainings. CEC will provide the requisite skills both for the community and to the WRD.

Steps to Implement CCWM:

Step i: 'Awareness Creation' about Water Resources, the need for optimum use of water in the village, equitable distribution of water and thereby water conservation of water.

Step ii: 'Conducting 'Water walk' with the cross-section of the people in the village with the active participation of all the people to assess the conditions of the water bodies including drinking water distribution system, taking in to their ideas, observations priorities etc., for sensitizing the community on the prevailing situation in the water scenario of the village and to chalk out water management strategies with their involvement

Step iii : Conducting Participatory Rural Appraisal (PRA)

Step iv: Development of Village Vision.

Step v: Water Budgeting- Assessment of water resources available in the village and the demand for various sectoral uses to assess status of the water balance .This is done by the community themselves by demystification of Science.

Step vi: Development of' Decision Supporting System' to suggest various cropping patterns and to assist in decision making by the community in choosing the suitable cropping pattern for the season based on water balance.

Step vii: Implementation of the finalized cropping pattern as the 'Operation Plan for that season.

Step viii: Training of 'Community Change Management Group (CCMG) for the sustainability of the process. CCWM will be implemented in all the model villages.

Step ix: Capacity Building on CCWM, Convergence, Team Building, line departments' interventions based trainings will be given to both officials and the community

Budget

The total budget for the sub component is Rs. 30 Crores. The detailed budget for the study on implementation of CCWM in selected model villages is given in Table. 3.2.

Table 3.2 Budget Details for Implementation of CCWM in Select Model Villages (800 WUAs)

Sl. No.	Description	Quantity	Rate	Amount
1	**Salaries and Wages**			
i)	**Key Professionals** Mobilization and Training Specialists (MTSs)10 Nos @ 1 MTS for 80 WUAs	12 Months	30000 /month	36,00,000
ii)	**Sub Key Professionals** Field Organizers(20 Nos) @ 1 FO for 40 WUAs	12 Months	10,000 /month	24,00,000
	Sub Total			**96,00,000**
II	**Travel Expenses**			
i)	**Key Professionals** Travel Expenses for 10 MTSs @20 days / month = 240 man days	12 Months	5000 /day	6,00,000
ii)	**Sub Key Professionals** **Travel Expenses for Field** Organizers 20nos x 12 month = 240 man months	12 month	2000 /month	4,80,000
	Sub Total			**10,80,000**
III	**Other Costs and Contingencies**			
i)	Designing Base line Questionnaire 5 man days	5 days	5000/Day	**25,000**
ii)	Designing IEC materials	5 days	5000 /day	**25000**
iv	Conducting Base line survey	250 villages	5000 /village	**12,50.000**
v)	Organizing Awareness Programs / villages including logistics, community mobilization, Water Walk, PRA, Water Budgeting, DSS and Operational Plan preparation etc.	250 villages	20,000 /village	**50,00,000**
vi)	Establishment of SWIKC Centers	250 villages	10,000 /village	**25,00,000**
vii)	Wall Painting Charges (Painting of village vision, Water Budgeting),	250 villages	15000 /village	**37,50,000**
viii)	Documentation Charges	250 villages	5000/village	**12,50,000**
ix)	Sundries and unforeseen items	LS		**5,20,000**
	Sub Total			**1,43,20,000**
	Total			**2,50,00,000**
	Grand Total (For 4 Phases)			**10,00,00,000**

For I Phase ,1,25,000; For II Phase 1,25,000; For III Phase; For IV Phase 1,25,000: Totals 5,00,00,000

The job descriptions for Mobilization and Training Specialists and Field Organizers are given in Attachment 3.4.

Results Indicators for Sub-Components A3-A4

The main results Indicator for sub components A3-A4 are: (i) staffing and operationalizing PIM wing in EIC office and regional office; (ii) operational water uses association created; and (iii) number of new WUAs formed and capacity built.

Chapter 4: Component B: Agriculture Productivity Enhancement, Diversification, Livelihoods, Marketing and Value Addition

The component activities converge on spatially linked investments within the command area of irrigation tanks made under Component A for improving productive use of water. Agriculture interventions will be spatially and temporally linked with rehabilitation and modernization of tanks and irrigation water delivery systems.

4.1 Overall Objectives

The interventions of this component are aimed at increasing productivity of key crops, promoting diversification of agriculture production systems, enhancing resilience and improving farmer access to markets in project sub-basins. The project will adopt climate-resilient approaches that promote sustainable use of land and water resources.

The component consists of 3 sub-components: (i) Agricultural intensification and diversification; (ii) Improving alternative livelihood sources through livestock and inland aquaculture; and (iii) Marketing, value-addition and post-harvest management. The implementing agencies are Departments of Agriculture, Agricultural Engineering, Horticulture, Animal Husbandry, Fisheries and Agricultural Marketing, Tamil Nadu Agricultural University (TNAU), Tamil Nadu Fisheries University (TNFU), and Tamil Nadu Veterinary and Animal Sciences University (TANUVAS).

4.2 Subcomponent B.1: Agriculture intensification and diversification

Sustainable intensification and diversification of agriculture production systems will be achieved through a large scale program of awareness creation and on-farm demonstrations on new seeds and promising technologies, capacity building and training activities; and by leveraging private sector investments in water management and farm mechanization. Climate risk resilience will be built into crop and horticulture production systems by:(a) promoting cultivation of short duration, high yielding, drought-, pest- and disease-tolerant crops/varieties of pulses, maize, oilseeds, millets, vegetables and fruits; (b) installation of micro irrigation drip and fertigation systems; and (c) promoting water saving agronomic practices like the system of rice intensification and the sustainable sugarcane initiative. For linking production with market demand, farmers will be supported and trained to grow those crops and commodities for which there is market demand, including shift from paddy to low water requiring crops in which Tamil Nadu is deficient. ICT-based activities like e-Velanmai, Farmer Cropping Advisory, etc. will be introduced and expanded.

4.2.1 Construction of Farm Ponds

Farm ponds are constructed by Agricultural Engineering Department (AED) to harvest rain water from smaller catchments of about 2 to 5 hectares which form the land holding of a single farmer and provide supplemental irrigation at critical stages of crop growth mainly as a “lifesaving irrigation’ to save the crop without wilting. Since the farm pond is constructed in farmer’s land, the conveyance loss is minimized. Under suitable conditions, whenever the water can be stored for more than 4 months, fish culture can be encouraged to get additional income. Among the eight agro climatic zones in Tamil Nadu, Cauvery Delta Zone and North Eastern Zone have high potential for the construction of farm ponds due to mild slope factor of the lands and clay/alluvium soil which holds water for a longer time from seepage and percolation losses. In the remaining zones wherever the soil conditions permit storage of water with less seepage and percolation, the farm ponds have been proposed, viz., Southern, North Western, South & Western Zones. In Hilly and High Rainfall Zones the land area is terraced and is not conducive for constructing farm ponds. The seepage and percolation losses are more in the upper reaches and at valley point there is no

need for ponds as the water is always at surface level. It is proposed to construct 521 farm ponds in the Phase-I and of it 80 percent are proposed in the Cauvery & North Eastern Zones. AED has proposed to execute 2800 farm ponds in TNIAM Project in the total project period.

Selection Criteria:

The beneficiary for the construction of farm pond is selected as per the following criteria based on the land owning farmers with preference to small farmers, who are willing to provide an area of approximately 1000 sq meters for farm pond:

- The farmer should be willing to construct the farm pond as per the technical specifications mentioned in the design.
- The Farmer should be willing to contribute 10 percent of the total cost of Rs.60, 000 per farm pond for general category farmers and 5 percent for SC/ST farmers as labor/material/cash contribution.
- The topography of the land should be such that there is sufficient catchment area for the farm pond to harvest rain water.
- Farm pond will be constructed at the lowest portion of the farmer's land to receive maximum runoff water.
- The soil should be non-porous so that there is not much seepage and percolation losses and thus rain water can be stored for longer days for making use of it during critical stages of the crop period.

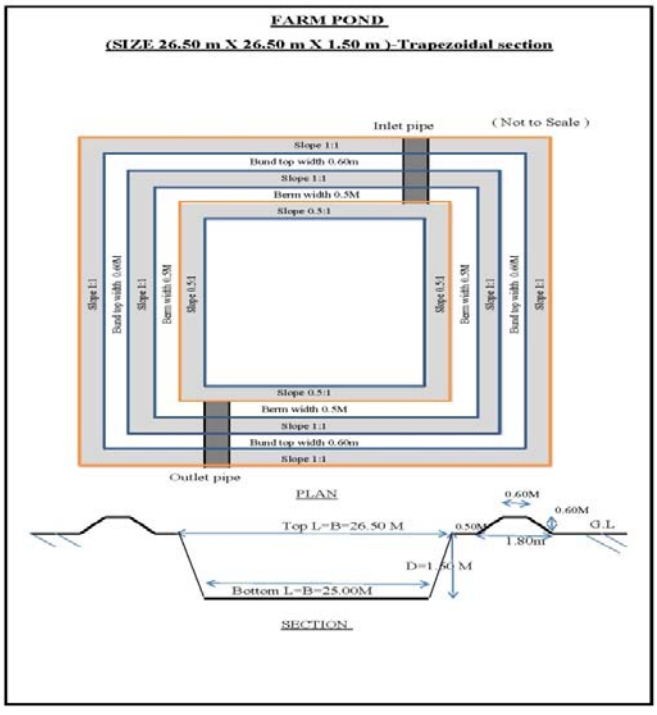
The Executive Engineer (AED) of the district/Nodal Officer of the sub basin will finalize the list of Beneficiaries at the district level/sub basin level.

Design and unit cost:

The average size of the Farm Pond is 26.5 m x 26.5 m x 1.5 m with a capacity to hold about 1000 cubic meters. The average cost for this size works out to Rs.60, 000 per Farm Pond. The size depends on the catchment area and quantity of runoff water in principle. But most important factor is the willingness of the farmer to use his land for the construction of farm pond. Sometimes depth can be increased to accommodate more water storage.

The design of the Farm Pond is depicted in Figure 4.1

Figure 4.1. Design of a Farm Pond



Unit: Rs Lakh

No. of Farm Ponds	Indicative No. of farmers	Total Cost	Project Contribution	Farmer's Contribution
2800	2800	1680.00	1500.00	180.00

4.2.2 On-farm Technology Assessment, Validation and Mainstreaming

As focus is shifted from production centric agriculture led by farm technologies and innovations to the market oriented agriculture because of rapid urbanization, rise in income levels, change in consumer preferences etc., the farm profitability is dictated by markets. Still, 66.14 per cent of the rural households in Tamil Nadu have to depend upon farming as the main livelihood supporting activity. In view of this, the Tamil Nadu Agricultural University (TNAU) formulated interventions will support testing, demonstration and dissemination of promising crop husbandry practices and water management technologies. 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 will look after the spread of technologies demonstrated in all the sub basin areas. The focus will be on how precision farming and improved production technologies could lead to enhanced productivity and production of crops and therefore higher income to farmers as conceptualized in Figure 4.2.

Basin farmers are now have a narrow choice of crops and face both production (due to variable monsoon rains and other factors) risks and price risks. They will be supported to respond to market signals so that when the signals are positive, the farmers should reap better profits and at the time of negative signals, they should minimize the risks. Hence delivering and disseminating market intelligence at appropriate time, especially two months before the sowing of a crop, will help the basin farmers to make informed decisions about growing appropriate crops based on price forecasts for the key crops before the sowing season. TNAU will also share the real time marketing intelligence data generated by Domestic and Export Market Intelligence Centre (DEMIC) with Agriculture, Agricultural Marketing and Horticulture Departments for wider dissemination to farmers in project sub basins.

Figure 4.2 : Linkages among technology, productivity and profitability

Technology demonstrations

The technology demonstrations are aimed at increasing crop productivity through Best Management Practices and Innovations (IPT Demos) covering an area of 37,750 ha. The technologies to be covered in TNAU demonstrations are those which are at an advanced stage of development and require on-farm validation and refinement before mainstreaming through the state extension system.

The number of demonstrations and other interventions, unit costs given in Attachment 2.3 and the following sections are only indicative. These will be appropriately modified during implementation in view of the ground realities, emerging priorities and changes in costs of inputs, implements, etc.

The demonstrations conducted on Farmers Field School (FFS) mode, will follow the integrated crop management approach from land preparation to harvesting of the crop, giving special attention to high payoff interventions. The resultant increased yield in demonstrations encourages the nearby farmers to adopt these improved practices in a wider area. Funds will be provided to cover the material and incidental costs of Improved Production Technology (IPT) crop demonstrations on paddy, pulses, millets, minor millets, supply of critical inputs such as quality certified seeds, hybrid seeds, bio-fertilizers, micro nutrient mixtures and other inputs with additional support to INM, IPM and organic farming techniques and IEC/CB activities, etc.

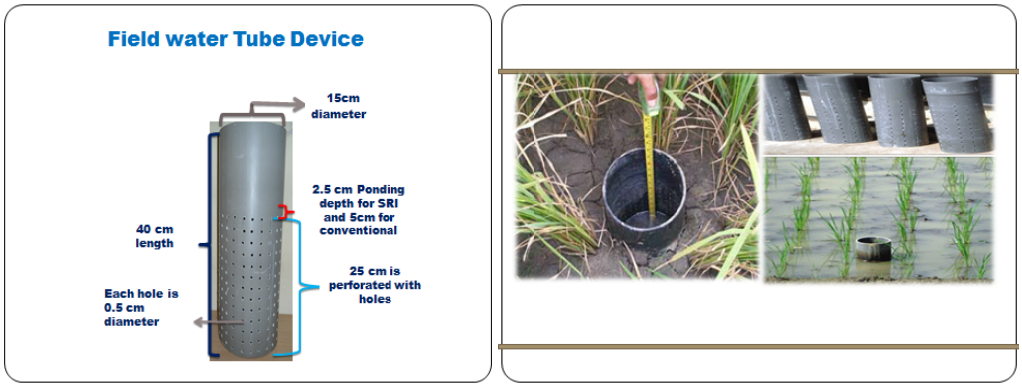
Productivity Enhancement in Paddy

Paddy is the main staple crop grown in all the sub- basins where in there is still scope for improving the productivity as the yield gap varies from 1.2 - 1.6 MT/Ha both in first and second seasons (Samba and Navarai). The TNAU will analyze the constraints in each sub-basin by conducting Improved Production Technology - Paddy Crop Demonstrations (IPT demo 15,000 ha) and suggest suitable interventions.

System of Rice Intensification (SRI): TNAU will analyze the constraints in each sub basin and suggest suitable interventions viz. seeds of improved varieties, supporting transplanting and application of required fertilizer inputs. Seeds are sown non-densely in a seedbed with good soil structure. Each plant has space to grow, and roots can develop easily and will not get entangled with each other. Transplanting young seedlings will be done at the 2 leaf-stage. Seedlings should be replanted quickly and carefully, at a shallow depth of only 1-2 cm deep, ensuring that the roots are not dried out or damaged. The seed of improved varieties are provided to the farmers.

Growing Green Manure Crops: Green manure crops will be grown especially for their organic matter and ability to improve the soil which can dramatically build up poor and exhausted soils and maintain the fertility of better ones. It boosts land's organic matter level. It keeps nutrients from leaching down beyond reach of crops, provides food for soil microbial life, helps legumes fix nitrogen in their root nodules and helps the soil produce good structure and maintain the air-pore spaces essential to good crop health. Green manure is less expensive than animal manure and is practically free of antibiotics and growth hormones. Poor and exhausted soils get rich in nutrients through green manures. Green manure crop will be introduced as pre-season rice crop in areas where water supply is available and soil type is clay in texture.

Reducing Irrigation Water Application: 'intermittent irrigation' or 'Alternate Wetting and Drying' (AWD) will be promoted. The drying period creates aerobic conditions allowing roots to better develop and to enhance the absorption of externally applied nutrients. The WUE will be enhanced by the reduced usage of water. 'Safe AWD' is the new technology developed by TNAU for the areas with reduced water usage. In all the rice growing regions, flooding shall be avoided and the water level beneath the surface may be monitored initially thro' field water tubes installed @ 5 tubes/ha for standardizing the safe AWDI level. Then the frequency of irrigation could be recommended based on the number of days for each region and soil type. This technology will be initially tested in the Cauvery and Southern zone. This will be further up scaled by the Department of Agriculture.



Direct Sowing of Rice (DSR)

Improved production technology on DSR will be implemented as resilient practice in Cauvery delta zone during delayed supply of canal water and shortage of irrigation water.

Rice Fallow Pulses

These are sown as a relay crop before the harvest of paddy. These rice fallow areas offer a huge potential niche for short season pulse crops thus exploiting the residual moisture and nutrients. It enhances the soil fertility status for the next crops due to nitrogen fixation.

Production of Pulses

The focus of pulse production program will be on production of Truth Fully Labeled (TFL)seed (IPT Demos: 2,500 Ha) and expansion of area and raising productivity of pulses (IPT Demos: 5000 Ha.)

In the river basins, pulses are grown next to rice as fallow crops. They are the main source of plant protein for achieving the nutritional security of the rural households and also act as the soil - nutrient enhancer by the way of fixing atmospheric nitrogen. Current yield levels are merely 50 per cent of the potential yield and the state is the net importer of pulses. Poor seed replacement rate, non-availability of quality seeds, uneven and poor plant population, terminal stress and non-availability of mineral nutrition, improper pest management practices, poor post-harvest practices etc., are the major constraints to increase the productivity. The focus of demonstrations will be on addressing these constraints. TNAU will intervene with production and supply of quality seeds under farmer's participatory approach and dissemination of improved production technologies. Keeping this in view TNAU will undertake quality seed production in pulses in sub-basins under farmer's participatory approach. The TFL seeds produced will be appropriately labeled and used to cover 15000 ha in sub-basin areas over 7 years. Under crop diversification, black gram and green gram) will be introduced with proper technology packages, including use of quality seed produced by TNAU.

Formation of pulse commodity groups, FPO and market linkages

Pulse commodity group will be formed which in turn will be federated to FPO (seed to sales) and linked with Agricultural Marketing Department (AMD). In addition processing and branding of pulses will be done in collaboration with AMD for value addition activities. To achieve this, TNAU proposes the value addition of pulses by promoting secondary agricultural practices by cleaning,

grading, branding and labeling. Pulse commodity groups will be formed and federated to Farmers Producing Organization and linked with major pulse handling companies in Tamil Nadu. This activity will be implemented in collaboration with Agricultural Marketing Department.

Promotion of Red gram (Tur Dhal)

The area and productivity of red gram is low in Tamil Nadu and the state is the largest importer of red gram. Cultivation of red gram will be introduced in the vegetable-based cropping systems. The productivity enhancement of red gram under precision farming techniques including IPM approach will be attempted on 1000 Ha through area expansion and by introducing new hybrids/varieties, seedling transplantation, and drip fertigation. This activity will be implemented in North western zone of Tamil Nadu. The split up cost and farmers share details are furnished below.

Unit: Rs in Lakh

Crop	Total Demo Area (in Ha)	Indicative No. of farmers	Drip Materials & installation costs	Project Contribution	Farmers Contribution
Red gram	1000	2470	856.00	642.00	214.00

Demonstrations on Oil Seed Crops

Under oil seeds, demonstration of improved production techniques for groundnut and gingelly will be undertaken to promote crop diversification (IPT Demos: 600 Ha.). These crops will be revived by promoting better crop husbandry practices and by linking the farmers with markets.

Sustainable Sugarcane Initiative (SSI)

Sustainable Sugarcane Initiative (SSI) will be promoted in sub basins under precision farming approach by scaling up SSI through joint venture with the nearby sugar mills. TNAU will act as Knowledge Partner for SSI by Sugar Mills (IPT Demos: 750 Ha.). TNAU will demonstrate SSI by providing young pro tray seedlings, improve water and fertilizer use efficiency with sub surface drip fertigation system and water soluble fertilizers for optimal utilization of nutrients. Although SSI will be up scaled on mission mode in all the sub basins, focused attention will be paid in Northern zone and Western zone.

Unit: Rs in lakh

Crop	Total Demo Area (in Ha)	Indicative No. of farmers	Drip Materials & Installation costs	Project contribution	Farmers contribution
Sugarcane	750	1853	642.00	481.50	160.50

The SSI was successfully demonstrated in TNIAMWARM increasing productivity, improving cane quality and enhancing water use efficiency. Capitalizing on these benefits, the sugar mills in Tamil Nadu promoted SSI in 22500 ha by investing Rs. 18000 lakh in drip fertigation.

Production of vegetable and banana through precision farming

To promote precision farming by adopting of IPM concept, production of vegetables and banana will be undertaken (IPT Demos: 1500 Ha.). The productivity of vegetables and banana and water use efficiency will be increased by adopting drip fertigation in conjunction with improved seeds/seedlings and crop management practices. This technology was successfully implemented by TNAU under TNIAMWARM and will be expanded in all sub basins.

Unit: Rs in lakh

Crop	Total Demo Area (in Ha)	Indicative No. of farmers	Drip Materials & Installation costs	Project contribution	Farmers contribution
Banana	300	988	219.40	164.56	54.85
Vegetables	1200	2964	1200.00	900.00	300.00

Fruits Crop Demonstrations

New technologies in fruit crops will be promoted by demonstrating new technologies like TNAU high density planting with drip fertigation in mango, guava, pomegranate, etc. (IPT Demos: 400 Ha.) Fruit crops are the better choice for the sub basins, wherein crops like mango, guava and pomegranate can be suggested. Interventions like better nursery practices, high density planting, micro irrigation facilities, intercultural operations, optimal mineral nutrition, pruning practices, post-harvest practices, packing and grading, branding, conducting trainings and awareness programs, precision farming, raising pesticide free fruits etc., will be promoted.

Unit: Rs in lakh

Crop	Total Demo Area (in Ha)	Indicative No. of framers	Drip Materials & Installation costs	Project Contribution	Farmers contribution
High density planting	400	988	146.24	109.68	36.56

Monitoring GHG Emissions (Portable GC, Field Glass Chambers and DNDC module)

Agricultural activities are associated with the emission of greenhouse gases, notably methane (CH4) and nitrous oxide (N2O).Methane (CH4) is a major greenhouse gas (GHG). Rice cultivation has been recognized as one of the major anthropogenic source for CH4 emissions. Methane emission from rice fields is a microbe-mediated anaerobic activity, favored by the flooded condition. Owing to its role in food security, rice will continue to play a major role in methane emission and apparently in increasing trend of atmospheric methane concentration. Thus it is necessary to estimate the methane emission from rice fields in the context of a strong inter-relationship between agriculture and climate change. Land-surface temperature is one of the MODIS land products which can be used to determine methane emission from paddy fields using different algorithms. TNAU will estimate GHG emissions from different land use systems in all sub basins. The impact of demonstration technologies on GHG emissions will be assessed using satellite data combined with EX-ACT model spatially. MODIS data will be acquired and analyzed for GHG emissions. At ground level, portable GC will be used to analyze GHGs collected through field glass chambers.

Remote sensing and GIS application for Impact Assessment

The impact on water resources and crop area and diversification will be studied using Remote Sensing and GIS. For effective assessment Synthetic Aperture Radar (SAR) data from Sentinel 1A and RISAT will be utilized along with optical data during the cropping season. Besides, infrastructure rehabilitation and modernization activities in the PWD tanks and interventions by line department viz., Agriculture, Horticulture, etc., will be Geo-tagged. A mobile based application will be developed for monitoring progress of technology

demonstrations and impact in TNIAMP area. During the implementation phase, the following activities will be carried out:

(i) Estimation of water spread area and duration in the PWD tanks using satellite data.
(ii) Assessing the expansion of irrigated area and monitoring the changes in area cropped (Rice) and crop diversification in each tank command area through microwave remote sensing.
(iii) Developing user friendly mobile application to Geo-tag interventions and demonstrations by line departments and host web interface to enable data access, analysis and report preparation.

The main activities to be undertaken under Remote Sensing and GIS are : (i) Satellite data acquisition, analysis and interpretation; (ii) Mobile application development for ground truthing; (iii) Generation of maps and statistics on water spread and crop cover, and their validation; (iv) Geo-tagging the progress of interventions/demonstrations; and(v) Web portal development, management and maintenance.

Crop Diversification in Cauvery Command

In Cauvery Command, growing of rice in the first season (June-September) is uncertain due to delayed release of water. Research results show that growing of maize and sesame as first crop can increase cropping intensity with less water consumption. Hence, crop diversification in Cauvery Command will be attempted by introducing new cropping patterns/promoting hybrid maize production (IPT Demos: 5,000 Ha.). In the Cauvery basins, maize is grown mostly with traditional varieties. Now, it is proposed to shift from traditional varieties to hybrids to increase the yield potential by conducting Improved Production Technology Maize Crop Demonstrations incorporating: (i) Use of high quality, high yielding hybrid seeds;(ii) Crop diversification from paddy to maize to increase water productivity; (iii) Spraying with maize growth promoter (TNAU promoter) - Maize Maxima; and (iv) Adopting the technologies like Integrated Nutrient Management (INM), Integrated Weed Management, Integrated Water Management (IWM)–including the use of drought mitigation substances and Integrated Pest Management (IPM).

Model Bio-Villages

Growing pesticide-free vegetables in sub-basins through climate resilience activity will be undertaken in model bio-villages. National Institute of Plant Health Management (NIPHM) model will be implemented. Farmers will be supported to produce their own bio-pesticides and supply to other farmers (IPT Demos: 5000 ha). The project aims to transfer an elite, novel, low cost and eco-friendly pest management technology like Ecological Engineering, Agro-Eco System analysis (AESA) based Plant Health Management and promote the "On farm Production" techniques for bio-control agents. The bio-control agents are excellent alternatives for chemical pesticides besides being eco-friendly and farmer friendly.

In this regard, the farmer groups/clusters will be supported for production of bio-control agents and bio-pesticide son their farms which can enhance the use of these bio-control agents and promote adoption of Ecological Engineering and AESA-based Plant Health Management, thereby reducing the cost of cultivation, production of residue-free crops, creating eco-friendly environment, and improving economic status of farmers.

Agricultural Implements:

For controlling weeds, farmers will be provided manual Cono weeder and power operated weeder. Mechanical weeding has multiple functions and benefits: incorporation of weeds into the soil, where their nutrients are recycled, superficial tillage improves soil aeration, and root growth is stimulated through some root pruning and soil aeration.

Other activities

TNAU will also implement a set of other activities which include:

(i) Training of farmers and line department staff,

(ii) Studies on development of compact and efficient value chains of selected commodities in project sub-basins,

(iii) Strengthening of e-Velanmai platform for two-way farmer-scientist interaction covering crops, horticulture, livestock and fish production (jointly with TANUVAS and TNFU) and promoting its extensive use by farmers through Departments of Agriculture, Horticulture and Agricultural Marketing. The proposed concept of e-agricultural extension advisory system will address the issue by harnessing the potential of ICT and build an e-agricultural extension advisory system that is transferable to sub basin farmers. The proposed system will involve Krishi Vigyan Kendras (KVKs) of TNAU in the technology transfer process. A user friendly Android App will be developed and loaded onhttp://agritechportal.tnau.ac.in for wider use by farmers in the state.

(iv) Use of remote sensing and GIS application for monitoring pre- and post-project impact, geo-tagging, concurrent monitoring and impact assessment of project interventions at regular intervals.

(v) Assessing carbon balance of TNIAMP, using EX-ACT model developed by Food and Agriculture Organization.

4.2.3 Enhancing Productivity and Climate Resilience of Crop Farming:

The activities aiming at enhancing productivity and climate resilience of cropping systems to be implemented by the Department of Agriculture will include (i) increasing cropping intensity and productivity, (ii) promoting diversification to low water requiring crops, and (iii) promoting use of improved farm implements and tools. The focus will be on providing better livelihood to farmers through improved water delivery for increasing productivity of agriculture. The twin focus will be on agricultural intensification and diversification.

It is proposed to effect shift from high water requiring crop to less water requiring crops like pulses, millets and oil seeds. Moreover, shift is made from productivity and production enhancement agriculture to market-led agriculture. The prospects of diversification to other crops from paddy would be disseminated to farmers for further expansion of area under diversification crops.

The TNIAM Project would lay 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. The Department of Agriculture (DoA) would address all these tasks in co-ordination with Tamil Nadu Agricultural University (TNAU) with the following interventions for the crops grown in 4778 Tanks, 477 Anicuts of 66 river sub- basins (Total registered ayacut 5,43,340 ha) in Tamil Nadu. The Department of Agriculture (DoA) will implement the interventions in 4278 Tanks (Total registered ayacut 4, 86,480 ha) leaving about 500 tanks (Total registered ayacut 56,860 ha) to Tamil Nadu Agricultural University (TNAU) for implementation.

The farmers who are members of Farmers Interest Groups (FIGs) would be organized into Farmers Producer Organizations/Companies by the Department of Agricultural Marketing and Agribusiness as per details in component B.3 Agriculture Marketing. Those farmer members of FPOs would be given priority for demonstrations. The demonstration farmers will be provided with market-led extension packages based on marketing intelligence information provided by the Tamil Nadu Agricultural University through DEMIC on price forecasts before the sowing of crops.

Technology Demonstrations:

Technology demonstrations will be aimed at increasing crop productivity through best management practices and innovations Improved Production Technologies (IPT Demos: 78,000 Ha.). Total area of about 78000 Ha is planned to be covered under demonstrations. Each demo will have an area of about one acre. The total number of demos will be about 1, 90,000. Approximately about 45 demos per tank will be spread over a period of 7 years. The demonstrations conducted on FFS (Farmers Field School) mode, will follow the integrated crop management approach from land preparation to harvesting of the crop, giving special attention to high payoff interventions. Focus will be on dissemination and adoption of improved crop husbandry and irrigation water management technologies for increasing productivity and enhancing diversification to less water requiring and climate resilience enhancing crops (pulses, oilseeds, millets, maize, etc.).

The number of demonstrations and other interventions, unit costs given in Attachment 2.3 and the following tables and sections are only indicative. These will be appropriately modified during implementation in view of the ground realities, emerging priorities and changes in costs of inputs, implements, etc.

Sl. No	IPT Demonstrations	Unit	Unit Cost	Physical Target	Total Finance [Rs. in lakh]
1.	Green Manure crop-SRI-Rice Fallow Pulses[3 crop sequence]	Ha	0.100	40,500	4,050
2.	Maize	Ha	0.050	7,500	375
3.	Ragi	Ha	0.050	1,000	50
4.	Minor Millets	Ha	0.040	10,000	400
5.	Pulses	Ha	0.050	12,500	625
6.	Oilseeds[Groundnut, Gingelly, Sunflower etc.]	Ha	0.050	6,500	325
	Total			**78,000**	**5,825**

Since the average size of demo will be about 1 acre during the project period, the number of demos. is about 1.90 lakh.

Funds will be provided to cover the critical off-farm inputs and other incidental expenses of Improved Production Technology Crop Demonstrations on paddy, pulses, millets, minor millets, including supply of critical inputs such as quality certified seeds, hybrid seeds, bio-fertilizers, micro nutrient mixtures and other inputs with additional support to INM, IPM and organic farming techniques and IEC/CB activities etc. The extra cost on the demonstrations wherever applicable will be borne by the demonstration farmers. The management practices and innovations to be demonstrated are described below.

Selection Criteria for Demonstration Farmer:

- A progressive small or marginal farmer from the community/sub basin would be selected. It would be ensured that he has the capability and resources to follow the instructions provided by the experts in a timely and complete manner.
- He should also be capable of and must agree to disseminate the demonstrated technologies to fellow farmers in the village(s) and the adjoining areas.
- He must provide labor for carrying out all operations for preparation of land, adoption of complete package practices (sowing, fertilizer application, water management, pest and weed management, etc) up to harvesting and marketing of the crop in a timely manner.
- He must use all the inputs provided by the project (like seed, fertilizer, IPM, etc.) for the demonstration plot only, and should neither sell nor divert these on his other land.

- In case of self-pollinated crop demonstrations, he should agree to sell/exchange the seed produced from the demonstration plot to other farmers in the village/adjoining villages on the agreed terms. This may include the prevalent rate in the village plus small additional amount in view of the good quality of the new variety promoted in the demonstration thereby benefitting the fellow farmers.
- He must grow a small control plot by following the farmer's practice in the area. This is required for comparison of results with the improved package of practices followed in the demonstration plot.
- He should preferably be a progressive small or marginal farmer.
- Different farmers will be selected for different demonstrations, ensuring that the project benefits do not go only to a few farmers.
- He must own the land for organizing the demonstration which meets the followings the selection criteria.
- Preference will be given to members of Farmer Producer Organization.

Selection Criteria for demonstration site:

- The plot selected for the demonstration should preferably be on the road side or main path used by villagers and should be easily accessible. This is necessary for organizing trainings and field days at the demonstration site as well as for showing the benefits to the farmers who pass by the demonstration site.
- The soil type of the selected plot should be representative of the area, including head, middle and tail regions of the tank command area.
- The exact area of the demonstration plot should be known and should have boundary bunds.
- The plot should be leveled and should have access to irrigation water.
- The unit area for demonstration will be decided according to the site conditions.

Organizing a Field Day/Farmer Meet:

It would always be kept in mind that an on-farm demonstration is a powerful tool to demonstrate the benefits of improved technologies to the farmers and not an end in itself. The objective would be to use the on-farm demonstrations for disseminating improved technologies to large number of farmers in the tank villages by organizing field days at selected demonstration plots as per following details:

- The field day would be conducted for cluster of demonstrations.
- Preferably, common date for Farmers Meet/Field Days may be fixed by the sub-basin implementing officers, after consulting all the line Department officers, aggregating all the farmers of the tanks for conducting the field days.
- Since seeing is believing, a field day would be organized at the site of demonstration for showing the benefits of adopting the improved technologies to the farmers. This would be done at a stage when marked differences in crop condition and expected yield between the demonstration plot and the control plot are clearly visible. Normally the appropriate time for organizing the field day is shortly before the harvesting of the crop or during the harvest.
- The date of the field day should be decided well in advance and this should be given wide publicity in the tank village (s) and the adjoining villages.
- Traders of the area who procure the demonstration commodity from the farmers should also be invited to the field day.
- Steps would be taken to ensure that large number of farmers attend the field day.

- On the field day the famers would be shown the control and demonstration plots and encouraged to discuss the likely benefits from the demonstrated technologies. A training session would be organized by the project staff to educate the farmers about what has been done in the demonstration plot which is different from the practice normally followed by them; when was it done, how and why; what are the likely benefits; etc. Relevant brochures and handouts should also be distributed to the farmers on the field day. Special attention should be given to educate the farmers about the critical inputs, operations and practices which they would follow to obtain highest productivity levels. In addition to short lectures covering specific aspects by the subject matter specialists, famers would give free time for interaction so that it is more of an interactive session rather than a lecture by an expert.
- Special attention would be given to ask the farmers if they would like to adopt the demonstrated technologies in their farm during the next crop season, where from they can obtain various inputs like seed, fertilizer, plant protection and weed control materials, how they should carry out all the operations at the optimum stage of the crop, wherefrom they would obtain technical guidance, what are the difficulties they are likely to face in procuring the required inputs and adopting the improved practices, and how these can be addressed.
- Since seed is a critical input and acts as a catalyst in the adoption of other practices, in case of self-pollinated crops, facility for exchange of seeds among farmers will be arranged to distribute the seed of the demonstration plot to other farmers in the village/adjoining villages on payment of agreed price.
- The date of crop cutting, which would take place sometime after the field day, should be announced in the field day. The farmers would be invited to come on that day so that they can actually see the increase in productivity as a result of adoption of improved technologies demonstrated in the plot.
- Facility for exchange of seeds among farmers will be arranged.

Guidelines for Organizing and Monitoring Demonstrations:

The criteria for selection of demonstration sites, selection of demonstration farmers, process steps in organizing demonstrations and evaluating success of demonstration are summarized in Attachment 4.1. The cost norms to be followed while conducting demonstrations are summarized in Attachment 4.2.

Productivity Enhancement in Paddy (IPT Demos: 40,500 Ha):

Paddy is the main staple crop grown in all the sub-basins in all the five zones in the project area wherein there is still scope for improving the productivity as the yield gap varies from 1.2 - 1.6 MT / Ha both in first and second seasons (Samba and Navarai). The DoA will analyze the constraints in each sub-basin and plan demonstrations to address these constraints as per details given below:

Introduction of three crops sequence of green manure – SRI paddy – rice fallow pulses:

Green Manures: Growing green manure crops improves soil fertility. Green manure can also help create vital soil in areas with little or no top soil due to water runoff. Green manure crops will be grown before planting SRI paddy.

System of Rice Intensification ensures saving of seed and water as it requires in lesser quantity. Greater root growth due to planting of 3rd primordial young seedlings and wider spacing produce more tillers, more grains and higher yield. There is reduction of cost due to labor saving through the usage of power weeder, fertilizer saving through usage of Leaf Color Chart and lesser pest and disease incidence through IPM practice.

- Rice Fallow Pulses will be sown as a follow up crop after the harvest of paddy using the residual moisture in the proposed cropping sequence. These rice fallow areas offer a huge potential for short season pulses. It enhances the soil fertility status for the next crops due to nitrogen fixation.

In Ramanathapuram, Sivaganga, Pudukkottai and Virudhunagar areas, paddy nursery is grown at different time intervals [staggered nursery] and the seedlings suited to the rainfall time are used as nursery. The remaining seedlings are left in the field. In these direct paddy sown areas, modified SRI will be introduced using seed drills.

Mechanized SRI planting will be encouraged in the labor shortage areas. Usually manually operated Cono weeder and markers are used in SRI Paddy cultivation. They demand manual labor, cover less area and cause shoulder pain. Hence, the power operated weeder will be promoted.

Innovative latest technologies, viz., Integrated Nutrient Management (INM), Integrated Weed Management, Integrated Water Management (IWM) including the use of drought mitigation substances, Integrated Pest Management (IPM) will be promoted in these demonstrations.

Promotion of Hybrid Maize Production (IPT Demos: 7,500 Ha):

In the river basins, maize crop is grown mostly using traditional varieties. It is proposed to shift from traditional varieties to hybrids to increase yield. Since the poultry industry is concentrated in Southern and Western zones and maize is the main poultry feed ingredient; the thrust would be given on maize in these zones. However, it would also be promoted in other zones, wherever possible. The Department of Agriculture and TNAU would discuss with the poultry industry to promote cultivation of those hybrids which are preferred by the poultry industry to ensure good marketing options in co-ordination with Department of Agricultural Marketing and Agribusiness. In these demonstrations the focus will be on the followings:

(i) Use of high quality, high yielding hybrid seeds;
(ii) Crop diversification from paddy during second season especially to maize to increase water productivity;
(iii) Spraying with maize growth promoter (TNAU promoter) - Maize Maxim; and
(iv) Adoption of IPM, Integrated Weed Management, IWM including the use of drought mitigation substances, and IPM, where ever possible.

Stabilizing Area under Ragi and Minor Millets: (IPT Demos on Ragi: 1,000 Ha; and Minor Millets: 10,000 Ha):

(v) The area of cultivation of Minor millets viz. Ragi (Finger Millet), Samai (Little Millet), Varagu (Kodo Millet), Pani Varagu (Proso Millet), Thinai (Fox Tail Millet) and Kuthiraivaali (Barnyard Millet) has come down by 50 per cent in last three decades. The DoA would analyze the constraints in each sub-basin and address these by conducting Improved Production Technology Minor Millets Crop Demonstrations and suggest suitable interventions. The thrust would be given in North Eastern, North Western Southern and Western zones as these are more suitable for these crops. It will also be taken up in Cauvery delta zone to the extent possible. These demonstrations will include:

(i) Use of high quality, high yielding variety seeds;
(ii) Diversification of paddy area to minor millets to increase water productivity and reduce water requirement;
(iii) Large scale demonstrations on minor millets; and
(iv) Use of INM, Integrated Weed Management, IWM, and IPM.

Promotion of Pulses Production: Garden Land Pulses (IPT Demos – 12,500 Ha) and Rice Fallow Pulses (IPT Demos – 40,500 Ha):

In the river basins, pulses are grown next to rice as garden land pulses and rice fallow pulses. In view of the shortage of pulses vis-à-vis demand, special attention will be paid to promote cultivation of these two groups of pulses in the project sub-basins. The pulse production demonstrations will include:

(i) Use of high yielding certified seeds of improved varieties;
(ii) Presoaking of seed for increasing germination;
(iii) Promotion of line sowing for maintaining optimum plant population;
(iv) Balanced fertilizer use including micronutrient mixtures;
(v) Spraying of 2% DAP 25 and 40 days after sowing;
(vi) Promotion of intercropping in groundnut, cotton and maize and also as bund crop;
(vii) Adoption of IWM - including the use of drought mitigation substances and IPM techniques.

Revival of Oilseed Cultivation (IPT Demos: 6,500 Ha):

Oilseeds are the next target group to be given special focus in the river sub basins of Tamil Nadu with special focus on North Eastern, North Western and Southern zones as these are more suitable for oilseed production. However, oilseed production will be taken up in other zones, wherever possible. The following interventions are proposed in oilseeds: (i) Use of high yielding certified seeds of improved varieties/hybrids; (ii) Promotion of rice fallow oilseeds, wherever possible; (iii) Promotion of castor as bund/border crop; (iv) Promotion of line sowing for maintaining optimum plant population; (v) Promotion of intercropping with pulses, where ever feasible; (vi) Application of gypsum in groundnut and manganese sulphate in gingelly and (vii) Adoption of IWM - including the use of drought mitigation substances and IPM.

Farmer Field Schools (4,500 Nos.):

Farmer Field Schools (FFSs) would be operationalized at Block level in sub-basins. These FFS would be set up in the field of outstanding or progressive farmers. “Farm Schools” and “Farm School Trainers” for each sub-basin will be approved by the Nodal Officer. “Facilitators” in the Farm Schools may be from among progressive farmers, extension functionaries or experts belonging to Government or Non-Government Sector. One of the main activities of Farm Schools would be to operationalize Front Line Demonstrations in one or more crops and/or allied sector activities. These demonstrations would focus on Integrated Crop Management including field preparation, seed treatment, IPM, INM, etc. Farm Schools would provide season long technical backstopping/build technical capacity of target farmers by having an interactive session once at least during each of the 6 critical stages in a cropping season. About 50% representation would be given to small and marginal farmers while selecting the trainee farmers. Preference may be given to members of CIGs/FIGs. Trainee farmers would participate in Farm Schools as per specified schedule or as may be necessary. “Facilitators would also visit along with trainee farmers as may be necessary. Knowledge and skills of “Facilitators” would be upgraded on a continuous basis through training at district/state/national level institutions and/or exposure visits, etc. “Trainee farmers” would also have the responsibility of providing extension support to other farmers in the respective village or neighboring villages. Training or exposure visit of about 5 to 6 days of the progressive/achiever farmer is supported under the Farm School as per norms approved in the ATMA Cafeteria. Trainings in Farm School would be flexible and non-lecture based with emphasis on hands-on-experience, observation, analysis and discussions.

IPM–Integrated Pest Management Villages (300 Nos.):

The Objectives to be achieved are (i) To impart training to the farmers groups/clusters for on-farm production of bio-control agents; (ii) To increase the income of farmers group/clusters; (iii) To increase the use of bio-control agents in agriculture and reduce the usage of harmful chemical pesticides; (iv) Production of non-toxic food grains through the adoption of ecosystem based pest and disease management method and ; and (v) To make farmers self-sufficient in management of crop pests and diseases. The activities include:

(i) "On farm production and augmentation of *Trichoderma viride, Trichogramma* sp. and Reduvid bugs" would be taken up by selected Farmers group / clusters;

(ii) The Department of Agriculture officials would be trained at National Institute of Plant Health Management, Hyderabad and their knowledge would be utilized to impart training on this technology for selected farmers groups/clusters;

(iii) Three innovative farmers will be selected from the group for adopting IPM based plant health management, who would be monitored by trained officers by providing them with technical skills and biological pest management inputs;

(iv) Bio-control agents that are being produced under this scheme would be distributed among and within the sub-basins;

(v) Training on "on Farm production of Bio-control agents" by trained Agricultural Officers would be provided to 10-12 selected farmers from each village at the nearest KVKs; and (vi) Another 3 farmers would be selected from the farmer groups to get training on IPM based plant health management and on-farm production of bio-control agents through simple, effective and economical ways at NIPHM, Hyderabad.

INM–Vermi compost (Silpaulin) Units [@ 5 Nos/ Village] in IPM Village (1,500 Nos):

The farmers in the Integrated Pest Management (IPM) villages are to be demonstrated growing green manure crops and also with the production of vermi compost with 5 units/ village, so as to train them in production of organic manures for their own use as well as for other farmers. The preference will be given for women farmers.

Seed Village Program for Pulse, Groundnut and Green Manure Seeds (500 Nos.):

In TNIAM project area special attention is being paid to raise productivity and area of low productivity crops like green manures, pulses and groundnut. The farmers will be motivated to cultivate new and improved varieties of these crops for which sufficient quantity of good quality seeds must be made available. Generally, seed producing farmers would incur 30 per cent to 50 per cent more expenditure compared to production of these crops as grains. Seed growers have to be extra cautious in post-harvest operations like drying cleaning, processing and packaging of seed. These seed farmers have to be supported financially. Hence, a revolving fund is planned to be set up for this purpose.

The farmers will be encouraged to produce the seeds required for their villages on their own especially for pulse, oilseed and green manure crops. Groups will be formed for the production of required seeds for the farmers in the village itself. The group members will be trained in seed village concept and technical aspects of seed production of target crops (Rs.4, 400/group). This will be supplemented by setting up a Revolving Fund for each seed village. The major objective is to increase the seed replacement ratio of pulses and oil seeds crops.

Salient Features of Seed Village:

Each seed village will have 15 - 20 farmers (not exceeding 20 farmers) from one or two (not more than 2) villages in the same crop for organizing 20 Ha of certified (foundation/certified) seed production. All the 15/20 farmers will be raising the same crop and they will form Farmers Interest Groups. Such groups will be either organized new by the

Agriculture Department or may be the existing groups. About 10000 farmers will be trained in seed production technology by way of organizing one day training program.

Selection Criteria:

- The seed village member should be a progressive farmer.
- He should preferably be a small or marginal farmer.
- He should have the capability and resources to follow the instructions provided by the experts.
- He should be willing to share the seeds produced among the fellow farmers in the sub basin/tank.

Revolving Fund:

The production and handling processes are different for seed than that for grain which demands additional financial and technical resources for better seed production. Hence, it is proposed to assist the seed producing farmers with revolving fund to help them come out with good seeds of the target crops. The seed village farmers will be helped to get required funds from the revolving fund for seed production and will be required to replenish the funds after selling of seeds. This process will be continued during the entire project period.

It is proposed that each seed village farmer will deposit Rs. 250/- and a total of Rs. 5000/- will be collected from 20 farmers in each group per year. An account in any nationalized bank will be opened by each seed village group by depositing Rs 5000 in the bank account. Then, on request, the revolving fund of Rs. 50,000/ will be deposited in each group's account from the project fund. The seed farmers have to replenish the fund after selling of seeds. For five years each member farmer will be required to contribute an additional amount of Rs 250 every year. In this way each Seed Village Group will have a corpus of at least Rs 75,000 (Rs 50,000 project contribution and Rs 25,000 farmer members' contribution) after five years. The monitoring of this activity and replenishing of funds every year shall be monitored by the block ADA concerned.

Rs Lakh

Total No. of Seed Villages	Indicative No. of Farmers	Total Revolving Fund	Project Contribution	Farmer Contribution
500	10,000	375.00	250.00	125.00

Moreover, there is provision of Rs.4400/- for training the seed village farmers for every group. TNAU may ensure the priority in the supply of breeder/foundation seeds to the seed village farmers as a special measure. The Seed Certification Department will be involved in certification process. The Tamil Nadu State Seed Development Agency (TANSEDA) of the Department of Agriculture may be requested to procure the seeds produced by the FIGs.

Agricultural Implements (6,300 Nos.):

In the TNIAM project, it is intended to give three types of implements such as the low cost hand operated and power operated sprayers which will help the farmers in cultivation of crops.

Rs Lakh

Sl.No.	Details	Total No.	Indicative No. of Farmers	Total Cost	Project Contribution	Farmer Contribution
1	Hand operated sprayers	2,650	2,650	66.00	33.00	33.00
2	Power operated sprayers	2,650	2,650	158.00	79.00	79.00
	Total	**5,300**	**5,300**	**224.00**	**112.00**	**112.00**

Beneficiary Selection Criteria:

- The beneficiary should be a progressive small or marginal farmer.
- He should be willing to spare the implements for use by fellow farmers.

It is also planned to give high power operated weeder for SRI cultivation to the paddy growing farmers as it reduces labor, covers more area in less time.

Rs **Lakh**

Sl.No.	Details	Total No	Indicative No. of Farmers	Total Cost	Project Contribution	Farmer Contribution
1	Power Operated Weeder for SRI	1,000	1,000	300.00	150.00	150.00

Beneficiary Selection Criteria

A progressive farmer from the community/sub basin will be selected as per following details:

- He should have the capability and resources to follow the instructions provided by the experts.
- He should preferably be a small or marginal farmer.
- He should be capable of properly maintaining the implement at his own cost.
- He should be willing to share the implement with other farmers in the village/tank/sub basin.

Regarding the supply and payment for the implements, the farmer has to pay the contribution amount to the approved firm. The firm on the receipt of the contribution amount will deliver the implements to the farmer. The project fund will then be released to the firm by the project implementing officer at the sub basin level.

Shield Awards for Best Farmers (48 Nos.):

Among the sub-basins for SRI, Maize and Pulses, it is proposed to have one award (1 set of Award includes 1st prize and 2nd price to two Farmers) among the Sub-basin level each year.

Shield Awards for Best Field Officers (18 Nos.):

Among the sub-basins, it is proposed to provide Incentive for Exemplary Extension Work done by the Extension functionaries. It is proposed to have one award (1 set of first position to three Extension Officers) among the Sub-basin level each year.

Communication Training and Capacity Building:

Trainings and capacity building activities will be organized for 96,600 farmers; 78,000 farmers will be trained in the latest crop production technologies and 900 farmers will be involved in exposure visits to other states and countries. About 3,300 Agricultural Laborers will be trained for SRI skills. About 1,980 officers of Department of Agriculture will be trained in crop production technologies, including exposure visits to other states and overseas.

Rs Lakh

Sl. No.	IEC/CB trainings	Unit	Unit Cost	Nos.	Total Cost
1	Trainings for SRI skills to 50 No. of agriculture labourers for 2 days. Total cost: Rs.18,500 x 1 Trainings x 66 sub-basins	Nos.	0.185	66	12.21
2	Farmers training to50 Nos. for 1 day. Total cost: Rs.21,000 x 2 Trainings x 66 sub-basins	Nos.	0.210	132	27.72
3	Extensional personnel training to 30 Nos. for 2 days. Total cost: Rs.27,500 x 1 Training x 66 sub-basins	Nos.	0.275	66	18.15
	Total			**264**	**58.08**

Change Management Trainings (264 Nos. Total Cost: Rs.58.08 Lakh):.

The capacity building and change management training will be given to the Agricultural labourers, farmers and extensional personnel viz., Assistant Director of Agriculture, Agricultural Officers, Deputy Agricultural Officers, Assistant Seed Officers and Assistant Agricultural Officers. These trainings will be imparted by reputed capacity building and change management training organizations.

Agriculture Labourers' Capacity Building Trainings (66 Nos.) for SRI skills:

66 batches, one in each sub basin, of 50 agriculture labourers will be trained at a unit cost of Rs.18,500 each. The trainings will be organized by the CEC trained agriculture resource persons, and the total cost is Rs.12.21 lakh.

Farmers Trainings (132 Nos.):

Batches of 50 farmers each will be trained for one day at a unit cost of Rs.21, 000. The trainings will be imparted by the CEC trained agriculture resource persons and the total cost is.Rs.27.72 lakh.

Agriculture Extension Personnel Trainings (66 Nos.):

Training for batches of 30 Extension Officers for 2 days will be organized at a unit cost of Rs.27,500. The trainings will be imparted by the CEC trained agriculture resource persons and the total cost is.Rs.18.15 lakh.

IEC/CB Activities:

Crop based demonstrations will be organized over an area of 78,000 hectares. These crop demonstrations will be conducted on FFS mode for which village level meetings, seminars and village melas will be organized. Publicity materials like leaflets, pamphlets, posters and banners will be printed and distributed to the sub basin farmers. For these activities an amount of Rs. 507.00Lakh has been earmarked.

4.2.4. Horticulture Development

The horticulture development includes four major interventions (i) Micro irrigation, (ii) Protected cultivation, (iii) Crop demonstrations, and (iv)Trainings. The horticulture interventions will be implemented in about 2100 tanks out of a total of 4778 tanks in 66 sub basins in 30 districts.

Present horticulture scenario in 66 sub basins:

The major horticulture crops grown in 66 sub basins are fruits like banana, mango, guava and pomegranate; vegetables like brinjal, bhendi, tomato, gourds, onion, green chilies, tapioca and watermelon; spices like chilies; and flowers like tuberose. The 66 sub basins are spread over in five agro climatic zones covering 30 districts. Except Cauvery delta zone, all other zones are suitable for most horticultural crops. Vegetables and mango are cultivated only in tail ends in Cauvery delta.

Cultivation of vegetable crops will be taken up in all the five zones. Fruits like mango, guava, pomegranate and banana will be taken up in North Western zone(Krishnagiri, Dharmapuri, Salem, Namakkal and Perambalur Districts),Western zone(Erode, Coimbatore, Karur), and Southernzone(Madurai,Dindigul,Theni,Ramanathapuram,Viruthunagar,Thoothkudi,Tirunelveli and Sivagangai). The spices like dry chilies will be taken up mainly in Southern zone. Flower like tuberose will be taken up in Western and North Western zones.

Enhancing productivity and climate resilience of horticulture crops

The focus of horticulture interventions is on optimizing productivity and diversification of the cropping systems. The project plans to adopt an extensive approach for optimizing productivity of the existing crops by disseminating improved technologies, providing need-based adoption support and piloting cultivation of new crops through market-led extension. The main objective of the programme is to accelerate crop diversification from high water requiring low income crops like paddy and sugarcane to lesser water requiring high profit horticulture crops, especially vegetables and fruits through promotion of high productivity and water conservation technologies.

For laying demonstrations on the farmers' fields the unit cost will be adopted as per the norms in Mission for Integrated Development of Horticulture (MIDH) and Pradhan Mantri Krishi Sinchayee Yojana (PMSKY) which is given in Attachment 4.3

Micro Irrigation for Horticulture Crops

Micro irrigation (MI) will consist of drip irrigation system combined with fertigation equipment. Sprinkler system will be taken up in smaller areas in Ramnad district(Lower Vaigai) under micro irrigation, it is planned to cover 11,069 ha at an outlay of Rs.110.00 Crore covering 28,000 beneficiaries. Per hectare project contribution will be Rs. 1.00 lakh for cost of drip and fertigation materials and equipment for vegetables. The farmers' contribution will be in the form of labor for installing drip and fertigation systems approximately @ Rs.15, 000/ha.

The project support will vary based on spacing of the crops. Since most of the vegetables are grown with the spacing below 1.2 m (4 ft), the project support for one hectare will be @ Rs.1,00,000/ha for marginal/small farmers. For banana, the project assistance will be @ Rs.85, 603/ha. In lower Vaigai sub basin(Ramnad district) for vegetables especially for chilies only sprinkler will be used with the project assistance of 19,542/ha. The actual area covered per farmer will be about one acre although it can vary depending upon various factors like availability and suitability of the land for MI.

Selection criteria for micro irrigation

- Small and marginal farmers will be given preference.
- He/she should have assured irrigation resources through a tube well/well.
- He/she should have power supply through a functional power connection.
- He/she should give an undertaking to adopt the design of drip and fertigation/sprinkler system.
- He/she should give an undertaking to maintain the drip and fertigation/sprinkler system.

The micro irrigation beneficiaries will be selected by the village level Asst. Horticulture Officers and block level Horticulture Officers under the guidance of block level Asst. Director of Horticulture (ADH) and Joint Director of Horticulture (JDH)/Deputy Director of Horticulture (DDH) of the district.

The officer in charge of selection of the beneficiary will get an application from the farmer. The application along with relevant documents and lay out design will be scrutinized by the block Horticulture Officer and Assistant Director of Horticulture.

Issue of Work order

Based on the merit of the individual application, design lay out and other documents, the Joint Director of Horticulture/Deputy Director of Horticulture of the district will issue work order to the concerned Firm approved by TANHODA Government of Tamilnadu. Based on the work order, the Firm will install the micro irrigation/fertigation equipment on the farmer's field.

Verification and certification

On completion of installation of micro irrigation system to the satisfaction of the farmer, a verification team comprising Joint Director of Horticulture/Deputy Director of Horticulture of the district and the concerned Asstt. Engineer (AED) of Agriculture Engineering Department will verify the installation, properly document and certify the same for release of funds to the concerned MI Firm by the concerned Joint Director of Horticulture/Deputy Director of Horticulture of the district.

Rs lakh

Crop	Total Area (Ha)	Indicative Number of Farmers	Type of Micro irrigation	Drip materials and installation cost	Project contribution	Farmer contribution
Vegetables	**10964**	**27740**	**Drip**	**12609**	**10964**	**1645**
Vegetables	**82**	**200**	**Sprinkler**	**16**	**16**	**0**
T.C.Banana	**23**	**60**	**Drip**	**23**	**20**	**3**
Total	**11069**	**28000**		**12648**	**11000**	**1648**

Protected Cultivation of Vegetables and Flowers

Under promotion of climate resilience technologies, construction of poly green houses and mulching technologies will be taken up.

Poly Green Houses:

The poly green house cultivation is more suited to Krishnagiri and Theni districts of Pambar to Krishnagiri and Varahanadhi sub basins. In the polygreen house high value

horticulture crops like capsicum, cucumber and flowers like Dutch rose will be cultivated. Under poly green houses, it is planned to take up 6000 sq.mts. at an outlay of Rs. 28.05 Lakh.

This programme will be implemented in selected sub basins ranging from 500 to 1000 sq.mt area per farmer. The provision covers the cost of erection of poly green house structure including material and labour costs of erection. The approximate cost of erection of 1000 sq.mt will be 10.50 Lakh, of which the project assistance is 4.68 Lakh. The unit cost will be fixed as per the norms in Mission for Integrated Development of Horticulture (MIDH) as followed in the ongoing programs in the Horticulture Department.

Selection criteria

- Small and marginal farmers will be given preference
- The village/location of the poly green house should be well connected with the main/approach road
- He/she should have functional power supply with quality water sources from a tube well/well.

The beneficiaries will be selected by the village level Asst. Horticulture Officer and block level Horticulture Officer under the guidance of block level Asst. Director of Horticulture and Joint Director of Horticulture/Deputy Director of Horticulture of the district. The officer in charge of selection of the beneficiary will get an application from the farmer. The application along with relevant documents and lay out design will be scrutinized by the block Horticulture officer and ADH.

Issue of Work order

Based on the merit of the individual application, layout and other documents, the JDH/DDH of the district will issue work order to the concerned farmer. Based on the work order, the farmer will construct the polygreen house at the proposed site. The unit cost covers the cost of material and construction cost.

Verification and certification

On completion of construction of poly green house by the farmer, the verification team comprising JDH/DDH of the district and the concerned AE of Agriculture Engineering department will verify the construction, duly document and certify the same for release of project funds to the farmer by the concerned JDH/DDH of the district as back ended subsidy.

Rs lakh

Poly green house area (in sq.mts.)	Indicative Number of Farmers	Construction cost	Project contribution	Farmer contribution
6000	**9**	**63**	**28**	**35**

Mulching

Mulching is another component to be taken up in the project under protected cultivation. The provision covers the cost of poly ethylene mulching sheets only. This programme will be implemented in 844 ha of selected sub basins exclusively for vegetable and banana in upper Bhavani at an outlay of Rs. 135 Lakh @ Rs 16000/ha. The labour for installing the sheet and other costs will be borne by the farmer.

Selection criteria

- Small and marginal vegetable/banana growing farmers will be given preference.
- He/she should have an already functional drip irrigation system
- He/she should have power supply through a functional power connection.

The beneficiaries will be selected by the village level Asst. Horticulture Officers and block level Horticulture Officers under the guidance of block level Asst. Director of Horticulture and Joint Director of Horticulture/Deputy Director of Horticulture of the district. The officer in charge of selection of the beneficiary will get an application from the farmer. The application along with relevant documents will be scrutinized by the block Horticulture Officer and ADH.

Laying of Mulch:

Based on the merit of the individual application and other documents, the ADH of the concerned block will scrutinize the application and recommend to the JDH/DDH of the district for approval. After approval, the mulching sheets will be supplied to the beneficiary. The field level officer in charge of this demo will periodically visit the field and guide the farmer technically and also about maintaining the sheets properly.

Rs lakh

Area (Ha)	Indicative Number of farmers	Material cost	Project contribution	Farmer contribution
844	**2000**	**270**	**135**	**135**

Horticulture crop demonstrations

The focus of horticulture crop demonstrations will be on promoting diversification to less water requiring, high income and more market-demand horticulture crops like vegetables, fruits, spices and flowers. The demonstrations will cover an area of 45025 ha at an out lay of Rs. 90.04 Crores. The size of individual demonstrations will vary from 0.2 to 1.0 acre depending upon nature of the crop – about 0.2 acre for flowers, 0.2-0.5 acre for vegetables and up to 1.0 acre for fruits.

Based on the performance of the crop under demonstration and the income of the stakeholder, the farmers nearby will be enthused to take up the crop without expecting any financial assistance from the project. The required technical guidance will be given from sowing to harvest of the crop by the technical staff of DoH.

Process and Implementation:

Each horticulture crop demonstration will be provided with inputs from the project covering improved seeds/quality planting materials, fertilizer and bio pesticides. The demo plots/farmers will be identified by the concerned Horticulture Officers and the Assistant Horticulture Officers of the block. These officers will be responsible for conducting the demonstrations and training of farmers participating in respective demonstrations and review the adoption in their fields through periodic field visits. They will conduct trainings on different aspects at the demonstration area at critical stages of crop.

Selection criteria for demonstration plot/farmer

- Easy accessibility on main/ approach road.
- He/she should have assured irrigation resources through a tube well/well
- Soil type is the representative of the majority of soil type in the village.
- The farmer should be cooperative and willing to adopt the complete package of practices in a timely manner.

The beneficiaries will be selected by the village level Asst. Horticulture Officer and block level Horticulture Officers under the guidance of block level Asst. Director of Horticulture and Joint Director of Horticulture/Deputy Director of Horticulture of the district.

Selected farmers will be provided project inputs like seed, planting material, fertilizers, bio-pesticides etc. well before the planting time.

Supervision by technical team members:

The project plans to utilize the existing departmental technical officers' expertise present in the districts and also by appointing Technical Input Provider (TIP) based on needs for which necessary provisions are made in the cost table. The district/block level members of Horticulture Department will supervise the demonstrations and trainings conducted at village level. The existing members like Assistant Directors/Deputy Directors and Joint Directors of Horticulture Department will be associated in supervision of the field activities. The field level officers in charge of the demo will periodically visit the field and guide the farmer technically so as to get more productivity and income.

The Horticulture Department at State and district level will play an important role in supervision and facilitation of the overall process. At state level the Nodal Officer, Horticulture Project Coordination Unit will monitor and guide the District officers in implementing the demonstration and subsequent documentation and reporting.

The details of crop wise zone wise demonstrations are given below.

Sl.No.	Crop	NEZ	NWZ	WZ	SZ	Delta	Total
I	Vegetables						
a	Brinjal	1500	3500	2850	3150	580	11580
b	Bhendi	2000	3000	3500	4400	1164	14064
c	Tomato	0	3000	2000	972	28	6000
d	G.Chillies	800	1500	1500	1615	385	5800
e	Onion	0	200	500	273	27	1000
f	Tapioca	0	0	409	0	91	500
g	Gourds	450	500	561	800	189	2500
h	Watermelon	1000	200	200	50	106	1556
	Sub Total	5750	11900	11520	11260	2570	43000
II	Fruits						
a	Mango	31	200	200	143	76	650
b	Guava	10	150	163	150	27	500
c	Pomegranate	0	75	50	75	0	200
d	T.C.Banana	0	77	100	300	23	500
	Sub Total	41	502	513	668	126	1850
III	Spices						
a	Dry Chillies	0	25	20	80	0	125
IV	Flower						
a	Tuberose	6	15	10	15	4	50
	Grand Total	5797	12442	12063	12023	2700	45025

Year wise details of demonstrations

Sl. No.	Crop	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Total
I	**Vegetables**	**5500**	**7200**	**7414**	**8600**	**8100**	**6186**	**43000**
II	**Fruits**							
a	Mango	**60**	**110**	**170**	**110**	**110**	**90**	**650**
b	Guava	**60**	**85**	**110**	**85**	**85**	**75**	**500**
c	Pomegranate	**25**	**40**	**45**	**25**	**30**	**35**	**200**
d	T.C.Banana	**75**	**85**	**85**	**90**	**95**	**70**	**500**
a	Dry Chillies	**20**	**20**	**25**	**20**	**20**	**20**	**125**
IV	Flower							
a	Tuberose	**8**	**10**	**8**	**8**	**8**	**8**	**50**
	Grand Total	**5748**	**7550**	**7857**	**8938**	**8448**	**6484**	**45025**

The project support for these demonstrations will include critical on-farm inputs like seed, planting materials, fertilizers, etc. All other expenditures will be incurred by the farmers themselves.

Promotion of reduced pesticide use in vegetable production

This concept is gaining momentum among farming community in recent times. It is proposed to cover 5962 hectares under reduced pesticide use vegetable production in clusters with an outlay of Rs 71.54 Lakh @ Rs.1200/ha. This program will be implemented in 300 IPM villages to be selected in clusters by Department of Agriculture.

Under this program, demonstrations are proposed only for vegetable crops. Village campaigns will be organized in the selected villages to educate the farmers regarding reduced use of pesticides in production of vegetables. Training strategies will be devised and given keeping in view of the farmers need, demand for such vegetables and its market potentials. The cost norms cover the cost of bio pesticides and fungicides only.

Selection criteria

- Vegetable demo farmers will be selected in the 300 IPM villages already selected by Agriculture Department.
- Demonstration plots should preferably be on the road side.
- The farmer should be innovative and keen to adopt the recommended practices.

The beneficiaries will be selected by the village level Asst. Horticulture officers and block level Horticulture Officers under the guidance of block level Asst. Director of Horticulture and Joint Director of Horticulture/Deputy Director of Horticulture of the District. The selected farmers will be supplied the required bio pesticides by DOH.

Rs lakh

Area(in Ha)	Indicative Number of Farmer	Total cost of Bio pesticides	Project contribution	Farmer contribution
5962	**30,000**	**238**	**71**	**166**

The project contribution indicated above is only for the supply of critical inputs. All other expenditures will be incurred by the farmers themselves.

Capacity building training (IEC/CB)

Under this program, the farmers are provided with the capacity building aimed at increasing production and productivity. Village level training to farmers on crop

diversification and laying of demonstrations will be given well before each season. This program covers about 13200 farmers at the cost of Rs.26.40 Lakh regarding dissemination of crop production technologies. Further to enthuse the farmers and to learn the key technologies/practices being followed elsewhere to reap good harvest, exposure visits (inside state/outside State) will be organized in all the 66 sub basins at a cost of Rs.66.00 Lakh.

Selection criteria

- Lead farmers who have actual interest in production of fruit, vegetable and flower crops will be given preference.
- Local farmers who can influence the fellow farmers in the village in adoption of improved practices will be selected.
- The farmers who have basic education and communication skill in the local language will be chosen.

Publicity and propaganda activities including village meetings and exhibitions will be held in all the sub basins to facilitate effective laying of the proposed horticulture demonstrations in time all at the cost of Rs.360.20 Lakh @ Rs.800/ha. The total cost of all activities proposed under IEC/CB is Rs.452.60 Lakh.

Activity wise IEC/CB project cost details Rs. Lakh.

Sl.No.	Activities	Details	Unit cost	Project cost
1.	Village level Training to farmers	13200 No.	0.002	26.40
2.	Exposure visit to farmers and officers within/outside state(66 batch of 50 each)	3300No.	0.020	66.00
3	Publicity	45,025 Ha.	0.008	360.02
	Total	-	-	452.60

4.3. Sub Component B.2: Improving Alternative Livelihood Sources through Livestock and Inland Fisheries

4.3.1 Livestock Interventions

Objectives

Livestock production, in particular dairy sector contributes significantly to the livelihoods and income generation for millions of small and marginal farming communities in the sub basin by way of producing high value products. Additional investments in this sector will provide an opportunity to increase milk production, leading to positive impacts in the overall socio-economic-nutritional status of smallholder farmers in the project sub-basins. The main objective of the livestock component is to improve the production potential of dairy cattle to ensure increased contribution from the livestock to family income and also to safeguard against potential reductions in yield or crop failure due to climate hazards.

Interventions

The interventions proposed are:

1. Farmer extension and technology dissemination programs through farmers' group approach – Dairy Interest Groups (DIG) will be promoted in the sub-basin villages
2. Addressing infertility issues in productive cows and buffaloes
3. Preventive health care and nutrition interventions aimed at improving the survival
4. Fodder development promotion and preservation

5. Strengthening breeding program through strengthening the existing artificial insemination (AI) network and establishing new AI units by placing a locally trained youth
6. Infrastructure strengthening for veterinary and disease surveillance units
7. Linking Government of India Animal identification system program to enable ICT based MIS. Project will supplement this activity by providing Animal cards.
8. Capacity development programs for AHD officers
9. Project documentation and impact assessment

The approach

The project has a focus on formation of Dairy Interest Groups (DIGs) consisting of 25 members of which 30% will be women. Demonstration activities by way of fodder, calf management, mastitis management and infertility management will be conducted utilizing DIGs. This activity is expected to demonstrate better dairy farming practices to large number of farmers resulting in sustained adoption and improvements in milk productivity. Each farmer of the DIG in turn is expected to horizontally disseminate the advantages of better animal husbandry practices to other farmers in their village. The problem analysis indicates a need for breed improvement to bring in change in productivity of animals. The project will thus make efforts to upgrade the local stock to improve the production potential of the livestock population owned in the project area by strengthening the existing the AHD AI centers and also training local youth as AI technicians.

Another important area of attention is the cattle management which needs focused attention. The cattle owners currently practice zero investment animal husbandry and get very low returns. They will be provided an orientation on scope and potential of the dairy farming and will be encouraged to improve the management practices. Orientation of cattle owners on nutrition management and providing encouragement and support in this area will be another important intervention.

The project realizes the need for not only long term sustainability but also resilience of the livestock development efforts. Hence, the veterinarians and livestock inspectors in the project area will be provided necessary infrastructure and will take up breed development by performing artificial insemination with high quality semen at the farmer's door steps. Semen will be sourced by direct contracting with reputed frozen semen center's like M/s.SAG, Mega Semen station, Alamadhi and M/s.BAIF. The Project will support the veterinarians and livestock inspectors with necessary operating cost for the above work. In addition, to ensure timely availability of AI services in the villages itself, local youths will be trained on AI and equipped with AI infrastructures and necessary operating cost for the above work.

Other than breeding coverage, the AHD veterinary institutions functioning at the village, Panchayat, municipality, taluk and district level will be involved in other activities of the project like preventive health cover, disease diagnosis, management and treatment. In addition, their services will also be utilized for training, extension and fodder development activities to farmers and their livestock.

The services of the field veterinary institutions namely the Clinician Centers, Veterinary Hospitals, Veterinary Dispensaries and Veterinary Sub centers functioning in the project area will be efficiently tapped to implement all the animal husbandry inventions of the project. Further for disease surveillance, prevention and control, the services of Animal Disease Intelligence Units and for providing the breeding inputs, the services of Cattle Breeding and Fodder Development Units will be utilized. The project will support to not only strengthen the above centers but will also appropriately fill the gaps in terms of capacity building, logistics and consultancy support.

Dairy Interest Groups

Farmer training, demonstrations, exposure visits, field days and extension program will be implemented through organizing Dairy Interest Groups (DIG) in conjunctions with the activities of Water User Associations. Farmers' Field School approach will be used to demonstrate the new technologies. Sub basins will have 1 to 11 DIGs and each group will consist of 25 members, of which 30% will be women. Organizing the group will follow consultative meetings in each of the group village followed by one day training and one day exposure visit. In year two and three the groups will be followed by one group meeting every year. Besides, continuous interaction will be ensured in DIGs by way of fodder, calf management, mastitis management and infertility management demonstrations. This activity is expected to demonstrate better dairy farming practices to large number of farmers resulting in sustained adoption and improvements in milk productivity. Each farmer of the DIG in turn is expected to horizontally disseminate the advantages of better animal husbandry practices to other farmers in their village. It is expected that at least 100 farmers in total will acquire and adopt improved animal husbandry practices through the project interventions.

Farmer's Interactive Meetings:

Before implementation of the project interventions, Farmer's Interactive Meetings will be conducted at a common place spread over the sub basin. The meetings will help to know the basic needs of the farmers, planning other interventions and identification of Dairy Interest Farmers and other farmers who are in need of various inputs that are to be provided under the project. During the meeting, farmers will be enlightened on the benefits of adopting good dairy farming practices and will be motivated to adopt dairying in an entrepreneurial way. A cost of Rs.1,000/- is earmarked for conducting a meeting and 3 such meetings will be conducted for selection of Dairy Interest Farmers. A total of 25 farmers with a minimum of 30% women participants will be selected and called Dairy Interest Group (DIGs). DIGs will be formally grouped and they will meet regularly and maintain meeting logs. AHD officers will randomly make visits to their groups and discuss on their issues while undertaking other group activities.

Training of Farmers:

Farmers will be provided one day training on better practices in dairy farming, importance of balanced feeding, cultivation of fodder crops, feeding of unconventional feeds, calf and heifer management, diseases generally affecting the livestock, their symptoms and control measures. They will also be enlightened on the importance of breeding, deworming, vaccination, mastitis control and clean milk production.

Exposure Visit

Within one month of the training program, they will be taken to an ***Exposure Visit*** to a progressive and market oriented dairy farm adopting good dairy farming practices. The exposure visit will help the farmers to visualize directly the impacts of better livestock rearing and also interaction at the field level with the progressive farmer in his farm will certainly boast the confidence level of the trainee farmers to adopt the improved techniques.
Training will be provided in the nearest veterinary institution or in a common place provided free of cost in batches of 25. For the **training**, each trainee will be given Rs.100/day towards transport cost from their residence to the place of training; logistic expenses @ Rs.100/day towards working lunch, tea and snacks; training material (note pad, pen and manual) worth Rs.100/-. To motivate the trainer, a trainer honorarium of Rs.250/- per day will be provided. In addition Rs.500/- will be provided for miscellaneous and unforeseen expenditure. Likewise for **exposure visit**, each trainee will be given Rs.100/day towards transport cost from their residence to the place of training and logistic expenses @ Rs.100/day towards

working lunch, tea and snacks. A trainer honorarium of Rs.250/- per day and Rs.10000/- for hiring of vehicle will be provided. A total cost of Rs.8250/- towards training and Rs.15250/- towards exposure visit has been ear marked for training each batch of Dairy Interest Group consisting of 25 farmers.

Follow-up Meeting for Dairy Interest Groups: To review the progress of the Dairy Interest Groups and overcome any hitches faced by the group, frequent interaction with the group by the department is essential This will not only help in accessing the current stage of the group but will also help in binding the group; apart from providing a platform for interaction among them. 2 Follow-up Meetings for Dairy Interest Groups at the rate of one per year during second and third year are indicated to be conducted. A cost of Rs.1,000/- is ear marked per Follow-up Meeting for a Dairy Interest Group consisting of 25 farmers and for 2 such meetings, Rs.2000/- is ear marked. Totally Rs.28500/- is ear marked for one Dairy Interest Group for 3 years.

Demonstrations through Dairy Interest Groups

Calf Management Demonstrations

'Today's calf is tomorrow's cow'. Successful rearing of young calves is the key to the success of dairy farming enterprise. Calves are future replacement stock for the cows. Calf care is not only essential for sustenance of dairy industry but also for preserving and maintaining our good quality germ plasm and ensures early maturity. Farmer's hardly pay attention to the younger female animals and invest very little, which results in delayed age at first calving, non-availability of replacement heifers in sufficient numbers and poor economic returns. To demonstrate the impacts of better calf management, the genetically improved female calves born through AI program will be followed through heifer stage by means of regular deworming and mineral supplementation. Since deworming and growth follow up requires constant monitoring, one of the female members of the DIGs will be trained in regular deworming and growth monitoring of the female calves. Around 75 calves are targeted per year per DIG for five years period under this activity. Important aspects in calf rearing are health and nutrition management. Calf mortality is mostly associated with housing, feeding, management practices, weather conditions, external and internal parasitic infestations and bacterial infections especially those causing septicemia and enteritis. These lead to economic loss to the farmers in terms of higher calf mortality, poor growth rate, delayed maturity and poor productivity. Hence it is proposed to improve the health profile and productive life by better calf to heifer management by demonstration through:

- Periodical deworming
- Distribution of nutrient supplements

Periodical Deworming:

Parasitism in one of the important constraints in better calf rearing in sub-tropics and tropics, where environment provide near perfect conditions for development and survival of parasites. This poses a serious health threat and limitation to calf rearing. They cause direct and indirect impacts. Generally, farmers in the sub basin do not practice the schedule of periodical deworming leading to increased calf mortality and draining of the high genetic potential calf, thereby affecting sustainable dairy development. Hence, periodical deworming will be performed to genetically improved heifer calves in the sub basin by deworming four times a year with oral tablets/bolus as a demo activity. On birth, they will be administered a first dose at the age of 7-10 days, followed by second dose at 30-35 days, third dose at 80-85 days and fourth dose at 200-210 days. For this, a cost of Rs.65/- per animal is earmarked for procurement of deworming medicines required to deworm an animal four times a year. 75 calves per year per DIG will be covered under this activity.

Distribution of nutrient supplements (salt mineral licks):

Generally, farmers in the sub basin depend of crop residues for feeding the calves. These are a poor source of minerals. Further, certain feeds contain anti-metabolites such as oxalates, silicates, phytates, gossypol which further limit the bio-availability of minerals from the gastro-intestinal tract. Hence, mineral supplementation needs to be focused. Vitamins and mineral supplements like Calcium, Phosphorus, Manganese, Magnesium, Zinc, Cobalt and Sodium are crucial in improving the health profile and productive life of the calves born with high merit semen. Calcium and Phosphorus are essential for normal bone development. Manganese is important to improve the fertility. Cobalt is important in ruminants for its part in Vitamin B12 synthesis. Zinc and Magnesium are essential for normal growth. Salt is an essential mineral to maintain appetite, weight gain and milk production. At present, the adoption level of farmers providing vitamins and mineral supplements to their calves is low. Hence, mineral supplements in the form of salt mineral licks to heifer calves born from high yielding cows at a cost of Rs.70/- per lick will be provided. Salt lick will be provided from third month to 18 months at the rate of 1 kg per month. Totally, 7 licks is ear marked per animal at a total cost of Rs.455/- per animal. 75 calves per year per DIG will be covered under this activity.

Mastitis Management Demonstrations

Next to infertility, mastitis is the major issue affecting the economics of dairy animal production. Mastitis is a major management disease that causes serious losses to the dairy industry due to discarded milk, early culling, drug costs, veterinary costs, increased labor and primarily decreased quantity and quality of milk and manufactured products. Clinical mastitis is easy to detect and hence amenable for immediate treatment. Subclinical mastitis on the other hand is an invisible malady, and routine surveillance and monitoring is necessary for its detection. In modern dairy management, subclinical mastitis contributes to 20-25% of the burden of mastitis. While cross breeding programme has increased milk production, the threshold for susceptibility to diseases has possibly increased the incidence of mastitis. Hence it is important that farmers need to be cognizant of this fact and need to perform routine screening of milk samples to device appropriate management practices. This will help in efficient implementation of mastitis control programs to ensure quality milk production; thereby increasing the lactation length and profitability of the farmers. The mastitis incidence in the sub basin is around 30%. The project aims to reduce this incidence to 5% levels by way of implementing mastitis control program. A mix of control measures using teat dips and sub clinical mastitis detection kits along with use of modern traditional medicinal systems will be demonstrated to the farmers that could result in effective control of mastitis, and improving milk quality and reduction of antibiotic residues in milk. In the project the farmers will be enlightened on the above points and lactating animals will be regularly screened. The animals showing sub clinical or clinical mastitis will be treated accordingly. In addition, the farmers who are regularly affected with mastitis and progressive farmers having 2 or more animals will be provided with mastitis prevention kits to control the incidence of mastitis. This demo effect is not only expected to control the incidence of mastitis in their farm but is also expected to spread horizontally to other farmers, thereby improving the quality and quantity of milk produced. 90 animals per year per DIG under prevention kit @ Rs.200/- per animal and 27 animals per year per DIG under treatment kit @ Rs.200/- per animal will be covered under this activity.

Infertility Management Programs

Around 30% of the breedable animals face some kind of infertility or sub fertility which directly affects the milk yield, productive life cycle and number of calves born. The project aims to reduce the level to 15%. The expected reduction in days in inter-calving

period due to correction of infertility problem would be 60 days, which is expected to bring in savings of Rs.3000/- per animal in terms of avoiding feeding during long dry period due to infertility. Under this intervention, special camps (Fertility cum Health Care Camps) and 3 follow up visits will be organized at a cost of Rs.14000/- and focused fertility treatment will be carried out. Every DIG will receive 12 infertility camps in a year. Ten animals will be covered under estrous synchronization per infertility camp to demonstrate the impacts of controlled breeding and also to reduce the calving interval, thereby bringing better economic returns to the farmers and the estimated cost saving is around Rs.3000 per animal.

Special Camps: Prior to camp, publicity will be given regarding the village where the camp is to be conducted and nearby villages. In addition, the day and place where the camp is to be conducted will be displayed in the Water Users Association building and veterinary institution. The services of the veterinarians and para-veterinarians working in the Animal Husbandry Department in the project area will be utilized for conducting the camps. Where ever possible, the services of Cattle Breeding and Fodder Development Unit will be utilized. In these camps, various activities like health care, disease prevention, vaccination against endemic diseases, deworming, castration, pregnancy verification, fertility treatment, etc. will be carried out free of cost. Prime importance will be given in the camps to identify the animals for sub-fertility and follow up treatment. A cost of Rs.10,000/- towards procurement of drugs, medicines, hormones and mineral supplements and Rs.2,000/- towards publicity, propaganda and miscellaneous charges will be provided for each camp.
Improving the fertility in female bovines cannot be solved by merely conducting the camps and providing treatment on a single day. But follow up visits can play a vital role in improving the fertility in bovines thereby improving the overall conception and calving rate. Hence, provision for hiring the vehicle for moving the LN2 containers, drugs, castrator, etc on the day of the camp and for three follow up visits at the rate of Rs.500/- per visit or totally Rs.2,000/- is ear marked. In the follow up visits, a vehicle will be hired and the village where the camp was conducted will be re-visited and necessary follow up treatment will be provided to the animals identified for further follow up during the camp.

Programmed Breeding: Repeat breeding, sub fertility and anestrum are the major stumbling blocks in improving the productive and reproductive potential in bovines and stands as a limiting factor in milk production. These problems could be due to multi-various etiology factors and cannot be pin pointed. The estimated loss due to failure in the economic traits such as inter-calving period, lactation length, lactation yield, service period, number of services per conception, gestation length, etc can be regulated by programmed breeding with hormone substitution. Programmed breeding not only regulates the conception, calving and milk production, but the non-settlers (which have failed to conceive) can also be easily identified and subjected for further treatment thereby creating a fertile and fruitful zone of genetically improved cattle. In the sub basins, Controlled Internal Drug Release (CIDR) containing progesterone will be utilized to increase the conception rate in infertile and sub fertile cows, thereby creating a zone of fertile, high-yielding dairy animals which can play a great role in steady milk production.

The methodology will be as follows:

- Veterinarians will identify animals showing anestrus and repeat breeding during the special camps, animals visiting the veterinary institutions or during visits to perform AI.
- Gross appearance and rectal examination to assess the condition of the genitals will be done.
- Eligible animals will be first dewormed with oral bolus.

- On the same day, one kg of mineral mixture will be provided to the farmer and advised to feed @ 25 Gms per day. The farmer will be advised to feed the animal well with concentrates and green fodder.
- After 22 days, the animal will be re-examined for signs of pregnancy. If pregnant, the animal will be removed from the program. If not pregnant, the cyclical status especially ovarian status will be assessed and the animal will be selected. Likewise for each special camp, 10 animals will be selected for programmed breeding.
- Then the selected animal will be subjected to programmed breeding as per the following schedule:

1. **Day 0:** Controlled Internal Drug Release [CIDR] device will be inserted intra-vaginally. Farmer will be again given one kg of mineral mixture and advised to feed @ 25 gms per day. Also will be advised to feed the animal well with concentrates and green fodder and bring the animal back on 8th day.
2. **Day 8:** Inj. Prostaglandin F2α -Inj. Cloprostenol will be administered to the animal inserted CIDR and advised to bring the animal next day.
3. **Day 9:** CIDR will be removed and advised to bring the animal back after 2 days.
4. **Day 11:** Animal will be examined and observations regarding uterine tone and heat signs recorded. Animals will be artificially inseminated and advised to bring the animal next day.
5. **Day 12:** Repeat artificial insemination will be performed and advised to bring the animal if the animal exhibits signs of estrum or will be advised to bring after 3 months.
6. **Day 30-37:** If the farmer brings the animal saying that the animal is showing signs of estrum, artificial insemination will be performed.
7. **Day 90-120:** If the farmer brings the animal after 3 months, the animal will be examined for pregnancy status.

A cost of Rs.1450/- per animal that includes Rs.1185/- towards the procurement of de-wormers, mineral mixture, hormones and CIDR; Rs.200/- towards hiring of vehicle for 5 visits and Rs.65/- towards miscellaneous cost is earmarked.

Fodder cultivation Demonstrations

Fodder deficit in the sub basin villages is to the tune of 30-40%. The shortfall need to be addressed by increasing the fodder bio mass by providing improved varieties and technology dissemination through Dairy Interest Groups. For every DIG, AHD proposes to undertake fodder development in 15 ha with a combination of seasonal and annual fodder crops. Tree fodder cultivation will be demonstrated in about 0.4 ha per group. Efforts will be made to demonstrate the importance of fodder conservation by exposing them to practices adopted by nearby progressive farmers in the village. To fill the short fall, there is a need to invest heavily in this activity, but the TNIAMP fodder demonstrations are expected to act as a stimulating factor to adopt extensive fodder development initiatives of the Government. TNIAMP fodder initiatives are expected to reduce the fodder gap by around 2% in the project villages.

Distribution of fodder slips and seeds: In the sub basins, one of the major difficulties noticed in non-propagation of the practice of fodder cultivation with the farmers is non-availability of the fodder seeds and slips at the farmer's door steps. Farmers are reluctant to transport fodder seeds and slips from distances considering the man hours lost and non-availability of quality inputs. Hence, to propagate fodder development, fodder seeds and slips will be supplied free of cost to the farmers at their door steps or nearest to their door steps. In addition, propagation in cultivation of tree fodder like Agathi (Sesbania), etc. not only in the

farmers land but also in the bunds and gap areas available near the house of the farmers will be explored. These farmers will act as demo farmers for other farmers to take up this activity.

The types of fodder planned for distribution is as follows:

Sl. No.	Type of fodder	Quantity required per hectare	Average Yield per hectare per year (In tons)	Financial cost for inputs per hectare (In Rs.)	Financial cost for transport per hectare (In Rs.)	Total cost per hectare (In Rs.)
1	2	3	4	5	6	5+6 = 7
1	Co3 / Co4 / Co5 slips	40,000 slips	250	20,000	4,000	24,000
2	Fodder cholam	40 kg seeds	40	2,500	100	2,600
3	Fodder maize	40 kg seeds	40	2,400	100	2,500
4	Hedge Lucerne	10 kg seeds	125	5,500	100	5,600
5	Cow pea	35 kg seeds	30	3,900	100	4,000
6	Agathi	10 kg seeds	35	4,000	100	4,100

Strengthening mobile Artificial Insemination network

Training of local youth as AI technician and equipping them with mobile AI infrastructure:

To ensure timely availability of AI services in the villages itself, AHD is planning to select and train the local youth and equip him or her with AI infrastructures. These centers will function under the control of respective AHD veterinary institution. AI inputs such as frozen semen will be procured and given to the AI technicians while liquid nitrogen will be made available by AHD as practiced for **"MAITRI"**(AI workers supported by Tamilnadu Livestock Development Agency (TNLDA)). The cost incurred for the supply of liquid nitrogen to these AI technicians will be met from project funds. Mobility costs for performing AI, pregnancy and calf born verification will be provided from the project. Further, they will be permitted to collect a maximum of Rs.50/- as insemination charges or at rates fixed by the Government from time to time from the farmer. The local youth will be selected from the group villages and he/she will continue to stay and provide the service throughout.

Strengthening Existing AHD AI Centre:

Animal Husbandry Department has 800 AI centers in the sub-basin villages which are mainly stationary centers. Farmers have to bring the animal to the institutions to carry out the artificial insemination and they find great difficulties in souring the man power to bring the animals for artificial insemination. Further, in some areas farmers have to bring the animals from long distances. All the above factors have a negative effect on the success of AI program and farmers prefer to have their animals inseminated at their door steps as this not only saves their man hours but also increases the success rate. On technical ground, timing of AI contributes greatly to the success. To circumvent the issues of mobility and round the clock AI services, AHD is planning to convert the existing 800 AI centers into mobile AI centers by providing mobile AI infrastructures (AI gun, mobile 1.5 liters liquid nitrogen containers, semen straws, AI accessories), mobility charges to meet the mobility costs and capacity building for the existing staff on good AI techniques. The input requirement such as liquid nitrogen will be made available through regular AHD supply.

Infrastructure: Infrastructures are AI guns, 1.5 liter LN2 containers and thawing flasks. Three 304 grade clip type artificial insemination guns per institution will be procured

at a rate of Rs.3,000/- per gun. For carrying out artificial insemination at the farmers' door steps, 1.5 liter LN2 containers, thermal strips and thawing flask will be provided to the stationery centers that are to be made stationary cum mobile at the rate of Rs.10,000/- each under the project.

Breeding Inputs: Breeding inputs required are frozen semen straws, LN2, disposable gloves and miscellaneous cost for the transport of frozen semen straws and LN2. A cost of Rs.15/- is ear marked for procurement per frozen semen straw. The LN2 generally procured for the regular department activity would be utilized for the project work and no separate procurement of LN2 will be made under the project. However, a cost of Rs.3/- per frozen semen straw is ear marked to the Cattle Breeding and Fodder Development Units towards transport / handling of frozen semen straws and LN2 to the AI centers.

Mobility charges: In the project area, publicity and propaganda will be carried out that AI services will be available at the farmers' door steps at rates fixed by the Government from time to time. The contact numbers of veterinarians and para-veterinarians will be given to the Water User's Association, local representatives, etc. On call, the veterinarian or para-veterinarian in whose jurisdiction the area falls will carry out the artificial insemination at the farmers' door steps. He will be permitted to collect a maximum of Rs.50/- as professional charges or at rates fixed by the Government from time to time from the farmer. Though most of the farmers will not pay the above charge for the service rendered, it will help in avoiding unnecessary calls from the farmers as most of the farmers will call unnecessarily if the artificial insemination is carried out free of cost at their door step. As the veterinarian / para-veterinarian has to make his own convenience for performing the artificial insemination at the farmer's door steps, he will be provided mobility charges @ Rs.20/- per artificial insemination; Rs.20/- per pregnancy verification and Rs.20/- per calf born verification from the project.

Presently AI coverage in the sub-basin villages is around 45-50% of the breedable population, and this project aims to improve the AI coverage by an additional 15%. Over a period of five years, TNIAMP will perform an additional 1.1 million AI in 66 sub basins.

Piloting of Sexed Semen:

Disposal of male calves born out of crossbred population is of limited use for agricultural operations and the religious taboos and ban on cattle slaughter poses hurdles in disposal of crossbred male calves. In addition, the growing dairy sector demands availability of replacement heifers on faster stride. To circumvent these issues, the project aims to pilot use of sexed semen which can assure production of 90% female calves against the conventional ratio of 50%. 2000 sexed semen doses will be piloted in select AHD institutions having high grade HF and Jersey cow population. Only one AI per animal will be taken up. If the animal does not settle with first AI, the second AI will be done with regular semen. In this way piloting will be carried out in 2000 animals. To enhance fertility, GnRH will be administered at the time of AI. Based on the success rate of sexed semen, the project will consider expanding in the subsequent phases. Cost of one sexed semen dose along with GnRH is ear marked at Rs. 1500/- per AI.

Establishing animal identification system by provision of animal card

Identification of the animal is necessary to document the project interventions and to implement an effective breeding and preventive animal health care interventions. GOI and GOTN is planning to implement a comprehensive animal identification system and to create a nationwide digital data base. TNIAMP will link this initiatives of the Government for identifying the animals, and for project monitoring purpose will provide individual animal cards for the animals in which AI has been performed, fertility treatment provided, heifer

management activities, etc., It will record comprehensive details like species, breed, age, milking status, pregnancy and calving status as well as owner's profile like name, village, veterinary institution, block, district and sub basin. For each card, a cost of Rs.5/- is earmarked.

Improving the delivery of veterinary services through strengthening essential infrastructure in the veterinary institutions and diagnostic centers

Strengthening of Field Veterinary Institutions

Well-equipped infrastructure is the key to provide quality veterinary services and breeding coverage to the livestock in the sub basin. Equipment like sterilizer, refrigerator, castrator, microscope, milk teat instruments and needle destroyer are essential to carry out the routine functions of the veterinary institution in an efficient, hygienic and environment friendly way. At present some of the veterinary institutions in the sub basin do not have the above equipment or may not be in working condition. The equipment may be beyond repair and needs replacement. Hence, essential infrastructure like sterilizer, refrigerator, castrator, microscope, milk teat instruments and needle destroyer will be provided to institutions functioning in the sub basin which do not have it / or not in working condition at present. 400 such veterinary institutions located in the project area will be assisted with strengthening activity at the rate of Rs. 45,000 per veterinary institution.

Strengthening of Animal Disease Intelligence Units (ADIU)

Diagnosing the problems and diseases at an early stage will go a long way in not only improving the health status of livestock in the sub basin but will also help to sustain the animal productivity, thereby improving the profitability through livestock rearing. At present, various readymade kits are available to detect not only multi-various diseases but also to assess the health status of the animal at pre-clinical stage itself. Hence for early and accurate diagnosis, various diagnostic kits at a cost of Rs.50,000/- per year will be made available to the veterinary institutions and diagnostic centers providing services in the sub basin. In addition, high resolution microscope facilities at a cost of Rs.55,000/- is ear marked to each of the ADIU in project area. 19 ADIUs will be assisted with this activity. 4 ADIUs will be assisted with new establishment with provision of diagnostic equipment like laminar flow, vertical autoclave and bacteriological incubator at a cost of Rs.1,25,000 each.

Data Capture on Project Interventions at Field Level

To assess the success or failure of the project interventions carried out under the Project, it is essential to properly and systemically document all the activities carried out under the project. For proper data capture, it is imperative to provide the necessary hard and soft ware. At present the facilities available at the sub basin Nodal offices (Regional Joint Director's office) and implementing offices (Divisional Deputy Director's office) for data capture is low. More over reports will be called regularly by the Collectorate, Government, WRO, MDPU and AHD Headquarters. Hence, there is a need to strengthen these offices. To enhance the efficiency of MIS, Rs.70000/- has been ear marked per sub basin Nodal office (Regional Joint Director's office) and Implementing offices (Divisional Deputy Director's office) to provide computer facility with printers and 100 offices will be supported in the project area.

Documentation of the Project Activities

For routine documentation of the project activities at the veterinary institution level, Rs.500/- per institution will be provided for printing of health card, fodder distribution register, fertility camp register, follow-up visit register, artificial insemination register, etc.

Like wise to maintain records, duplicate vouchers and to carry out miscellaneous and unforeseen expenditure, Rs.700/- per institution will be provided. 800 institutions will be supported in the project area.

To conduct impact studies on project interventions at the field level, impact studies will be carried out on milk production through appropriate sampling and validated methodologies. For the above purpose, veterinarians / para-veterinarians and farmers will be involved. Suitable Proforma and guidelines will be developed in consultation with the World Bank. The selected veterinarians / para-veterinarians will be provided training on capturing the data at the field level. Each veterinarian / para-veterinarian will randomly select 10 farmers in their jurisdiction and they will enlighten the farmers on the methodology to be adopted for recording the data and provided suitable formats for recording. The farmer will record the needed data once in a month on a specified date for a minimum of 5 months. The veterinarian / para-veterinarian will make periodical visit to the farmer to assist the farmer in recording the data. After recording the data, the data will be compiled, evaluated and outputs assessed. The veterinarian / para-veterinarian has to make a minimum of 7 visits per farmer and a cost of Rs.140/- is ear marked per veterinarian / para-veterinarian to make 7 visits per farmer. The farmers to provide the data, they will be provided a onetime lump sum incentive of Rs.100/- per individual after successful completion of the data collection. In addition, Rs.100/- per veterinarian / para-veterinarian towards data entry at field level and Rs.60/- towards data compilation at HO level has been ear marked.

Capacity Building for Animal Husbandry Department Officers

Orientation Training on Implementation of the Project:

Two days orientation training to veterinarians, para-veterinarians and staff working in the sub basin during the afternoon without disturbing the day to day activities of the veterinary institution will be provided at a cost of Rs.400/- per institution to 800 institutions.

Training to Veterinarians on technical areas:

Veterinarians in the sub-basin will be given training on various technical aspects like animal feeding, breeding, fertility, animal health, food safety and traditional systems like ethno-veterinary practices. In addition, they will be permitted to attend important seminars/conferences/workshops conducted on the above technical areas across the country A cost Rs.15,000/- is ear marked per individual for 400 veterinarians.

Training to Veterinarians on Disease Diagnosis:

Veterinarians will be given training on morphological, histopathological and molecular diagnosis of prevailing, emerging and re-emerging diseases of livestock in various collages / institutes across the country. In addition, they will be permitted to attend important seminars/conferences/workshops conducted on disease diagnosis across the country. A cost Rs.10,000/- is ear marked per individual for 100 veterinarians.

International Training / Exposure Visit:

With the gaining in importance of emergent trans-boundary diseases, it is the need of the hour to have a direct on-field exposure to countries where not only animal husbandry activities are progressive but also where good disease containment are enforced and where animal productivity has been enhanced by carrying out simple corrections and techniques. Developed countries also implement advanced and sustainable breeding programs which may provide ample opportunities for replication. Therefore, on-field visit to these areas will help to directly experience and learn the techniques. Also, this will be of great help in extending

the platform for bringing in the desired adoptable technologies to our state, which may pave way for climate resilient and sustainable animal production. A cost Rs.5/- Lakh per official is ear marked for sending 10 officials to other countries for international training / exposure visit.

Activities at Project Coordination Unit at AHD office Head quarters - Establishment and Operation of Project Cell at Head Office

A Project Cell in the Animal Husbandry Department Headquarters will be established and operated for the entire project period for smooth implementation of the project. This cell will act as a liaising between the Department, Government, World Bank and Project Office. Further, this cell will liaise with the Nodal Offices (Regional Joint Director) and Implementing Offices (Deputy Director) and help them in preparation of the Sub basin development plan activities. This cell will supervise and monitor the field activities and will be involved in sub basin wise fund distribution and monitoring the expenditure.

For effective functioning of the Cell, it will be equipped with necessary infrastructure like computers, printers and peripherals, laptop, UPS, basic furniture, Almira, DSLR camera and color printer cum copier cum scanner. For connectivity, the cell will be provided with cell phones and data card for net accessibility. Also, provision will be made under contingencies for stationeries, miscellaneous and unforeseen expenditure. Hiring charges for hiring vehicle for carrying out routine field visit to the sub basins and a motor bike for mobility of the Project Cell staff to MDPU, Government, etc. will be provided. In addition, 2 staffs one for physical monitoring and reporting to WB/MDPU and other for procurement will be provided at a cost of Rs.20,000/- per staff per month. Totally, Rs.53.95/- lakh is earmarked at present and further assistance will be provided from the project in the implementation years on justification and approval of the World Bank.

Role of DAH

It is planned to take up the project interventions in collaboration with the DAH. The primary role under the collaborative arrangement will be on integrating the animal health services in project area with a result oriented approach. Concerned district level Joint/Deputy Directors of Animal Husbandry will work on livestock development sub-component in the project area where tank rehabilitation is to be taken up. The list of villages falling under the command area of the tank / ayacut will be provided by the concerned official of PWD. A district plan in collaboration within the district officials and consolidated to the Sub basin development plan will be prepared. The support of material inputs, technical backup, training will be included as part of the proposal.

Monitoring and evaluation will be done as part of the project monitoring and learning proposed under the project. In addition, the concerned JD / DAH will undertake periodic reviews of physical and financial progress achieved. Need based support will also be provided for training and capacity building of field and supervisory staff of Department of Animal Husbandry.

TANUVAS

TANUVAS will undertake programs for sensitizing farmers On **"NUTRITIONAL SUPPLEMENTAL STRATEGY" DEVELOPED AT TANUVAS TO INCREASE PRODUCTIVITY IN DAIRY CATTLE AND MITIGATE METHANE EMISSION**"

Objectives

a. Demonstrating the impacts of critical nutrient supplementation to dairy cattle to increase milk production and mitigate methane production

b. Establishment of mineralized salt lick production units using TANUVAS technology for Dairy Interest Groups
c. Popularizing the technology for adoption.

Planning and implementation Structure

- The Vice chancellor (TANUVAS) shall delegate sanction to the officers for the implementation of the Project at TANUVAS.
- Director of Research (TANUVAS) shall be the Nodal officer in coordinating with nodal officer identified by Animal Husbandry department and MDPU for implementation of the project.
- Principal investigator (Professor, Institute of Animal Nutrition (IAN), TANUVAS) and Co principal investigator (Assistant Professor, IAN, TANUVAS) shall be responsible for planning and implementation of the project.
- The staff of the various farms, KVK's, VUTRC's, FTC's will coordinate with Principal investigator, Co-principal investigator, line department staff (VAS) and farmers for implementing the project.

Pre Implementation strategies

- On administrative Sanction, Vice Chancellor, TANUVAS will delegate / assign the staff of VUTRC's /KVK's / FTC's / Farms who will coordinate the work with the Principal investigator, Co-principal investigator, staff of line department and farmers.
- On administrative Sanction, the principal investigator will prepare the detailed modalities of implementation and initiate the purchase of the equipment involved in setting up of the production plant.
- In concurrence with the nodal officer Animal Husbandry, a plan will be laid out in the selection of beneficiaries.
- The Principal investigator along with Co-principal investigator will chart out the modalities on data documentation and providing capacity building program for farmers.

Implementation

The following will be the implementation schedule of the project

I. Establishment of exclusive project coordination unit at Institute of Animal Nutrition (IAN), Kattupakkam, TANUVAS – 0-6 months
II. Orientation for scientists concerned – 0 to 6 months
III. Selection of Lactating cattle, Pre-supplementation data collection and interpretation – 7 to 60 months
IV. Setting up of Production Plant – 0 to 12 months
V. Production and distribution of supplement at free of cost – 13 to 66 months
VI. Post supplementation data collection and documentation – 18 to 72 months
VII. Setting up of mineralized salt lick production units in selected farmers dairy groups
    a. Orientation training for farmers - 7 to 18 months
    b. Selection of farmers dairy groups - 7 to 18 months
    c. Technical training to members of selected groups – 13 to 30 months
    d. Setting up of mineralized salt lick production units in selected farmers dairy groups – 19 to 36 months
VIII. Report preparation and Preparing plant for sustainable production -69 to 72 months

I. Establishment of exclusive project coordination unit at Institute of Animal Nutrition (IAN), Kattupakkam, TANUVAS

The project implementing unit will be set up at Institute of Animal Nutrition, TANUVAS which lies in the lower Palar sub basin. The unit will be headed by Professor and Head of the Institution with Technical staff of the unit and Assistant working at the Institute will provide the administrative support. The following table provides the cost details for this component.

Cost details for establishment of exclusive project coordination unit at Institute of Animal Nutrition (IAN), Kattupakkam, TANUVAS

S. No	Activity description	Amount (Rs)
1	Computers, accessories and peripherals	100000
2	Photocopier with printer	100000
3	Computer Table, chair and storage unit	100000
	Total cost	**300000**

II. Orientation for scientists concerned

Capacity building workshop of one day duration for concerned staff of VUTRC/ KVK /FTC / Departments of TANUVAS will be organized by Institute of Animal Nutrition, TANUVAS to orient the scientists concerned to the scheme activities. The cost details for the same is given below.

Cost details for Orientation for scientists concerned

S. No	Activity description	Amount (Rs)
1	Cost for orientation per scientist	5000

III. Selection of Lactating cattle, Pre-supplementation data collection and interpretation

- The beneficiaries in the respective sub basins from the dairy interest groups will be selected. From each dairy interest group 200 animals will be selected based on the following yardstick. Small holder dairy farmers owning less than four dairy cattle.
- Milking cows fed on low quality crop residues.
- Cows in early lactation

The animals will be grouped as cross bred and indigenous. Pre-supplementation data will be collected on feeding regimen adopted and quantum of feedstuffs fed to animals, from 1% of the animals to be covered. Data collection will be done by TANUVAS scientists from the respective VUTRC / FTC / KVK in coordination with the assigned staff from project implementing unit. The data will be collected one time prior to the intervention viz supplementation of critical nutrients.

- Milk yield from the selected animals will be documented by TANUVAS scientists from the respective VUTRC / FTC / KVK in coordination with the assigned staff from project implementing unit.
- Methane production potential of feeds will be quantified using *in vitro* techniques (Menke and Steingas gas production studies) at pre-supplementation period and this data along with productivity data of animals will be used in conjunction to evolve regression equations to assess the methane production in the animals specify data collection costs

IV. Setting up of Production Plant

The following machineries will be procured and installed at Institute of Animal Nutrition, Kattupakkam, Tamil Nadu Veterinary and Animal Sciences University.

The procurement will be done as per the TNIAMP procurement norms. The following are the details of the machineries to be purchased.

V. Production and distribution of supplement at free of cost

Raw material for producing the supplement, packaging materials, labeling materials will be procured adopting purchase norms of project norms. Eight of daily coolies will be engaged for need basis to produce supplement. Supplement will be packaged and transported to the concerned VUTRC/ KVK /FTC / Departments of TANUVAS from where ever it has to be distributed to the beneficiaries in consultation with Divisional Assistant Director and Veterinary Assistant Surgeons of the concerned sub basins. Each of the selected animals from the DIG will be provided supplement for five month period which is sufficient to elicit beneficial effect. Each animal for five months will require 3 litres of the supplement. The cost of one litre of the supplement will be Rs 66.66/-

VI. Post supplementation data collection and documentation

Post supplementation data pertaining to milk yield from the beneficiary animals will be documented. Milk card will be distributed to the selected farmers. The card will have details to record yield in morning and evening every day. Every fortnight a cross checking of yield details will be done by the staff of the implementing unit Methane emission post supplementation will be quantified using by regression equations based on documented data.

The data on milk yield and methane emission pre and post supplementation will be validated statistically to arrive at a meaning full conclusion. List of farmers who have success stories will be prepared and maintained.

The cost involved in data collection is given below.

Cost details for Selection of Lactating cattle, Pre-supplementation data collection and interpretation

S. No	Activity description	Amount (Rs)
1	Number of lactating cattle per DIG	200
2	Cost for selection of lactating cattle (Rs. 50/cattle)	10000
3	Pre-supplementation data collection (Rs.20/cattle)	4000
	Total cost for one DIG	**14000**

VII. Setting up of mineralized salt lick production units in selected farmers dairy groups

a. Orientation training for farmers - Will be provided to farmers from DIG. From each group 25 farmers will be selected and training will be given.
b. Selection criteria for DIG –From the training provided volunteering and entrepreneurial farmers will be identified.
c. Technical training to members of selected groups – The selected farmers will be provided technical training of hands on nature in the production of mineralized salt lick.

VIII. Setting up of mineralized salt lick production units in selected DIG – The selected farmers will be provided basic devices and raw material for setting up the mineralized salt lick production unit. The cost for setting up of one unit inclusive of hydraulic press and raw material will be Rs70,000. Cost benefit ratio for converting the unit for a commercial venture is given below.

S.No	Details	Cost/No
1	Production capacity of unit (No/day)	100
2	Cost of Mineralized salt lick (Rs/no)	55
3	Raw materials cost per lick (Rs)	20
4	Labour cost per lick (Rs)	10
5	Electric cost per lick (Rs)	5
6	Total cost for production (Rs/lick)	35
7	Total cost for production (Rs/day)	3500
8	Sale of 100 licks (Rs)	5500
9	Income (Rs/day)	2000
10	**Cost benefit ratio**	**1.57**

IX. Report preparation and Preparing plant for sustainable production

The last activity pertaining to the scheme will be preparing the plant for sustained production and interpreting data documented, preparing and submitting report. The production of the plant will be continued, considering the real time expenditure involved in production of the supplement a sale price will be fixed. From the receipts through sale of the supplement expenditure for further production will be incurred. Cost benefit ratio for converting the plant for a commercial production is given below.

S.No	Details	Cost/No
1	TNAUVAS GRAND supplementation per cattle (No/month)	10
2	Production cost per unit (Rs)	50
3	Total cost for TANUVAS GRAND supplement (Rs)	500
4	Average milk yield per cattle (ml/day)	500
5	Increase in milk yield for seven months (lit)	105
6	Cost of milk (Rs/lit)	20
7	Total income per cattle (Rs)	2100
8	Income on TANUVAS GRAND supplement (Rs)	1600
9	**Cost benefit ratio**	**3.2**

4.3.2 Inland Fisheries Development

Inland Fisheries Development activities to be implemented by the Department of Fisheries will promote good aquaculture practices (GAP) on currently available aquatic resources (reservoirs, tanks and ponds) consisting of 25,100 ha effective water spread area (EWSA) in project areas, and support participation of fish farmers in value chains. The Project is to be implemented in 66 sub basins of Tamil Nadu. Inland Fisheries development activities shall be implemented in the sub basins where there is potential for fishery improvement. Implementation will be taken up sub basin wise in Phased manner. IAMP Cell established at the headquarters of Department of Fisheries shall coordinate the formulation, implementation and progress of the project.

Fish culture in irrigation Tanks

The IAMP proposes to rehabilitate about 4800 irrigation tanks in 66 Sub basins of Tamil Nadu. Suitable tanks to promote improved aquaculture will be identified for promotion of improved aquaculture. It is estimated that water spread area of 25,000ha of irrigation tank shall be brought under improved aquaculture. The productivity of water in the irrigation tank shall be judiciously utilized for producing/culturing fish before it is let in to irrigate Agriculture and Horticulture crops. Thus, the Fish culture in irrigation tanks well support to

achieve the ultimate motto of the project i.e. “More income per drop of water”. The improved fish production and income shall benefit the stakeholders particularly the fishermen, fisherwomen, cooperative members, SHGs Water User Association. The share of amount to be given to WUA of respective tanks from “lease amount from auction of tanks for fisheries” will help the associations to take up operation and maintenance of tanks.

Majority of the irrigation tanks in the sub basins fall under the classification of small/minor irrigation tanks considering the total area of individual tank. However the water retention period in the tanks varies widely. Considering the water retention period tanks are classified in to

(i) Long seasonal i.e. tanks having water retention period of >6 Months.
(ii) Short seasonal i.e. tanks having water retention period of < 6 Months.
(iii) Perennial tanks i.e. tanks having water throughout the year.

Aquaculture interventions are proposed in long seasonal and short seasonal tanks. It is noticed that no suitable perennial tank which needs project intervention to promote aquaculture is available in the sub basins. An estimated effective water spread area of 25,000 ha is to be covered by the end of the project period. Tamil Nadu University will suggest suitable aquaculture models to be promoted in tanks.

Fish culture in long seasonal irrigation Tanks

It is estimated that about **10000ha of WSA** of long seasonal tank with water retention period of more than 6months will be available in the sub basins for promoting aquaculture. Carp seeds (IMC, Common Carp, Grass Carp) will be stocked at the rate of 1,500/ha of Effective Water Spread Area (EWSA). Species combination will be arrived after ascertaining the quality of water and natural food availability in the tanks. Tamil Nadu Fisheries University (TNFU) will suggest appropriate culture technology. It is estimated to yield a fish production of 420kg/ha with a survival rate of 40% and average growth of 700g.

The project will provide quality fish seed at an estimated cost of Rs.3000/-/ha. The beneficiary/lessee of the tank (WUA/Inland fishers Co-operative Society/Individual /Self Help Group) will bear the other cost like lease amount, Ward and watch, Harvesting expenditure etc.).The beneficiary will be trained in good aquaculture practices by the project. Knowledge and assistance on marketing and harvesting will be provided.

Fish culture in short seasonal Tanks

It is estimated that about 10,000ha of WSA of short seasonal tanks with water retention period of 3 to 6 months will be available in the sub basins for promoting short seasonal aquaculture. It is proposed to adapt two different aquaculture models with different species combination. TNFU shall provide the appropriate production model.

Model 1:

Different combination of species with Indian Major Carp, common Carp and Grass Carp will be cultured in an estimated area of 10,000 ha of EWSA. Species combination will be decided with the assistance of TNFU. The stocking density proposed is 2,000 nos/ha. An average fish production of 320kg/ha with a survival rate of 40% and average growth of 400g.is envisaged.

The project will provide quality fish seed at an estimated cost of Rs.4000/-/ha. The beneficiary (lessee of the tank i.e. WUA/Inland fishers Co-operative Society/Individual /Self Help Group) will bear the other cost like lease amount, Ward and watch, Harvesting expenditure etc.

Model 2:

Polyculture model with GIF (Genetically improved Fish) varieties including Tilapia (GIFT) is proposed to be cultured in 5,000ha of EWSA. The stocking density proposed is 2,000 nos/ha. An average fish production of 400kg/ha with a survival rate of 50% and average growth of 400g.is envisaged. The project will provide quality fish seed at an estimated cost of Rs.8000/-/ha. The beneficiary (lessee of the tank ie WUA/Inland fishers Co-operative Society/Individual /Self Help Group) will bear the other cost like lease amount, Ward and watch, Harvesting expenditure etc.

The Sub basin Nodal officer will identify suitable tanks (based on the strict criteria as per above paragraphs) that can be promoted with improved aquaculture and in consultation with TNFU arrive at the appropriate aquaculture model. Estimate will be prepared by Nodal Officer and incorporated in the sub basin DPR and sent to HOD. On receipt of approval, administrative sanction and procurement plan he will arrange to commence the aquaculture activity by stocking fish seeds. Good quality fish seeds will be stocked in the presence of WUA/FCS members/lessee/SHG, WRD official and the regional DDF/JDF. The Inspector of Fisheries shall assist and coordinate in all the process to ADF/NO. The Departments concerned (Fisheries, WRD) who own the fishery rights shall auction the fishery by following the existing government procedures. The lessee will be trained on GAP by the Department and TNFU. He may be taken on exposure visits also.

The Nodal Officer and his staff will monitor the culture and document the activities. Fortnightly reports on the progress shall be sent to the HOD and the HOD shall send the progress to MDPU

Selection criteria:

- Tanks for the above activity will be selected primarily on the basis of water retention period.
- Type of soil, quality of water, catchment area of tank which influences the productivity of tanks will be considered.
- The classification of tanks based on water feed/receipt of water source as System and non-system will be important criteria for adaption of type of fish production model.

Fish Farming in cages

With capture fisheries coming under increasing pressure due to various factors that include over-fishing and environmental changes, the need for innovative methods that help increase or sustain fishery resources are getting fresh attention. One such method is cage farming or cage fish culture.

Cage fish culture is a practice of growing fish in confined areas, which facilitate feeding, harvesting and other management procedures. It has been established as an intensive fish farming system. Cages made of wood or Galvanized iron / HDPE/LDPE steel frames, covered with nets are kept immersed in natural water bodies. Little fish, or fingerlings, of different varieties such as GIF, Pangasius etc. shall be put into these cages and provided with feed regularly until they grow to marketable size. To demonstrate the commercial viability of this cage farming of fish, it is proposed that a total of 15 cage units with each cage unit having 100 sq. m (4 cages 25 sq m each, mesh net in each cage unit) is to be established.

a. Capital Cost @ Rs. 4.00 Lakh per unit: 60.00 Lakh
(Each cage consists of inner, outer, predator and birds nets, Frames, Floats, Anchor)
b. Operational cost @ Rs. 1.00 Lakh per unit: 15.00 Lakh
(Seed, Feed and Wages) **Total:** **75.00 Lakh**

Community participation (inland fisherman or farmers of WUA) will be encouraged for implementation. The operation and maintenance will be done through them. Identification of suitable sites for this farming activity will be done by the Department.

Selection criteria:

- Cage farming protocol developed during the IAMWARM I Project shall be followed for selection of water bodies where the cages are to be erected
- The protocol details guidelines to be followed right from site selection to harvest of fish which include ideal water parameters, species of fish, cage maintenance, feeding method etc.

Promotion of High Value Native Species Channa striatus /marulius:

Murrels constitute a unique group of food fishes that fetches high value because of their taste, few intramuscular spines and better keeping quality .Though the economic viability of farming is known to the fish farming community of Tamil Nadu non availability of adequate seeds is hampering the adaption in a significant way.

The Project proposes to establish a reliable source of seed production technique and also package of practices for farming. The department has the scope to establish seed production units with its technical man power and with overseas consultancy. The project shall also support further technical training and technical support.

An amount of Rs.70 lakh is estimated for breeding, rearing and also to demonstrate improved farming techniques.

Aquaculture in Farm Ponds:

Available farm Ponds within the sub basins will be selected based on strict criteria and promoted to undertake advanced aquaculture. Besides farm ponds excavated by the Agriculture Engineering Department other existing farm ponds in the sub-basins under the project will be also taken up for aquaculture. There will be joint walkthrough and inspection along with AED while selecting site for pond. The farm ponds are created primarily for rainwater harvesting and Storage in the farmer's field with a Water Spread Area of 1000 m2. These farm ponds are well suited for aqua farming activity. The aquaculture activity will pave way for improved income generation to the farmers.

The farm ponds are proposed to be stocked with quality advanced fingerlings (>6cm) which would grow to marketable size within 4-6 months. Stocking density of 1,500nos/Pond is proposed. Different fast growing fish combination will be adapted and the species will include GIFT, Jayanthi rohu, Amur, grass carp, Common Carp and IMC. The TNFU will assist in arriving species combination and appropriate production Models. Department of fisheries and TNFU will also provide training to farmers in adapting good aquaculture practices.

The project will provide fish seed and feed to the farmers at an estimated cost of Rs. 27,000/- It is proposed to cover 1000 farm ponds in the sub basins.

After analyzing the parameter in consultation with TNFU appropriate fish production Models will be arrived at and accordingly inputs (fish seed and feed) will be given to the farmer. Immediately after selection of the pond the farmer or his nominee who is to carry on the culture will be given training on culture technique. One to two persons shall be trained per pond. Department's field officials will frequently visit the pond and guide the farmers in executing Good Aquaculture Practices to get maximum yield and also document the events. Culture operation note will be provided to each farm ponds in which all the details like soil& water parameters, pond preparation, Fish species and numbers stocked Feeding schedule, Growth assessment (trial netting), Harvest particulars with average growth, price sold etc

shall be recorded by the farmer. The Department will assess and record the sustainability of the activity in the subsequent season.

Selection criteria:

- Farm ponds in the field of farmers with additional water source apart from rain water will be prioritized for implementation.
- Pond bottom having better water holding capacity with less seepage will be preferred
- Farm Ponds owned by women will be given priority.

Fish seed rearing in cages:

The fish seeds should be reared before stocking in water bodies for better survival. Cage rearing of fish seeds is a common method that can be adopted in water bodies. One unit of cage system will consist of 3 cages of different mesh size (P 40, 16, P8). Fish Seeds will be reared from early fry to advanced fingerlings in these cages that will be fixed or floated in irrigation tank, having water depth of more than 4 feet. These Cages will be owned, operated and maintained by the farmers / fishermen of fishermen / women cooperative society / SHG. 100units shall be provided to the farmers in the sub basins. The project will provide Cages (fixed cost), early fry and Feed (operational cost) at an estimated cost of Rs.40, 000/-per unit. Rest of the cost on cage installation materials like poles and other accessories like Hand nets, buckets, mugs, brush for cleaning and labor cost on cleaning and harvesting will be contributed by the beneficiary.

Selection Criteria:

- Farmers who are already doing aquaculture will be preferred.
- Fisher cooperative society, WUA and self-help group will be preferred.

Gift tilapia hatchery

Under IAMWARM 1 Gif Tilapia was introduced on pilot basis. The fish could be bred successfully at the government farm at Krishnagiri with the support provided by the project. The culture trials are also encouraging and found to be ideal for short seasonal culture. Hence to have a reliable source of seed supply it is proposed to establish a GIFT hatchery.

Fisheries Department will implement this activity with the technical assistance of Rajiv Gandhi Centre for Aquaculture (RGCA) Vijayawada in close cooperation with TNFU. The hatchery will be designed with the technical expertise of RGCA and the construction will be taken up by the Civil Construction Wing (Fishing Harbor Division) of the Department. Execution of the intervention from sight selection till commencement of operation shall be guided by Additional DOF (who is looking after the Inland Fisheries),Regional JDF/DDF with the consent of HOD.

Pure line brood stock maintenance Center:

The objective is to improve the genetic potential of the fish seeds so as to increase the survival and growth in aquaculture ponds and tanks. Inland fish farming in the State is being practiced with carps as major contributing species. Due to consumer preference and high market possibility most of the farmers always prefer to stock Catla and Rohu in their ponds. Seeds are currently being produced by the captive breeding of the carps. An in-depth look into this scenario can reveal that there is less control or governance over the quality of the seeds that seriously impair the fish production in the inland sector. The impacts of the uncontrolled seed quality are,

a. Mostly poor quality seeds are stocked in the ponds in large quantity to compensate the loss
b. In many instances, inbred seeds are stoked leading to poor growth
c. Production and revenue loss due to poor production

In order to prevent the losses and ensure the quality for long term uninterrupted fish production in the inland sector, it is necessary to have pure line or genetically uncontaminated brood stock in the hatcheries. Pure line brooders can help in the production of good quality seeds, which can be achieved through systematic approach in the brood stock selection, maintenance, quality improvement, breeding attempts and sperm bank approach. Keeping the goal of achieving production of good quality seeds, the project is proposed to contemplate the following objectives:

1. To improve the genetic potential of the fish seeds so as to increase the survival and growth in aquaculture system.
2. To make available quality seeds in the seed production farms of the Department for supply to farmers.
3. To educate the hatchery operators for the maintenance of pure line brooders in their farm.

Two farms of Fisheries Department will be designed to carry out the activity. Facilities for maintaining pure line brooders and multiplication/breeding shall be created. Technical assistance and collaboration of TNFU will be taken for implementation of this activity Fisheries Department will implement this activity with the technical assistance of TNFU and Central research Institutes. The construction will be taken up by the Civil Construction Wing (Fishing Harbor Division) of the Department. Execution of the intervention shall be guided by Addl. DOF (Inland), Regional JDF/DDF with the consent of HOD.

Earthen Fish seed rearing and culture Farm

Stocking of quality fish seeds at the right time in required quantity will ensure optimum utilization of water for fish production. However the mismatch of the breeding season of Indian Major Carps (IMC) with that of the fish culture season in irrigation tanks of sub basin causes sudden spurt in fish seed demand soon after the onset of North-East monsoon rains. Establishment of fish seed rearing farms to maintain seed stock helps to meet the fish seed demand at the appropriate season. For meeting the fish seed demand of the sub-basin it is proposed to establish earthen fish seed rearing and culture farms.

The beneficiaries targeted would be in land fishers cooperatives associated with irrigation tanks / Water User Associations / Progressive farmers / SHGs / Organizations that have established management systems and who are involved in community development activities. The fish seed farm will be established in a land area of minimum 0.40 ha. Having water spread area of 0.30 ha with an output of 7.00 lakh fingerlings per annum. The rearing of fish seeds would be taken up in two stages i.e. from Early Fry to Late fry (L.F.) and L.F. to advanced fingerlings. Ponds will be designed in such a manner to have rearing ponds and rearing cum grow out ponds with necessary pumping facility. The Ponds shall also be utilized for culturing fish on completing the seed rearing activity. This will enable the farmer to fetch additional income by way of producing table size fish.

The capital cost for this farm is estimated as Rs.4.25 Lakh and the operational cost as Rs. 2.45 Lakh per year. The project proposes to invest in capital cost (4.25 Lakh) and early fry and Feed (0.75 Lakh). Rest of the estimated operational cost (Rs.1.70) shall be incurred by the beneficiary.

Capital cost involves civil Work for Creation of earthen ponds, Water supply arrangements; shed etc. operational cost is for fish seed, feed, electricity charge, Wages for labor, manure, lime etc.

Department will create awareness of the intervention in the sub basins. Interested inland fisheries cooperatives / SHG / WUA / Progressive farmers will be identified and their sites will be inspected. Suitability of the site and critical soil and water parameters to take up nursing of fish seed shall be studied. If found suitable, the site will be selected for the execution of the activity. Construction will be taken up by the Civil Construction Wing (Fishing Harbor Division) of the Department or Public Works Department or by AED. After selection of the site for the construction of the farm, the farmer or his nominee who is to operate the farm will be given training on culture technique. One to three persons shall be trained per farm. Department's field officials will frequently visit the farm and guide the farmers in rearing fish seed and documents events. Assistance for marketing the seeds will also be provided by the Department. The farmer shall record all the details like soil& water parameters, pond preparation, Fish species and numbers stocked, Feeding schedule, Growth assessment(trial netting), Harvest particulars with average growth ,price & numbers sold etc in a register. The Department will assess and record the sustainability of the activity in the subsequent season.

Selection Criteria:

- Water quality should confirm to the standard hydrological parameters suitable for aquaculture
- The soil quality should confirm to aquaculture and should have reasonable water holding capacity.
- The site should have adequate water facility and electricity.
- The farmer shall have sufficient interest in taking up the venture.

Modernization of fish seed Farm:

Two government fish seed farms *(Lalpet and Agaram)* will be modernized to enhance the operational efficiency. The quality of seed produced will be enhanced to perform faster growth in culture systems. Renovation of existing infrastructure and creation of some additional facilities will be supported from the project. Estimated cost is Rs.2.5 Crores.

Fisheries Department will implement this activity in two of its existing fish seed farms. A regional team headed by Regional joint Director/Deputy Director of fisheries along with ADF, inspector of fisheries and an Engineer will assess the requirement and prepare estimate. This shall be perused by Project cell and on approval by HOD the component will be implemented. Operational efficiency shall be recorded and analyzed for assessing the performance of the farm post modernization.

Small scale fish Feed Mill

One Cluster where inland aquaculture activities are intensive has been identified. These cluster farmers who have formed group/association and are interested in producing their own fish feed and also desire to market. They will be supported by this intervention. The department is in the process of commencing a feed mill at Achampatti in Thanjavur District of Cauvery Delta Sub Basin. The feed mill will be operated by Tanjore District Fish Farmers Association under a MOU. TNIAMP shall also establish a small scale feed mill which can be operated by similar arrangement in the same campus/place. The Department will establish the facility and the operation will be taken up by the Society. The TNFU shall provide suitable feed formula developed under the Project. The feed mill Campus is a centrally located one and shall cater to the need of the inland aqua farmers of the state.

An estimated cost of Rs.100 Lakh is provided.

Fish kiosk

Lack of hygienic marketing infrastructure in sub-basins has resulted in poor economic return to the farmers. To provide the nutritionally rich fishes in fresh condition to the consumer in hygienic manner, it is proposed to establish modern fish kiosk in selected sub-basins. The activity was well established in the IAMWARM I project and many women self-help groups were benefited. The fish kiosk will make available the nutritionally rich fish to the public in hygienic condition and easy accessibility to be ensured. Different value added products of fish shall be also promoted for sale. Facilities to sell value added products will be provided.

The capital cost for Kiosk will be Rs.8.00 Lakh / unit. It is proposed to establish a total of 20 Fish Kiosk in sub-basins. Since 66 sub basins are to be taken, it is assessed from the demand of the stakeholders that there will be requirement for at least 20 no of Kiosks. All sub basins will not need the facility of this type and marketing infrastructure shall already exist in some basins. The Capital cost of 8 Lakh per Kiosk will be provided from the project and the beneficiary group shall provide land and incur the operational cost. Beneficiary will be women SHG/fisherwomen/ fishermen cooperative society/WUA. The beneficiary will be trained in hygienic handling of fish and quality control , fish marketing technique and also in making value added fishery products like fish cutlet, pickles etc.

The Department will create awareness of hygienic fish marketing and the support to be provided from the project. On receipt of request for Kiosk, the nodal officer will analyze the potential of the group to operate the Kiosk and the opportunity of running the Fish Kiosk in the identified place. The regional JDF/DDF shall also inspect and analyze the chance of successfully running the Kiosk before selecting the beneficiary. Beneficiary group will be given training on Marketing and making value added products. Selection criteria:

- Women SHG and cooperative society will be prioritized for giving the project support.
- Capability of the group on fish marketing will be analyzed.
- The site to be provided will be analyzed for suitability of fish marketing.
- Adequate linkage of fish source for marketing should be available.
- Fish and value added product demand of the area will be assessed
- The beneficiary group should provide the land for establishing the Kiosk.
- Department establish the Kiosk and hand over to the group with a legal agreement to run the Kiosk/ If the Beneficiary group does not operate the Kiosk in proper manner the Department has the right to cancel the agreement and re-allot to any other prospective group.
- The Beneficiary should maintain records of transaction and shall make available it for inspection of Department on demand.

Overseas/domestic training/exposure visit:

As many of the interventions proposed requires good communication to spread the information among the beneficiaries and to have greater impact beyond the project participants, it is suggested to have good communication system established. Needed communication equipment depending on suggestion and justification by sub basin nodal officers will be provided on approval of HOD.

Beneficiaries of key activities will be given a short term orientation training of the activity by the Department

Capacity building of the staff and farmers in the new activity suggested like GIFT tilapia seed production units and cage farming etc. will be done. Appropriate exposure visit and training in countries where these activities are widely practiced like Vietnam, Bangladesh and Thailand will be undertaken.

Exposure visit to Indian States where Inland aquaculture is better off will be made. Arrangements with Central and State institutes and other State Fisheries Departments will be made to train the farmers and Department staff after assessing the need and identifying the field requirement.

The IEC (Information, Education, and Communication) requirement of Sub basins will be assessed based on the report of Nodal Officers. Based on the need of the sub basin necessary facilities/funds for IEC shall be provided. Some short term training to exposure visits shall be given to farmers by the department.(rest by TNFU). The field officials will be given training/exposure visit (Domestic and Oversea) in the fields related to the approved activities in the Project. The training and exposure visits will be arranged in the initial years of the project hence the learning shall contribute to effective implementation of Project activities.

Documentation, Office Equipment and transport

Effective documentation is vital in the project preparation, implementation and concluding stage. Hence for effective evaluation of results this has been provided. Computers, Xerox machine, furniture, handy cam and documentation through video will be done. For monitoring the stocking, growth of fish, harvesting, providing training to fish farmers for transport fish seed etc. by the nodal officers transport cost is essential. An amount of Rs. 70Lakh is provided.

Monitoring support in sub basin and IAMP cell

The activities proposed needs constant technical support to farmers for successful implementation. Since the Fisheries Department is not equipped with adequate no of field staff that can constantly support the farmers, it is proposed to employ field staffs on contract basis. They will support the nodal officer of the sub basin from identifying site of implementation, beneficiary to documentation of results as well as sustainability of the activities. IAMP cell at headquarters shall be provided with adequate staff for monitoring and reporting to WB/MDPU on the implementation and progress. The project shall provide 180 Lakh in financial assistance. Further assistance shall be provided from the project in the implementation years on justification and approval of World Bank.

On approval of Phase wise DPR, the manpower required to implement the same will be arrived at by the Cell at HOD office. Accordingly the Field Activity managers (FAM) will be recruited on contract basis either centrally or at sub basin level. Salary similar to Senior Research Fellow in TNFU shall be given. The HOD will appoint needed additional staff for the Cell at quarters either on contract basis or by deploying regular staff by creating new posts with the approval of Government. The nodal officers shall assign the field work of the Project to Department staff and FAM. Short term training /orientation shall be given on Project Implementation FAM. The Cell at Headquarters shall review the Job Chart and execution.

Implementation arrangements

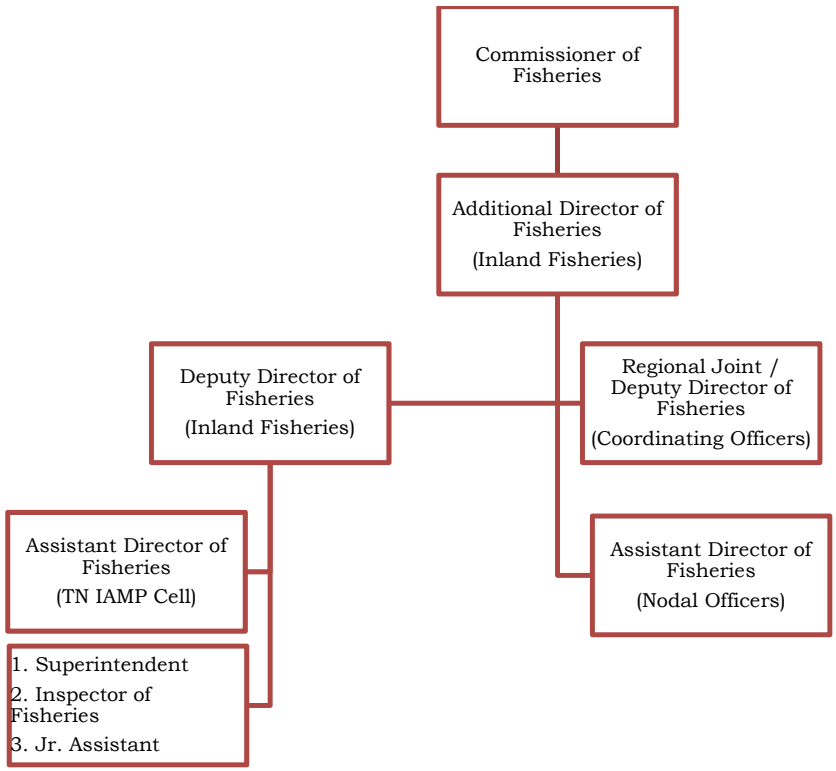
Project Implementation Cell will be established at the Headquarters to coordinate and manage project implementation.

- Commissioner / Director of fisheries/HOD will be overall in charge of operating the budget and project implementation.

- IAMWARM Cell at HOD office at Chennai will monitor the progress and implementation
- Nodal officers at the sub basin level will be in-charge of Sub basin DPR preparation, action plan and execution
- Field Officers at the sub basins attached to Nodal officer will assist in implementation
- Beneficiaries/Target group will be identified by the sub basin nodal officers
- WUA, progressive Women/men SHG, Fishermen/fisherwomen co-operative, Farmers, Inland Fishers or existing informal groups in respective tank command will be the target group.

The organization structure is given in Figure 4.3.

Figure 4.3 Implementation Arrangements for Fisheries



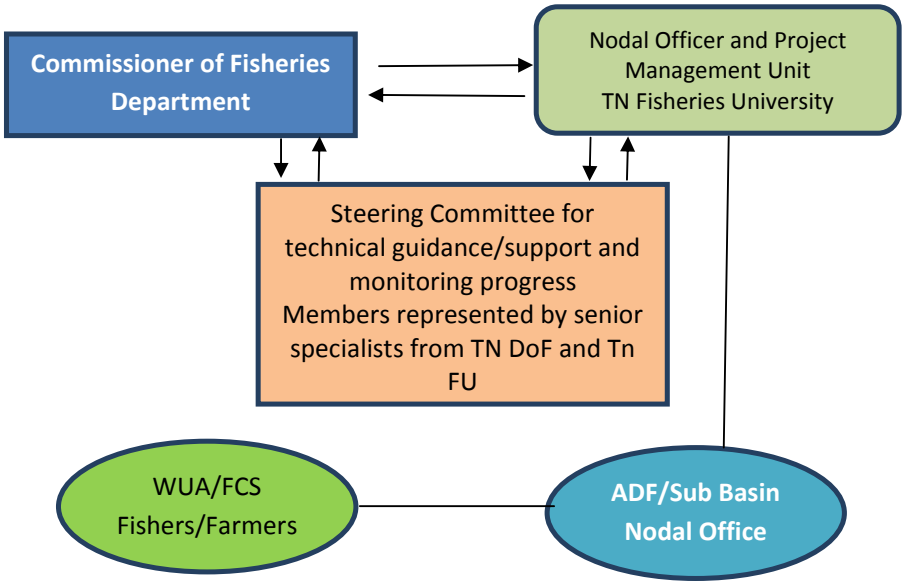
Working arrangements with Fisheries University

A steering committee will be appointed for providing technical guidance and monitoring implementation progress. The committee will meet once in two months to review the technical issues and project implementation progress. Considering the subject specialization based on project proposed for the university senior officers (level equivalent to Professor and Joint Director or above) from both agencies (TNDOF and TNFU) respectively will be nominated as members of the committee. Nominated senior officers should have expertise in following topics.

- Pure line breeder development
- Fish nutrition and formulated feed development
- Stocking and capture fish production models in reservoir/irrigation tanks
- Fish Seed Production and Advance fish farming in ponds

The arrangement with the Fisheries University is given Figure 4.4.

Figure 4.4 Implementation Arrangements with Tamil Nadu Fisheries University



Monitoring:

- The Nodal officers in charge of each sub basin will monitor the activities of IAMWARM on regular basis
- Regional Joint Director/ Deputy Directors will monitor the activities and review the work on weekly basis (i.e. physical, financial & technical).
- The IAMWARM project cell at Chennai shall review the progress on monthly basis

Procurement:

- Procurement Plans will be prepared on the basis approved DPR of sub basins and approval of World Bank will be obtained through MDPU.
- Procurement officer shall be nominated for this purpose for proper procurement guidance at IAMP Cell.
- Fish seeds and other inputs at sub-basin level procurement will be done by the Nodal officers in the sub-basins.
- STEP the procurement procedure to get World Bank approval will be followed.
- Status of Procurement packages will be periodically reported by Nodal officer of Sub basins to HOD/Project Cell and HOD to MDPU.

Reporting:

- Sub basin Nodal officer shall send fortnightly physical, financial & technical progress to the IAM Project Cell at Chennai.
- MDPU Cell will furnish all the reports related to finance, physical and technical to the Project Director, MDPU, Chennai on fort nightly and monthly basis.

- With the reports received from the field officers the Project cell in the HODs office shall prepare a comprehensive report and send to MDPU which after perusal shall forward to Government and to World Bank.

Documentation:

All the activities, during the project and post project period will be documented/video graphed periodically by the sub basin Nodal officers. Copies of documents will be sent to IAMP cell and a separate server with back up facilities will be created in the office of HOD. A website shall be created to upload the progress and activities of this project.

Programs by Tamil Nadu Fisheries University

The programs proposed are in complimentary to the activities to be taken up by the Fisheries Department. They are proposed with the aim to achieve the overall objective of the project. Following are the activities to be implemented by the TNFU:

Optimum sustainable production model for irrigation tanks

Inland aquaculture has been practiced in irrigation tanks and farm ponds with lesser degree of technology adoption. In irrigation tanks, intensive feeding is not possible. However, the fishes can be grown based on the fertility and management of fertility. A sustainable production model for irrigation tanks and farm ponds needs to be fine-tuned with field trials under the supervision of project staff. In addition to the above, the diversification in inland fish farming is very much limited and almost 90% of the farmers are doing only with carps. This also one of the reasons for their less production since many carp hatcheries in the State could not assure quality seeds due to varied reasons. Therefore it is proposed to develop a model farming practice that can be adopted in the specific locality.

Objectives:

1. To prescribe production models for the irrigation tanks that are sustainable through scientific intervention in terms of stocking density, species selection, species combination, water quality management, sampling and harvesting procedures.
2. To advise resilient production models that could stand viable irrespective of the seasonal variations for farm ponds aquaculture
3. To demonstrate the viable farming model to the aqua farmers.
4. To extend technical support services to the aqua farmers through Farm Service Vehicle.

Implementation strategy:

This project will be implemented in collaboration with the State Fisheries Dept. for both irrigation tanks and farm ponds aqua culture. The operation base for this project will be at Thanjavur CeSA, TNFU and the activities in all the sub-basins wherever this project is implemented will be monitored by the team based at Thanjavur CeSA. The following are the steps in the project implementation:

For irrigation tanks,

- This intervention is done simultaneously with the implementation of the irrigation tanks aquaculture project by the Dept. in TN IAMP.
- Based on the discussions with the field officers of State Fisheries Dept., irrigation tanks (3 to 6 numbers in each region and per category) will be selected as the experiment tanks for the adoption of structured culture plan with the adjacent tanks as control for comparison.
- The inputs involved in the proposed culture plan for the irrigation tanks are listed in Table 3 and the Dept. will supply the needed inputs like seeds for the irrigation tanks aquaculture and the TNFU will undertake the monitoring of the crop including sampling, data management, processing and reporting.

- While planning the crop, past history of the tanks' fish production will be taken as base data and the presence of native species will be considered while deciding the stocking density. The basic hydro biological data will be recorded for each experiment tank for correlating the results with the hydro-biological data.
- Optimal stocking density, size of the seeds, species combination will be determined along with other parameters like species selection and harvesting procedure

For the Farm Ponds aquaculture, the following will be the project plan:

- Selection of farm ponds will be done based on the suggestions from the field officers of DoF as followed for the irrigation tanks.
- In every zone, 3 to 6 farm ponds will be selected for the study, which may have wider representation in the particular zone.
- Different species combination (3 or 4) will be studied and best results will be advocated.
- The same ponds will be used for the growth study of the seeds produced through pure line brooders and feeds developed with locally available ingredients
- The optimal stocking density and feeding schedule will be advocated.
- At the end of the study parameters like – optimum stocking density, species selection, size of seeds, feeds to be used; feeding regime, sampling process, harvesting process, use of growth promoters, etc. will be recommended for adoption.

In general, the steps in the project implementation will also have the following:

- Water quality and wet laboratory will be established at 3 places (Thanjavur, Chennai and Thoothukudi, where the TNFU has the Stations) for the maintenance of fishes and offering support services to the farmers in the four zones (pl Ref. the map)
- Educating and training the farmers holding the water body before and during the experimental crop.
- The low cost feed that will be made through another project of this Directorate will be supplied to the farmers for the evaluation of the utility and determination of the suitability in the farming separately.
- Monitoring the culture through regular visits and sampling.
- Collection of all data and documentation.

Measurable parameters for monitoring:

The project can be reviewed based on the measurable parameters like growth of the fishes in the selected tanks and ponds, survival and production achieved at the completion of the crop. Enhancement in terms of percentage over and above the normal farming activity can also be used as a measurable parameter.

Anticipated outcome:

1. The possible outcome is the production models that are suitable for irrigation tanks that would spell out the entire culture strategy for the irrigation tanks.
2. Strong production model for fish farming in seasonal tanks with species adoptable to our climate, pond dynamics, fertilization strategy, seed and feed quality.

Formulation of species based fish feed using locally available low cost ingredients.

The project is proposed with the following objectives:

1. To develop a nutritionally balanced formulation for low cost feed production for various inland aquaculture models after assessing the nutrient requirements of the species, quality, cost and logistics of the low cost ingredients.
2. To farm test the feeds thus formulated and produced.

3. To educate the farmers for adopting the low cost feeds for their farming operations through training and demonstration.

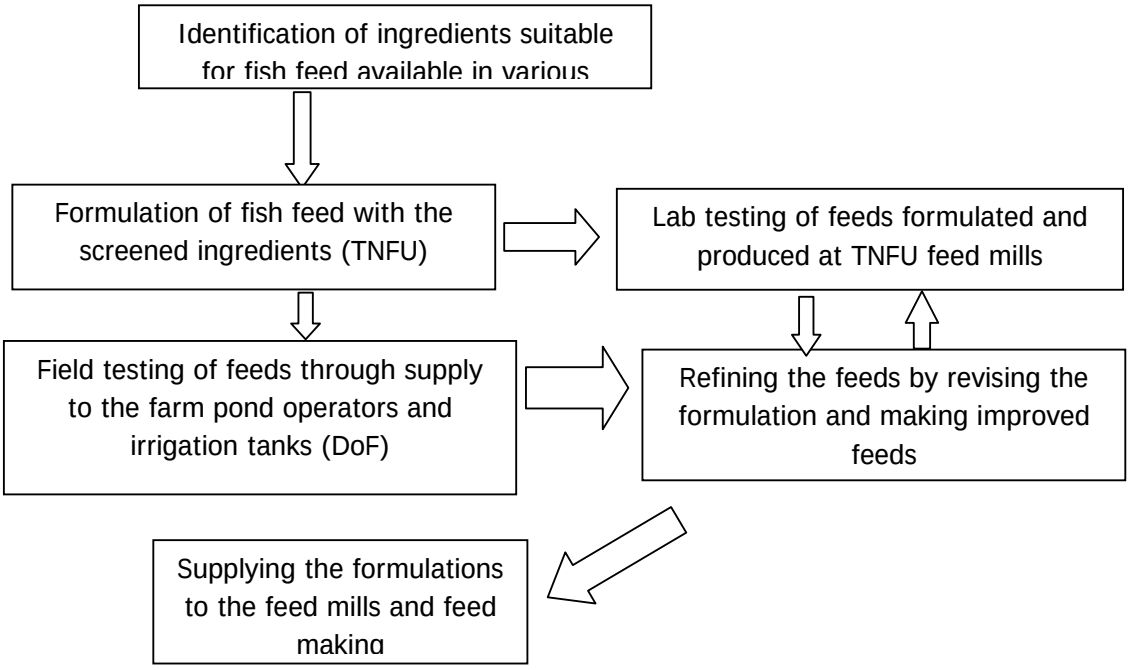
Implementation strategy:

The project comprises of two major aspects, viz., formulation and production of the feed and field testing the feeds for their suitability. In order to achieve the above two goals, the project will be implemented strategically as below keeping the operation base at TNFU station at Chennai & Fisheries College & Research Institute, Thoothukudi to utilize the feed mill available in both the places:

- Screening and selection of the low cost ingredients in all regions
- Recommending region specific optional ingredients for the feed mills
- Regional ingredients availability will be documented and location specific feed formulations will be developed and proposed
- Formulation of feeds and production for evaluation
- Lab evaluation of the feeds and quality determination
- Field evaluation of the feeds in the farm ponds
- Scaling up the production and supply to the farmers for adoption
- The feed formula will be provided to the feed mill established through State Fisheries Department for feed production and supply.

The implementation pattern is summarized in Figure 4.5.

Figure 4.5. Implementation Strategy for Fisheries



Anticipated outcome:

1. The key outcome of the activity is enhanced feed conversion, reduction of feed cost, providing flexibility in the selection of ingredients, nutritional quality and feed safety in aquaculture.
2. Benefits to the marginal farmers in adopting the low cost feed for their farming.

Development and management of pure line inland fish brooders in the brooder farm and production of good quality seeds

Objectives:

1. To improve the genetic potential of the fish seeds so as to increase the survival and growth in aquaculture ponds.
2. To make available improved quality seeds in the seed production Centers of the State Fisheries Dept. for supply to the farmers.
3. To educate the hatchery operators for the maintenance of pure line brooders in their farm.

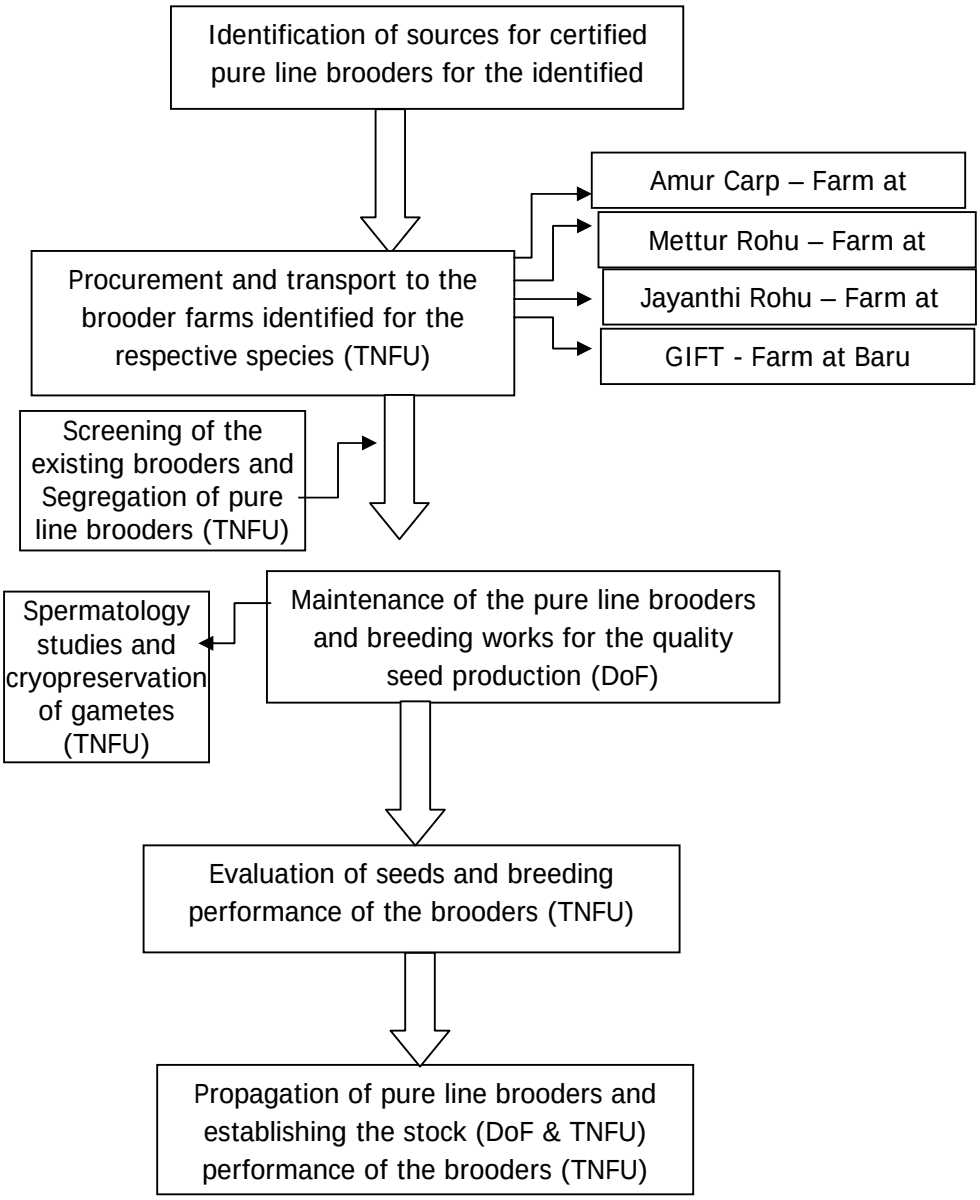
Implementation strategy:

This project will be implemented keeping its operation base at Krishnagiri Centre for Sustainable Aquaculture (Krishnagiri CeSA). The cryopreservation lab available in Fisheries College & Research Institute, Thoothukudi will be used for the cryopreservation works in this project. The project will be having the following steps:

- Pure line development will be done for Jayanthi Rohu, Amur Carp, and GIF Tilapia & Mettur Rohu.
- Pure line brooders available under certified sources from different locations in India will be procured, base line developed and maintained under bio-secured conditions in the Govt brooders farms
- The seeds from pure line will be produced and further propagated.
- History of the pure line brooders will be tagged and documented
- Pure line templates (finger prints) for IMC and other identified varieties will be obtained and used for the identification of the pure line brooders
- Screening of the existing brooders will be done for the identification and segregation of pure line
- Maintenance of pure line brooders with the feeding and pond management will be done in the brooder farms (GIFT – Krishnagiri CeSA, Mettur Rohu – DoF Seed Farm at Mettur, Jayanthi Rohu – DoF Seed Farm at Bhavanisagar & Amur Carp – DoF Seed farm at Lalpet / Agaram)
- Evaluation of their breeding performance in terms of spawn yield, fry survival, growth rate of young ones, etc will be taken up and documented. The good breeders identified will be electronically tagged.
- Spermatology and artificial fertilization for pure line brooder propagation will be done.
- Pure line brooder maintenance and quality seed production will be taken up in the identified seed production Centres by the DoF by the Dept. The maintenance of the pure line brooders at Mettur and Bhavanisagar will be done by the Project personnel recruited by the TNFU for this project, while the watch and ward and support facilities like watering, feeding, etc… will be provided by the seed farm staff of the DoF.

The implementation pattern is summarized Figure 4.6.

Figure 4.6. Implementation Strategy



Standard reference qualities (both phenotypic and genotypic) will be documented beforehand for the individual species selected for this work.

The project will result in the following benefits:.

1. The characters of the pure line brooders and seeds will be prescribed and documented for adoption in the inland fish farming.
2. The brooders will be periodically subjected to the evaluation based on the selective scale of their phenotypic and growth performance together with the sperm analysis to fix their quality.

In order to accomplish this goal, it has been proposed to establish the facilities for brood bank and sperm bank at selected places.

Anticipated outcome:

1. The major outcome is the high survival (up to 80%) and growth (about 25% more than the present level) of the fish seeds thereby the production can be enhanced in aquaculture ponds.

2. Hatcheries in the State can adopt maintenance of pure line brooders and produce quality seeds.

Capacity building and training of trainers, fishers, fish farmers and entrepreneurs in the adoption of advanced farming techniques.

The objective is to empower the farmers, fishers and entrepreneurs in the advanced farming techniques. Trainings in the areas of advanced fish production technologies and disease prevention will be conducted periodically for the different groups of stakeholders involved in the fisheries development.

Separate trainer training and entrepreneur training will be undertaken during the project period in different technical aspects for the empowerment of the people involved in the implementation of the technologies.

Implementation strategy:

This project will be having the operation base at Thanjavur Centre for Sustainable Aquaculture (Thanjavur CeSA) and all the Stations of CeSA will take part in this Project in imparting training. The first approach in achieving the goal is the capacity building in the advanced fish farming techniques. In this line the project will be having the following **components:**

1. The farmers will be selected based on the recommendations of the State Fisheries Dept. and the direct approach of the farmers to the Directorate.
2. Appropriate training programmer will be scheduled and communicated through all possible media to attract the farmers for the participation in the training programmer.
3. The training will be having orientation, exposure and learning experience of various advanced farming techniques like raceway farming, intensive nursery rearing, disease identification and health management, management of the stock, feed based aquaculture, nutrient analysis and ecosystem awareness, eco-friendly approaches in aquaculture, waste management techniques, live-feed culture and use, etc.
4. The trainees will be taken to the farm operations site and feed mills for the exposure in the particular line.
5. Manuals and booklets will be developed and issued to the DoF, trainees and also interested farmers.
6. Low priced video lessons also will be developed and shared with DoF at free of cost in sufficient numbers to distribute to all the field offices.
7. Awareness on different aspects of farming and technical issues will be done

The project can be monitored based on the measurable parameters like number of trainings conducted, training materials produced, farmers coordinated, field visits arranged, and feedback from trainees.

Department of fisheries shall inform the need of the group to be trained and subject of empowerment. Accordingly trainings will be designed. The outcome is the dissemination of various advanced farming techniques for adoption in the State.

Financial operation of the project will be as in the case of TNAU in the IAMWARM 1 Project. Fund allocation will be done to TNFU as done to other schemes already in existence. Detailed discussions were already done with Fisheries Department, TNFU and MDPU by a financial consultant of WB who already visited about fund flow and reporting. Progress on activities shall be reported through DOF to MDPU since all the components are interlinked in implementation with the Department activities.

The outlay for TNFU is Rs. 2.5 Crore.

4.4 Sub Component B3: Agriculture Marketing Value Addition and Post-Harvest Management

This sub-component to be implemented by Agricultural Marketing and Agribusiness Department (AMAD) in coordination with Departments of Horticulture and Agriculture, aims to enhance farmers' linkages to markets through (i) Improving farmer access to markets, (ii) promoting agri-enterprises, and (iii) Institutional strengthening and capacity building.

To improve farmers' access to market, the project will support (i) Auotmation, modernization and digitization of regulated markets), (ii) promoting alternative marketing channels through FPOs, and (e) piloting and expanding the Negotiable Warehouse Receipts schemes.

4.4.1 Improving Farmer Access to Markets:

The intervention, aims at creating more linkages between farmers and private sector besides strengthening of farmers' access to more traditional markets for better price discovery through reform and modernization interventions.

Support for New Farmer Producer Organization (FPO):

A Farmer Producer Organization is

The main focus of agriculture development program in the past was on increasing the production and relatively less attention was paid to post-harvest management and marketing. As a result, the shares of producers receive as a percentage of consumers spending not commensurate. Similarly, timely availability, price and quality of agricultural inputs (seed, fertilizers, feed, etc.) were a serious handicap for the farmers. These constraints can be mitigated by strengthening backward and forward linkages through integrating producers and markets, and making the value chains compact and efficient. To achieve this goal, project would organize the producers into FPOs, develop their capacity and skills for post-harvest management, value addition and marketing to access wider markets; and provide investment support to these FPOs for the establishing Farmer Common Service Centers (FCSCs). The project will also finance 'productive' demand-driven investments on a grant basis to FPOs for establishing these Farmer Common Service Centers (FCSCs) and will be available on the basis of business plans prepared by them.

It is expected that the FPOs will undertake various activities such as bulk purchase of inputs; and post-harvest management, quality control, grading, aggregation and marketing of produce. Expected benefits to FPO members are higher farmer prices through the combination of larger critical mass of saleable produce thereby providing economies of scale, savings in transaction costs, reaching out to distant markets, and strengthened negotiation positions, coupled with the added value achieved through cleaning, grading and packing.

FPOs under the project will be formed either as entirely new one or on the production clusters already formed by the Department of Agriculture and Horticulture. For this, members of existing Farmer Interest Groups (FIGs)/Common Interest Groups (CIGs) may also be considered besides new members who will be mobilized to form FIGS and FPOs. A minimum of 20-25 active farmers from existing or newly formed Farmer Interest Group (FIGs)/Common Interest Group (CIGs) will be organized and by federating 20-25 such groups, an FPO will be formed. FPO will therefore have not less than 500 members and there will not be any upper limit to enroll no of farmers to an FPO.

These FPOs will be guided by principles such as Voluntary and Open Membership, Democratic Farmer Member Control, Farmer-Member Economic Participation, Autonomy and Independence, Education, Training and information, Co-operation and networking among FPOs, concern for the Community, etc.

The project will form a minimum of 80 new FPOs during the project period. The FPO will have a General Body, Executive Body and Board of Directors and will be managed

professionally by technically trained staff. The process will start with mobilizing and organizing farmers in the clusters as groups. Once the critical mass in terms of number of members is achieved, the FPO will be registered legally. The Consultancy firm will be hired for formation of FPOs along with Department Officers and within 12 months of existence FPOs will be registered as Farmer Producers' Company (FPO).The Consultancy firm so engaged will be selected through competitive bidding. The Consultancy firm will also help in preparation, execution of the Business Plan of the FPO and increase business turnover of FPOs which will be approved and evaluated by Agri Business Promotion Facility (ABPF). The FPO will have a share capital which will be contributed by the member farmers at the rate of Rs. 1000 per member. The member farmers will collectively perform the various activities for the benefit of members.

The FPO members will engage in production, marketing, value addition etc. in collective or in group basis. For improving cohesion among farmers in an FPO and to perform various activities in collective basis, physical infrastructure will be established at farmers' level, which may be called, Farmer Common Service Centre (FCSC). An FCSCs will be built around farmer producer companies (FPOs) and will be located in production locations and its primary function will be to improve farmers' incomes by aggregation, basic value addition, grading, packing, logistic support and sales facilitation of agricultural produce and marketing of agricultural inputs like seeds, fertilizers etc.

The process of FPO formation and setting up of FCSC will be completed by Consultancy firm with the collaboration of Agricultural Marketing and Agri Business Department. The contract period with the Consultancy firm will be for a minimum of three years (36 months). The project districts will be divided into 5 zones for formation of FPO and Business plan development. Each of the 5 zones will further be divided into 3 sub-zones for implementing in 3 phases of the project viz., 2017-18, 2018-19 and 2019-20. Accordingly, consultancy firm will be hired for 5 zones. Separate FPO guidelines is prepared for TNIAMP and available in the Department Manual.

Formation of FPO:

Steps for formation and activation of an FPO include formation of Commodity Groups, aggregation into an FPO, registration under Company Act , taking up commercial activities, which is envisaged to play a pivotal role in meeting the PDO for diversification, post-harvest management and value addition. The major steps in formation of FPOs are as follows:

Mobilization of farmers and setting up FPO

Major Steps	What are all activities/work	How that should be done	Time Frame	Funds
1. Consultancy services for FPO Formation for 1 year			1 year	1,92,000
2. Engagement of Mobile Training Specialist and Field Organizers by the Deputy Directors of Agriculture (Agri Business) for first year			1 year	4,68,000
2.Baseline survey	Identification of crops with marketable surplus in the selected villages	MTS and FOs along with Department Officials	1month	-
3. Preliminary meeting/awareness campaign @ 2 meetings/10 villages = 20 meetings	Conduct awareness campaign In consultation with local bodies and progressive	By arranging meetings in project villages and dissemination of	2 month	2,00,000

	farmers about FPO. Basic refreshment charges included Campaign to canvas individual farmers to join commodity groups	successful FPO models through audio visual aids, leaflets, literature to the farmers, experts		
4. CGs formation	Collection of land records- forming and naming CGs, make them ready for opening of bank accounts	Creating consensus among farmers to join as commodity groups/FIGs.	3 month	50,000
5. Conducting meeting with Commodity Groups/FIGs	Collection of shares – identifying bank and opening of bank accounts	Pass the resolution for opening of bank accounts and collecting share amount into bank account	2 month	50,000
6. Identifying members for BOD and chairman	Nomination of BOD and Chairman – getting DIN (Director Identification Number) for registration	MTS and FOs along with Department Officials	15 days	
7. Trust Building/ Business Motivation for CGs	Signing EOI between CGs and Private company or Traders & buyers	Through stakeholders meeting and interface workshop	3 months	30,000
8. Registration	Registering under Companies act	With auditor assistance for registration with ROC	15 days	50,000
		Total	**12 months**	**10,40,000**
Support for Business Plan Development and Administration of FPOs				
9. Consultancy services for Business plan development for 2 years	Collection of data for business plan preparation, creating market linkages, capacity building for BoDs, CEO, financial management, preparation of bankable projects with banks for productive investment	Specialist in the team	24 months	11,88,000
10. Startup grant for administrative and contingent expenses	Management, Manpower cost for FPO on subsidized basis, capacity building for BoDs, office rent, electricity and other contingencies.			10,00,000
		Total		**21,88,000**
			Grand total	**32,28,000**

Methodology:

The methodology of formation and activation of FPOs under the project is a modified version of the SFAC approach. Given the existing strength of the Department and the of the project, it is proposed to adopt a flexible method in mobilizing the farmers into Commodity Groups and aggregation of Commodity Groups into Farmer Producer Organizations/Companies during the 1st year. The onus of formation of FPOs shall primarily lie with the Department through DDA (AB) and with support from consultancy firm with effect from other skills and resources required primarily. However, the role of consultancy firm is enhances in enabling FPOs in business turn over (viz., Productive/Capital Investment for FPO), wherein, the role of the Department would be to follow and monitor. This approach is sought to progressively make a FPOs self-reliant and business initiated.

The Deputy Directors of Agriculture (Agri Business) will form FPOs by engaging Mobilization Training Specialists (MTS) and Field Organizers (FOs). The MTS and FOs will be selected by the consultancy firm. However, for administrative norms, the remuneration for MTS and FOs would be disbursed through DDA (Agri Business). A team led by AAO/AO at the field level and consisting of 1 MTS for 2 FPO and 2 FOs for 1 FPO will be engaged under the administrative control of DDA (AB) per district. The team leader or Social Mobilization Experts from the consultancy firm will work in tandem under the overall supervision of DDA (AB) to provide technical support to the MTS and FOs in the formation process.

During the 2nd and 3rd year, the consultancy firm shall develop a detail business plan with a marketing calendar and estimation of working capital, execution support, etc. by engaging subject expert consisting necessarily, of Agri Business Specialist, Market Executive and Account Executive for carrying out the above commercial activities, besides the social mobilization specialist from the first year. The main functions of the Consultancy firm are

a. Training Needs Assessment (TNA) on market linkages and agri business needs of selected Commodity Groups.
b. Assisting FPOs for collection of share capital.
c. Registration of FPOs as
d. Assisting and facilitation FPOs in overall management.
e. Identification of business activities, prepare commercially viable bankable business plan and to get bank finance for the business plan.
f. Assist the FPOs to develop and execute the business plan. And also developing and strengthening the linkages for marketing with other stakeholders.
g. Assisting FPOs in assessment, planning and execution of productive/capital investment.

An work chart with model role defined as follows:

Sl. No.	Activity/Task	Execution Responsibility*		
		Deputy Directors of Agriculture (Agri Business) by engaging the Mobilization Training Specialist (MTS) and Field Officers (FOs)	**Consultancy firm**	**Time Schedule**
a)	**Initiation of Services**			3 Months
1	Interactions with Department of AM & AB Officials understand the Project Details.	✓	✓	
2	Discussion with District officials to understand local needs and Field visit to understand implementation arrangements	✓		

3	Design and develop Implementation Plan.	✓	✓	
4	Base line survey	✓		
5	Organizing awareness campaign.	✓		
6	Identification of existing groups.	✓		
7	Designing Methodology for Formation of groups.	✓	✓	
8	Prepare and submit inception report covering, baseline survey findings, understanding of field activities, and outline of the implementation plan	✓		
9	Make presentation on inception report	✓	✓	
b)	**Formation of Groups / Strengthening of existing groups**			
1	Social mobilization & formation of Commodity groups:	✓	✓	
2	Identification of particular area and particular commodities/ activities for formation of groups under mutual consultation.	✓		5 months
3	(i) Conduct Training Need Assessment and prepare training modules and training material (Notes/CDs/leaflets (including agribusiness activities). (ii) Prepare calendar of training with approval from the Deputy Director of Agriculture (Agri Business).(iii) Conduct Training for the groups on (a) group dynamics, record keeping, group management (b) increasing productivity, market led production, quality improvement.	✓	✓	
4	Submit report of training, list of trained groups and Commodity groups land records, Collection of shares – identifying bank and opening of bank accounts	✓		
3	Identifying members for BOD and Chairman	✓	✓	
C	**Handholding and Linkages of Commodity Groups for their Sustainability**			
1	Mentoring, backstopping and monitoring effectiveness of the groups on regular basis, revising and adapting planning & implementation arrangement to ensure sustainability of groups.	✓	✓	4 months
2	Linking groups with crop production activities.	✓		
3	Jointly organizing training programs for Commodity groups on marketing techniques, market linkages & agribusiness.	✓		
4	Registration	✓	✓	
	Total			**12months**

*- These assigned roles an indicative and would be finalized after mutual consultation between Department and Consultancy firm.

Startup Grant to New FPO:

The Project will support for newly formed FPOs with a bridge funding to meet out the initial expenditure involved in engagement of technical manpower, purchase of office equipment and to meet out the other contingencies immediately after registration of new FPOs through start up grant. This grant will be utilized by the FPO from registration to business take off. Registered FPOs supported by TNIAMP will be eligible. The consultancy firm will prepare proposal to get start up grant from the project and it will be sent to Commissioner of Agricultural Marketing and Agri Business through Deputy Directors of Agriculture (Agri Business). The proposal will be scrutinized by ABPF Cell and it will be approved by TNIAMP Cell. It will be released as grant in aid by Deputy Directors of Agriculture (Agri Business) through ECS to FPOs to meet out the following expenditure:

1. Honorarium to CEO
2. Honorarium to accountant
3. Purchase of furniture and computer
4. To meet out the initial office rent of the FPO immediately after FPO formation
5. To meet out the contingencies like electricity bill and stationery.

The monitoring will be done by the Deputy Directors of Agriculture (Agri Business) on regular basis and Head quarter TNIAMP Cell.

Productive/Capital Investment for New FPO on grant basis:

It is proposed that each FPO will have facilities with the main objective of aggregation of agricultural produce and for providing basic minimum value addition facilities like cleaning, grading, packing and input marketing. The maximum ceiling amount for this component is Rs. 60.00 Lakh per FPO. The quantum of support will be based on the business plan of the FPO. Each business plan will be scrutinized by ABPF consultancy firm who will prepare well defined criteria for selection in consultation with TNIMAP Cell. The procurement of goods, civil works will be done by the FPOs according to the Departmental Procedure.

The Productive investment for New FPO will be released in phased manner as follows:

1. Grant for new FPO (80:20)

The project will support initial infrastructure development, purchase of post-harvest equipment/materials to carry out their business activities. An FPO formed under TNIAMP fund by following the procedure laid down in the TNIAMP and a business plan scrutinized and approved by ABPF Cell will be eligible for getting grant. The business plan prepared by the Consultancy firm will be sent to TNIAMP Cell and the business plan will further be scrutinized by the ABPF Cell and sent to TNIAMP Cell for approval with their objective in assessment and recommendations. Approved FPOs may avail the grant by contributing 20% in a Joint Account after which the project would release 80% subject to a ceiling of Rs. 20.00 Lakh to FPOs account through ECS. MoU would be signed between FPOs and the Department for release of project grant to FPOs. Funds will be released in a phased manner of 50%, 30% and 20% based on performance appraisal by ABPF. Deputy Directors of Agriculture (Agri Business) will monitor the performance on regular basis and report to Head quarter TNIAMP Cell.

2. Business Expansion grant for new FPO (75:25)

A. The project will also support for expansion of business. FPOs who successfully utilized the startup and grant released from the project will be eligible for availing business expansion grant of up to Rs. 30.00 Lakh. The business plan for expansion grant can either be a part of and a progress of the original business plan prepared for availing grant or it may be fresh business expansion plan in addition to or in deviation of the original Business Plan. The

business plan prepared by the Consultancy firm will be sent to TNIAMP Cell and the business plan will further be scrutinized by the ABPF Cell and sent to TNIAMP Cell for approval with their objective in assessment and recommendations. Approved FPOs may avail the grant by contributing 25% in a Joint Account after which the project would release 75% subject to a ceiling of Rs. 30.00 Lakh to FPOs account through ECS. MoU would be signed between FPOs and the Department for release of project grant to FPOs. Funds will be released in a phased manner of 50%, 30% and 20% based on performance appraisal by ABPF. Deputy Directors of Agriculture (Agri Business) will monitor the performance on regular basis and report to Head quarter TNIAMP Cell.

B. Supporting Existing Farmer Producer Organizations:

The project will also support expansion of business by way of grant to execute FPOs registered as per Companies Act provided eligibility criteria framed for such a proposals in met by the FPOs. Inter alia, the criteria should include condition such as;

1. 51% of the members of the existing FPOs should be from the sub-basin area.
2. Minimum turnover of Rs. 25 Lakh /annum with additional condition of selecting the existing FPOs based on the annual business turn over from maximum in descending order to the minimum of Rs. 25.00 Lakh.
3. Minimum 2 years audited balance sheet.
4. Regulatory compliance of FPOs.
5. Credit worthiness of the FPOs
6. Paid up share capital (Rs. 1000/share: proposed

FPO so selected will be supported by the Project through a consultancy firm for 2 years and capital investment (75:25) for expansion of business with ceiling amount of Rs. 40.00 Lakh. The grant will be released in a phased manner.

The business plan prepared by the Consultancy firm will be sent to TNIAMP Cell and the business plan will further be scrutinized by the ABPF Cell and sent to TNIAMP Cell for approval with their objective in assessment and recommendations. Approved FPOs may avail the grant by contributing 25% in a Joint Account after which the project would release 75% subject to a ceiling of Rs. 30.00 Lakh to FPOs account through ECS. MoU would be signed between FPOs and the Department for release of project grant to FPOs. Deputy Directors of Agriculture (Agri Business) will monitor the performance on regular basis and report to Head quarter TNIAMP Cell.

Template for release of grant to New FPOs/existing FPOs is enclosed as Attachment 6.6.a

C. Smart Agri-Marketing Hub: Next Practices for Modernization, Automation and Digitization of Regulated Markets

The presence of a robust, vibrant, better performance of regulated market is mandatory for price-discovery and liberating the farmers from the clusters of private markets. Many of the regulated markets lack modernized infrastructure due to financial limitations.

It is proposed to implement in 3 Regulated Markets on pilot basis for implementation of modernization intervention through ICT and up gradation of infrastructures required for IAMP supported commodities. Proposed infrastructures are integrated pack house, grading, sorting hall and auction hall, etc., and other post-harvest infrastructures. The investment in infrastructural up gradation will yield its benefits by increased arrivals of fruits and vegetables and other commodities, supported by IAMP. To execute the project as pilot basis through diversification and post-harvest management, the budget provisions on 75:25 matching grant basis are made for

- Gap filling Infrastructure Facilities such as drying yard, pack house, godowns, auction halls and Post-harvest materials, machineries.
- Modernization with automation using ICT tools, app development with 3 selected Regulated Markets for enabling e-tendering system
- ISO Certification for 3 Selected Regulated Markets.

These interventions will improve the functioning of regulated markets. Infrastructures will be assessed on the needs and affordability of the Market committee on Capital investment. The Salient features learned or identified from the pilot study will provide a base for up scaling of other regulated markets.

Piloting e-Negotiable Warehouse Receipt:

The Department will pilot (e) Negotiable Warehouse Receipt model (e- NWR) for mitigating price risk to farmers on tripartite agreement among beneficiaries, private and public sector banks and Collateral Management agencies. Pilot investment is also proposed in 4 selected godowns adopting following 4 different approaches.

1. Existing regulated market 1000 Mt storage godown/PACB (either actual amount or ceiling of Rs. 15.00 Lakh)
2. New 1000 Mt godown closer to farms as back ended support (70:30 @ Rs. 30.00 Lakh from project fund)
3. New 2000 Mt godown in Regulated Market/PACB (50:50 @ Rs. 100 Lakh from project fund)
4. New 1000 Mt godown for agro based entrepreneur as back ended support (75:25 @ Rs. 25.00 Lakh from the project fund)

The pilot investment will be made by adopting the modalities of accreditation of godowns and also procedure of appointing Collateral Management Agencies.
Based on the success of piloting, the successful models will be expanded for which financial allocation has been proposed.

4.4.2 Promoting Agri Enterprises:

Agriculture and Horticulture Department has planned for intensification and diversification of crop production activities, which leads to increased crop production. In this context, absence of local entrepreneurship, the opportunities in agriculture are benefited by outsiders, particularly the urban businessmen and traders, leading to exploitation and deprivation of employment for the farmers. Considering the growing unemployment in rural areas and slow growth of the agricultural sector, it is necessary to tap the opportunities for promoting entrepreneurship in agriculture, which in turn can address the present problems related to agricultural production and profitability.

A. Setting up of Agri Business Promotion Facility (ABPF)

For promoting Agri enterprises, foster backward and forward linkages in the value chains for agricultural products, facilitate access to finance for Micro, Small and Medium Agri Based Enterprises (MSMEs) and agribusiness entrepreneurs, the project will establish an Agri-Business Promotion Facility (ABPF).

ABPF will create a body of knowledge; facilitate the development of a network of market/producer linkages, Organizing interface workshops, consultative meetings, seminars with stake holders and banks. Assisting Micro, Small and Medium Agri Based Enterprises (MSMEs) to prepare proposals to access Government grant schemes and bank financing. It will encourage PPP mechanism which will facilitate crop based approaches and disseminate successful business models that emerge from the project's interventions.

The budget provision is earmarked for the following activities:

i. Recruitment of Consultancy firm for five years on contract basis.
ii. Consultant for value chain analysis, Market research studies, other impact studies and Study on business model of direct farmer to consumer sales through mobile interface.
iii. Facilitating PPP Mechanism includes interface workshop, seminars, conferences, preliminary consultative meeting with institutions, private sector, publicity propaganda, etc.

Formation of ABPF Cell at Head Quarters:

ABPF cell will be established in the Department of Agricultural Marketing and Agri Business. It will be managed and operationalized by the Consultancy firm. The consultancy firm will deploy required Agri Business consultants for potential zones, for which provision has been made to have one Agri Business specialist for each zone. The entire work of ABPF will be supervised by TNIAMP cell.

Consultancy Services:

The Consultancy firm consists of Senior Agri Business Specialist, Banking Specialist, Agri Finance Specialist, Program Manager, Market Linkage Specialist and supporting staff like Civil architect, IT Specialist, Data Entry Operator and Record Maintainer and 5 Agri Business Specialist for 5 zones for the implementation activities of ABPF Cell. The consultancy firm will be selected by Quality Cost Based Selection method as per the World Bank Procurement guidelines.

The MoU will be signed with the selected consultancy firm for the following major activities: a) to assist and provide required guidance to the IAMWARM Cell (IAMP) in overall co-ordination and implementation of the program; b) TORs preparation for consultancies for value chains studies, impact studies, marketing research studies, Study on business model of direct farmer to consumer sales through mobile interface, c) to study and evaluate business models for Agri Entrepreneurs and FPOs; d) Organizing trainings, workshops, consultative meetings with stakeholders and banks; e) Bringing the investment from the private sector under PPP mechanism; f) Training to entrepreneurs g)Business Plan development for agri-enterprises h)Credit facilitation and business execution support for agri-enterprises through service providers; i) responsible for achieving the project target for leveraging of investments from private companies, farmers, banks and Government and j) Follow up action for the studies should be framed and subsequent interventions for entire State should be designed as proposals.

The major activities of Agri Business Specialist in the 5 zones are listed below:

1. Organizing trainings, workshops, consultative meetings with stakeholders and banks at zonal level.
2. Bringing the investment from the private sector under PPP mechanism
3. Business Plan development for agri-enterprises
4. Credit facilitation and business execution support for agri-enterprises through service providers
5. Responsible for achieving the project target for leveraging of investments from private companies, farmers, banks and Government and
6. Follow up action for the studies should be framed and subsequent interventions for zone should be designed as proposals.

Hiring of individual consultants/Specialists for TNIAMP Cell:

The existing organization strength available in the Headquarters of the Department and also the present Government procedure of promotion and deployment of the senior officials do not provide an atmosphere of stability and long term association in the TNIAMP planning and implementation for next 6 years. In order to find the solution for this existing

lacuna, it is proposed to immediately recruit individual consultants in a phased manner to assist TNIAMP cell and also in overall co-ordination and implementation of the program.

The major responsibilities of the consultants are listed below:

1. To execute all preliminary activities before implementation of the project such as arranging training for field officials in mobilization of farmers into Commodity Groups.
2. Identification of 40 existing FPOs to be funded by the project.
3. Preparation of plan of action for creating Smart Agri-Marketing Hub (Regulated Market).
4. Consultative meeting with bankers and taking up all actions for selected banks (both private and public) to form consortium to provide project financing, gap financing, working capital financing to FPOs, agri-entrepreneurs, agri-enterprises etc.
5. Reporting system for all interventions should be developed.
6. To assist TNIAMP Cell in preparation of proposals for administrative and financial sanction.

B. Consultancy for value chain analysis/ Marketing Research /impact study:

7. Value Chain analysis studies for pulses, maize, vegetables, banana, millets, oilseeds, chilies, turmeric, cut flowers and mango.
8. It is programmed to conduct study to market the farmers produce directly to the consumer through online marketing in which main focus will be traditional product available in the District suitable for online marketing. The outcome of the study highlighting the issues to be addressed and strategies to be followed for creation of on-line marketing of the FPO Produce should enable to be handled through separate agency.
9. Studies should be taken for online marketing possibility in the District as well as State Headquarters.
10. Actual financial implications involved in marketing the selected agro product through online marketing.
11. Study of major products marketed through online marketing.
12. Study of forward and backward linkages involved in the online marketing.
13. Comparative study of online marketing followed by different companies and suggest successful model of online marketing in this project.
14. Studies result should be obtained through the implementation of the online marketing in the delivery hub as well as from the procurement center.

Facilitating PPP Mechanism:

It is proposed to conduct interface workshops, seminars, consultative meeting and conferences at State level and District level periodically during all six years project period for market linkages with stake holders and banks.

Outcome of the PPP Mechanism:

1. No of private companies invested in the project
2. No of private companies signed MoU.
3. Value of the commodities procured by the private companies.
4. Dovetailing of funds to the private companies from Government Schemes.

Publication:

Documentation of various activities under this intervention will be taken out periodically of the project and the cost will be shared with advertisement charges.

Supporting Agro-entrepreneurs to provide services to farmers:

The TNIAMP emphasis is that the farmers should be benefited through the strengthening of individual agro entrepreneurs and also up scaling small and medium

enterprises in the State. In order to achieve this objective, the following processes of activities are proposed as follows:

i. Facilitation workshop involving the lead farmers, eligible women, existing entrepreneurs, new entrepreneurs etc.
ii. Suitable participants will be selected from the workshop for undergoing Training for Entrepreneurship
iii. The trained entrepreneurs who are selected from above training will be assisted for Business Plan development
iv. The same entrepreneurs who have availed business plan assistance will be provided with the Credit facilitation and business execution support through service providers.

Another important target of agri-entrepreneurship development is to focus on women individual agri-entrepreneur.

Grant for Women entrepreneurs (50:50):

The project will promote agro entrepreneurship by women entrepreneur in the area of value addition, food processing etc. Women farmer from the sub-basin who have undergone certificate training to be priority specified and acquired, minimum education qualification with capacity to invest for the business will be supported up to 50% of the total project cost or to a maximum of Rs. 5.00 Lakh whichever is less. The business plan prepared by the Consultancy firm will be sent to TNIAMP Cell and the business plan will further be scrutinized by the ABPF Cell and sent to TNIAMP Cell for approval with their objective in assessment and recommendations. Approved women entrepreneurs may avail the grant as back ended by contributing 50% after which the project would release 50% subject to a ceiling of Rs. 5.00 Lakh to women entrepreneurs account through ECS. MoU would be signed between women entrepreneurs and the Department for release of project grant to women entrepreneurs. Deputy Directors of Agriculture (Agri Business) will monitor the performance on regular basis and report to Head quarter TNIAMP Cell. Template for release of grant to women entrepreneurs is enclosed as Attachment 6.6.b

All the proposal will be evaluated by ABPF Cell and reviewed, selected by the reviewing committee constituted as detailed below:

1. Commissioner of Agricultural Marketing and Agri Business
2. Joint Director of Agriculture (IAMWARM)
3. Joint Director of Agriculture (Agri Business)
4. Joint Director of Agriculture (Regulated Market)

Selection Criteria:

1. Agri Entrepreneur should be from farmers' background and agro enterprise.
2. The Agri Entrepreneur should be registered and produce authenticated documents.
3. The Agri Entrepreneur should have its own share capital or it may have borrowed share capital or it may have borrowed share capital from bank for the authentication should be produced.
4. The capital investment of Agri Entrepreneur should be in the range of 5-10 Lakh.
5. The Agri Entrepreneur should have the sufficient fund flow.
6. The Agri Entrepreneur must obtain required license from statutory institutions.
7. Preference will be given for the Agri Graduate starting with new Entrepreneur.
8. The Agri Entrepreneur preferably involved in procurement of produce directly from the village farmer.
9. The Agri Entrepreneur involved in food processing and value addition of agriculture produce may also consider for the support.

4.4.3 Institutional Strengthening and Capacity Building:

The Government of Tamil Nadu Agriculture Marketing and Agri Business department have significant capacity gaps in agribusiness and agriculture marketing. Build up the technical capacity of its staff, the project would support technical trainings in agribusiness, agriculture marketing, supply chain management and other relevant topical issues; exposure and learning visits (domestic and international) to learn nuances of agribusiness development; Technical training like Market Intelligence, Reduction of Post-harvest losses, Food processing and value addition, Agri Entrepreneurship Development Program, Export promotion etc. through the institutions like MANAGE, NIAM etc.

Selected successful models will be taken for exchange / exposure visit. The knowledge gained from this model and it can be adapted to our existing model. So that it become a successful model in the state. These activities will create well educated, intelligent Agriculture Market environment in the State.

Chapter 5: Component C: Project Management Support

Though the project will be implemented through Water Resources Department in partnership with other implementing agencies like Departments of Agriculture, Agricultural Engineering, Agricultural Marketing and Agribusiness, Horticulture, Animal Husbandry and Fisheries; Tamil Nadu Agricultural University, Tamil Nadu Fisheries University, and Tamil Nadu University of Veterinary and Animal Science, The Multi-Disciplinary Project Unit (MDPU) headed by the Project Director and located in WRD will provide management support and co-ordination. Nodal officers have been designated in all the implementing agencies for coordinating implementation of project activities pertaining to their department and university.

Individual project components (and sub-components) will be implemented by Departments of Water Resources (Lead Agency), Agriculture, Agriculture Engineering, Horticulture, Animal Husbandry, Fisheries and Agriculture Marketing, Tamil Nadu Agricultural University, Tamil Nadu Veterinary and Animal Science University, Tamil Nadu Fisheries University..

The Multi-Disciplinary Project Unit (MDPU) established under the IAMWARMP will serve as the management and coordination unit for the project, with need-based modifications. The MDPU will coordinate and catalyze departments for preparation and implementation of annual project budget, sub-basin development plans, and implementation progress reports. The MDPU will provide knowledge support on M&E. procurement and fiduciary related actions of the departments/implementing agencies involved in the project.

Chapter 6: Project Implementation Processes

The project will be implemented over a period of seven years. The lead implementing agency will be the Water Resources Department (WRD) under the administrative jurisdiction of Principal Secretary, Public Works Department (PWD), Government of Tamil Nadu (GoTN). Other implementing agencies will be the Departments of Agriculture, Agricultural Engineering, Agricultural Marketing and Agribusiness, Horticulture, Animal Husbandry and Fisheries; Tamil Nadu Agricultural University, Tamil Nadu Fisheries University, and Tamil Nadu University of Veterinary and Animal Science. The Multi-Disciplinary Project Unit (MDPU) headed by the Project Director and located in WRD will provide management support and co-ordination. Nodal officers have been designated in all the implementing agencies for coordinating implementation of project activities pertaining to their department and university. It is important that both at the state level and at the implementation level there is shared understanding about the different activities to be converging at the sub basin level. To achieve such a convergence and to ensure smooth implementation of activities in a cascading and coordinated manner, the project will follow a process approach.

6.1 Sub basin level convergence

The project will converge all its activities at the sub basin level. A sub basin committee will be constituted by EE (WRD) with all Nodal Officers of line departments as members at the sub-basin level. The sub basin committee will ensure that all activities of the line departments converge at the sub basin and farmer level. This committee has powers to decide on the sub-basin development plans through interactive sessions. In the meantime, the MDPU will function as the most important coordination hub to help different agency activities happen around the sub basin. This will be ensured through a cascading set of activities leading the preparation of a sub-basin development plan (SBDP). The first set of the activity in the sub-basin will be an assessment of the base line situation which will help agriculture, horticulture and other departments to explore the scope of various activities. Important data will be collected for all the sectors will be gathered to decide on possible interventions. Representatives of the different department along with other stakeholders will undertake various participatory exercises including joint walk through. Various interventions including improvements and building of irrigation infrastructure required for the tank system will also be explored. Parallel to these farmers will be motivated to form Water User Associations (WUA) and the existing ones will be strengthened. All these activities are documented into a comprehensive Sub basin development plan. The format/ checklist for the preparation of DPR/sub basin development plan is given in Attachment 6.1.Thus the project will follow a process approach which will involve cascading steps of preplanning, planning implementation and post implementation. Each of the stages has various activities which will be carried out in a step-wise sequence. The planning stage will result in the Sub basin development plan which will be accepted by all stakeholders. The Sub basin development plans developed, because its follows a participatory and convergent process will be addressing local priorities and geographical needs. Above all the plans will be owned by all important stakeholders. The planning will cascade into implementation and continued management. The whole process could be visualized in to a scheme cycle. The time lines in the scheme cycle and contain of a Sub basin development plan will help the implementing entities with a shared understanding of the needs and requirements in each sub basin. In addition the different department will be able to time their activities in sequence and in sync with the agro climatic and socio economic needs in each sub basin.

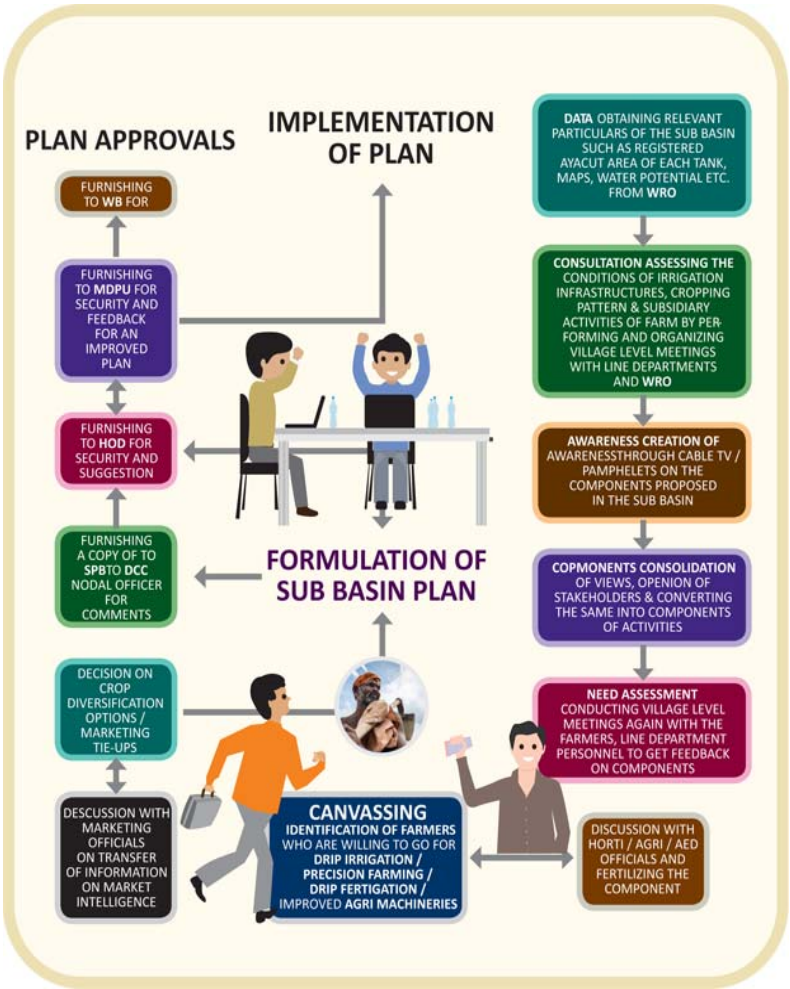
The process of preparing SBDPs, covering engineering and agriculture (crops, horticulture, livestock and fishery) aspects, developed and refined under IAMWARMP will be followed. The plans are prepared in a participatory manner, with the involvement of the

field staff of all the implementing agencies, WUAs, farmers, traders, civil society and other stakeholders in joint walk through of the irrigation infrastructure and consultation sessions in several villages in the sub-basin irrigation commands. Requirements of modernization of irrigation infrastructure are tailored to meet the needs of crop, horticulture, livestock and fish production. Focus crop, horticulture, dairy and fish production interventions appropriate for the sub-basin are identified, and the specific agricultural, horticultural, dairy and fish production, and on-farm irrigation technology options, marketing strategies and other interventions are prioritized.

Implementation of various activities contained in SBDPs will be the responsibility of the concerned implementing agency The MDPU will ascertain that an integrated development plan is being implemented through receipt of monthly and quarterly reports. MDPU will also ensure that the sub basin development plan are prepared in an integrated manner and agreed by the respective agencies. The MDPU will also appraise the plans to ascertain its completeness and have followed due processes. Physical and financial progress will be monitored at the MDPU by a unit which will also oversee the work of the monitoring and evaluation consultancy. Monitoring of project outputs and outcomes will be undertaken by an independent consultant under the guidance and supervision of MDPU in addition to line agency internal monitoring and reporting systems

Most of the physical investments are of an engineering nature and all engineering designs will be subject to the technical sanction by the respective Regional Chief Engineer and the Chief Engineer (Plan Formulation). This process will be facilitated by the project cell located in the Engineer-in-Chief's office and the convergence mechanism is diagrammatically presented in Figure 6.4.

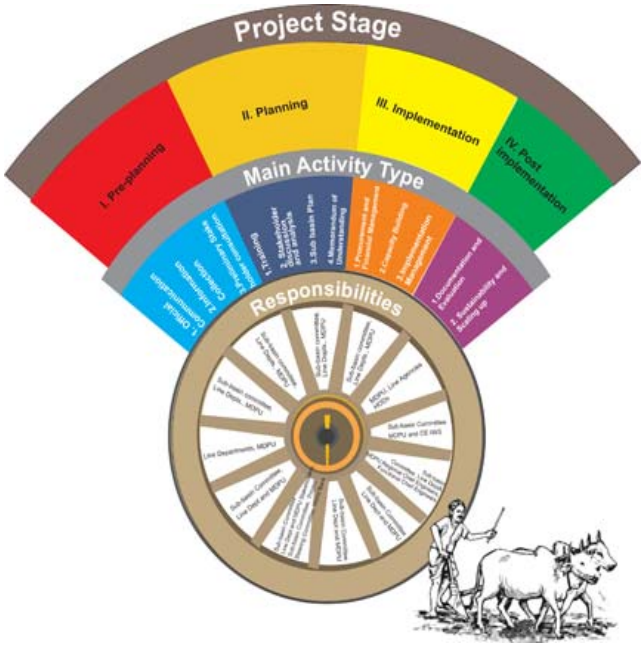
Figure 6.4: Convergences of Sub Basin Level Project Activities



6.2 Sub basin Project Processes

The operational process for implementation of the project at the sub basin level consists of the different stages and activity types shown in Figure 6.1.

Figure 6.1 Sub basin Project Processes



The main project activities in each of the project process stage, its objectives and sharing responsibilities for implementing the activities are summarized in Table 6.1.

Table 6.1 :Operational Processes for Project Implementation

Project Stage	Main Activity Type	Objectives	Responsibilities
I. Pre-planning	1. Official Communication	Ensure appropriate institutional arrangements to initiate activities at Sub-Basin level	MDPU, Line Agencies HODs
	2.Information Collection	Develop initial knowledge base for stakeholder consultation and analysis; develop shared inter-agency vision of Sub-Basin characteristics	Sub-basin Committee (with Sub-basin Atlas, presentation, and fly-through finally collated by MDPU and CE IWS)
	3.Preliminary Stake holder consultation	Obtain stakeholder perspectives on key issues in improving irrigated agriculture and water productivity to help guide Sub-Basin planning	Sub-basin Committee with Line Dept& MDPU assistance with due support from Regional Chief Engineers and Functional Chief Engineers of WRD
II. Planning	1.Training	Improve stakeholder awareness of project activities (e.g. modern approaches to irrigated agriculture) to build capacity to be partners in developing Sub-Basin plans	Sub-basin Committee with Line Dept and MDPU assistance

	2. Stakeholder discussion and analysis	Merge technical analysis and stakeholder views on hardware (e.g. construction) and software (e.g. capacity-building) options to included in the Sub-Basin plan	Sub-basin Committee with Line Dept and MDPU assistance
	3.Sub basin Development Plan	Develop appropriate Sub-Basin Development plan to be supported under the project consistent with project objectives and design	Development: Sub-basin Committee with Line Dept and MDPU assistance Appraisal: MDPU Approval: Stakeholders, Sub-basin Committee, line agencies, MDPU, Project Steering Committee, World Bank
	4.Memorandum of Understanding	Line departments and project stakeholders agree on what is to be implemented, and where, how and when	Sub-basin Committee with Line Dept and MDPU support
III. Implementation	1.Procurement and Financial Management	Effective and transparent procurement and financial management undertaken	Line Departments, MDPU
	2.Capacity Building	Capacity-building of stakeholders to help become partners in project activity implementation and quality management	Sub-basin Committee, Line Depts. and MDPU
	3.Implementation Management	Project activities implemented as designed and any changed agreed upon by all parties	Sub-basin committee, Line Depts., MDPU
IV. Post implementation	1.Documentation and Evaluation	Ensure that activities conducted as part of the project are well-documented and lessons learned are captured and used	Sub-basin committee, Line Depts., MDPU
	2. Sustainability and Scaling up	Ensure sustainability of project activities	Sub-basin committee, Line Depts., MDPU

6.3 Overall Project Implementation Frame Work

As the project implementation responsibilities are spread over all participating departments it is important that responsibilities are clearly earmarked. It is also important that the activities are converging at the sub basin level and to be orchestrated into a sub basin level plan. Such a sharing of responsibilities and key actions is being achieved through the implementation frame work. The Figure 6.2 shows the overall implementation arrangement showing different entities partnering in the implementation process and the overall sharing of responsibilities for project implementation is summarized in Table 6.2.

Figure 6.2: Overall Implementation Structure (to be modified)

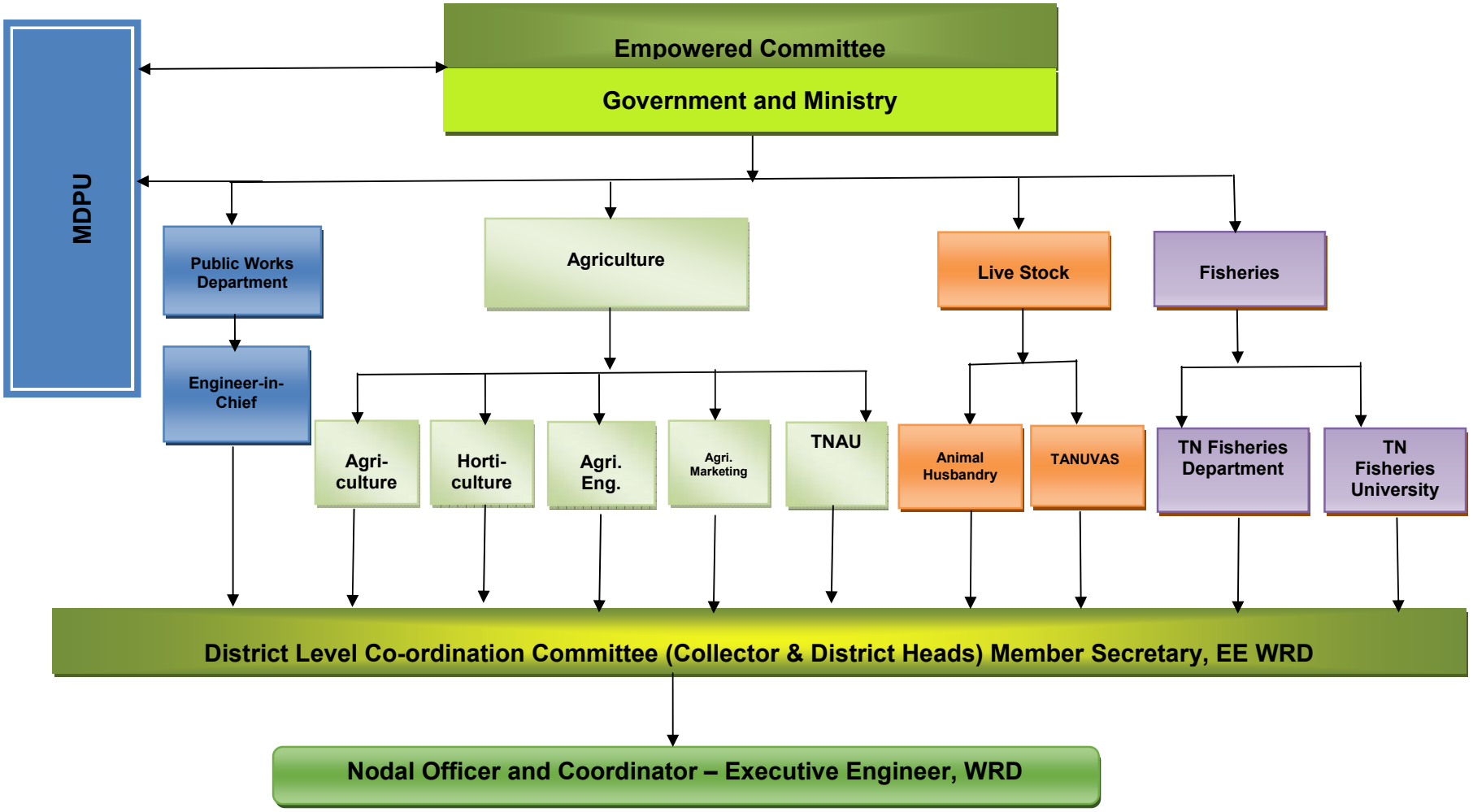


Table 6.2: Overall Sharing and Convergence of Project Implementation Responsibilities

Sub-Basin Plan Stage	Implementing Agency								
	WRD	**AED**	**Agri**	**Horti**	**Marketing**	**TNAU**	**Fisheries**	**Animal Husbandry**	**MDPU**
I. Pre-Planning	• Collate maps, data on Sub-Basin irrigation and drainage infrastructure, extent of irrigation, water potential, quality (incl. data from IWS and SGSWRDC) • Topo Survey completed • Conduct review with Line Department and share the data on Irrigation Infrastructure with Ayacut details	• Assess the suitable fields for promoting Rain water Harvesting , Farm Ponds etc •	• Collate maps, data on current cropping pattern, soil maps, suitability for other crops, crop water requirements, pesticide, quality seeds and fertilizer use by type, adequacy of extension service,		• Locate and assess existing markets for key inputs and Agri/ Horti outputs, agro processing facilities associated with this Sub-Basin • Assess markets for current and potential crops (in consultation with WUAs,/consumers group if any , traders, Factories, businesses and other line agencies)	• Extent of SRI use in paddy, and precision farming in Sub-Basin • Assess the scope for introducing SSI • Focus Crops and their productivity issues	• Current and past production of various species of fish • Assess current and potential market potential	• Assess population and health status and services of livestock and current milk yields • Assessing the infrastructure in veterinary institutions • Selection of site for production plant	• Frequent interaction with all line agencies
	TOOLS • Sub-basin Atlas – first draft • Monitoring Arrangements • Stakeholder Meetings (incl. with WUAs or farmer groups) • Joint Walkthrough								

II. Planning	• Assess irrigation and drainage infrastructure (incl. canal and tank systems) condition and modernization requirements and costs • Water balance studies for supply (surface and ground water) and demands (under various cropping patterns and other uses) • PIM and Env /Social Cells formulate Plans • Designs and costing & vetting by WRD Regional CE, DRCS, PF & TNIAMP (IAMWARM II)Cell	• Identification of farmers and field for new technologies • Collect tank wise details • Prepare Ayacut map • Prepare Examine the possibility for water harvesting structures like farm ponds • Establishing quality control measures	• Assess the soil quality • Quantify the number of demonstrations on INM, IPM, • Quantify the required inputs like seeds, bio-fertilizer, and timely supply • Promoting organic farming • Possibility of utilizing the services of Agri-clinics and NGOs • Strengthening the extension service	• Assess soil nutrient status • Availability of quality seeds for hybrid varieties • Promoting Micro irrigation with fertigation • Identification of farmers field for demonstrations • Suggesting cropping pattern and the extent of diversification	• Propose correct market linkages with reference to the market intelligence data • Propose suitable infrastructure for better marketability and value addition measures • Promote contract farming avoiding third party interference in marketing • Develop skill for Agri business entrepreneurship by farmers/WUAs	• Consult with sister departments on the profitable and suitable crops that ill suit the agro-climatic condition • Propose adequate large scale demonstrations for SRI in Paddy • Propose farmers friendly TOT from lab to farm • Propose suitable farm implements and machinery for drudgery reduction to achieve increased productivity	• Propose aquaculture development in adequate number of tanks in the Sub-Basin in consultation with the WUAs • Different species for different Sub-Basin depending on the period of storage in the tanks • The infrastructure improvements needed for rearing fingerlings are to be suggested	• Selection of farmers for formation of Dairy Interest Groups • Identify the farmers willing to take fodder cultivation • Identify areas for conducting camps • Selection of youth for training as AI technicians • Identifying sources for procurement of breeding inputs, drugs, medicines and equipment • Identify centers for providing capacity building • Identify farmers for distribution of TANUVAS GRAND supplement and Mineralized salt lick production unit .	• Frequent interaction with all line agencies • Consolidation and appraisal (technical, economic, environmental, social) of each Sub-Basin plan • Liaise with Empowered Committee and World Bank for plan clearance
	• Detailed Sub-basin Atlas (for planning) • Stakeholder Meetings • Monitoring arrangements – finalize Sub-basin Baseline • Training, including TNIAMP (IAMWARM II)Field Day, study tour/awareness visits • Sub-basin Committee Meetings to finalize Sub-Basin Plans in consultation with HODs and District Coordination Committee and sent to MDPU • • MOU agreed (incl. farmer/WUA contribution to their O&M fund)								

III. Implementation	• Procurement process for Sub-Basin plan implementation initiated (e.g. bid documents prepared, evaluation, empowered committee clearance, agency selected, work initiated…)	• Procurement process for formation of farm ponds with necessary MOU arrangements •	• Demonstration fields identified and timely supply of inputs to be ensured • Procurement process to be followed • IPM and INM demonstrations to be arranged • Replication of demonstrations to be enlarged through media campaigns and publicity materials	• Arrange field days at critical stages of crops and on important field operations • Arrange exposure visits and workshops for promoting diversification • Procurement process to correctly followed for input supply	• Procurement process for construction of godowns, kiosks, threshing floors, weighing scales • Tie up with CII and DEMIC, TNAU for promoting Agri-business entrepreneurship with WUAs • Product specific and commercial specific grading, collection centers pack houses to be made ready adhering to quality control measures	• Layout of demonstrations and supply of inputs to be made available at all plots • Number of demonstration on SRI technique should be more with adequate awareness creation • Drip and sprinkler arrangements with fertigation etc should also form part of demonstrations • Adoption of mechanized system to be effectively demonstrated	• Procurement of cages, gratings, nets and fish feeds to be done promptly • Correct quantity of fingerlings to be made available for aquaculture in farm ponds and tanks from fish rearing centers to be ensured • Adequate trainings to farmers/WUAs to be arranged • Kiosks at suitable locations to be provided in consultation with the WUAs	• Formation of DIGs • Conducting various demos • Initiate procurement process for timely supply on inputs and equipment • Encourage identified farmers for quality fodder production by supplying quality seeds • Ensure supply of medicines, Frozen semen in adequate quantity for improved livestock health • Performing AI on mobile by AHD and AI technicians. • Setting up of TANUVAS GRAND production plant and supply of TANUVAS GRAND and Mineralized salt lick production unit to identified farmers in DIG.	• Frequent interaction with all line agencies • In prior review cases, MDPU vets and obtains clearance from PSC/Empowered Committee and World Bank
	• Supervision and Quality Management • Strengthening institutions with computer and IT net work connectivity • Monitoring progress by all HODs and District level and Sub-Basin committees • Training, including TNIAMP (IAMWARM II)Field Day(s), study tour/awareness visits • Financial Management (incl. reimbursement) • Completion Report by Agency								

IV. Post-Implementation	• Discuss additional activities required with WUA for sustainability • Develop detailed WRD&WUA O&M plan for Sub-Basin	• Develop O&M plans for maintenance of Drip and Sprinkler systems with WUAs • Ensure that farm ponds formed are sustainable for aquaculture	• The impact of demonstration to be documented effectively for the farmers group to keep it as model for future adoption • Field day meetings to continue	• The spread of latest technology on raising horticultural crops in line with the NHM to be ensured • The effect of exposure visit for increasing productivity to be made dynamic by the WUAs	• The benefits of improved marketability of Agri- produce to be documented and the WUAs to be trained to keep this process continuing • Maintenance of the infrastructure by the WUAs to be made mandatory through MOUs • Lending Institutions to tie up with WUAs in Agri –business activity	• The yield increase due to adoption of SRI to be quantified and remedial action to be suggested wherever there is shortages • The tested technology for Maize, Groundnut, and vegetables to be expanded by WUAs • The adoption of more machinery in agriculture to be encouraged through tie up with lending institutions	• The farmers themselves should take aquaculture • Kiosks to be run by the WUAs	• The sustainability of improved cattle health to be ensured through effective awareness campaigns • Conducting impact studies on milk production.	• Frequent interaction with all line agencies • Prepare Sub-basin ICR with assistance of M&E Consultants • Discuss Sub-basin ICRs in groups with PSC
	• Develop a Sub-basin ICR and contribute to project Monitoring & Evaluation • Revision for Sub-basin Atlas and inputs to next year's Sub-Basin Plan • Adequate trainings on O&M for all WUAs and agencies to be ensured at last for some periods beyond the completion of packages								

6.3.1 Common Activities of All Agencies

Though individual domains of activities and responsibilities are assigned to different in implementing agencies, there is a common thread of activities around which all agencies have to converge their efforts. Such common activities to be shared by all departments are summarized in Table 6.3.

Table 6.3: Shared Common Project Implementation Activities

Main Activities	Expected Output	Responsibility sharing
Pre Planning Stage		
1.Officcal Communication		
Communication to initiate activities in Sub Basin, fill posts, appoints nodal officers, setup sub basin committee. Acquaintance with interdepartmental officers	• Official Communication	MDPU, Line Agencies HODs
2.Information Collection		
Collect relevant reports, data, maps to assist with Sub basin development planning develop sub basin baseline Initiate surveys Document Information	• Sub-basin Atlas drafted (description of different aspects of Sub-Basin and baseline information with illustrative maps, charts, photographs, tables), including description of physical setting/ topography, climate, hydrology, schematics of water network, agriculture/ irrigation/ tank systems status, cropping patterns, livestock, key markets, economy, institutions, potential partnerships • Presentation on Sub-basin (with relevant maps, data, and Google Earth or equivalent fly-through of Sub-Basin showing key features)	Sub-basin Committee (with Sub-basin Atlas, presentation, and fly-through finally collated by MDPU and CE IWS)
3.Preliminary Stakeholder Consultation		
Identify key stakeholders (informal and formal WUAs, Progressive farmers, women,SC/ST,fisher folk, livestock owners, local Agri-entrepreneurs) and initiate stakeholder consultation Prepare communication materials on project (basic project information-objectives, types of activities envisaged, activities initiated/completed elsewhere under project, environmental and social management framework summary) Communicate project information to local stakeholders and obtain initial feedback Undertake joint walkthrough(s) to determine key issues and options in consultation with local stakeholders (formal or information WUAs and other stakeholders) and using Sub-Basin atlas(taking photographs, videos)	• TNIAMP (IAMWARM II)Awareness Day(s) held • Joint Walkthrough Report (integrated across agencies and indicating a few strategic problems/issues to be addressed in Sub-Basin and a brief discussion of possible options – represented on a map wherever possible and with illustrative photographs and video footage) • Document list of stakeholders consulted	Sub-basin Committee with Line Dept& MDPU assistance with due support from Regional Chief Engineers and Functional Chief Engineers of WRD
Planning		
1. Training		
Identify immediate capacity-building needs (technical, administrative, other) Identify appropriate sites for awareness visits Identify appropriate stakeholders (in an open and transparent manner) for awareness visits and training activities Identify stakeholders who could be good trainers in future	• Training/Capacity-building plan developed for planning stage • Awareness visits undertaken (coordinated across line agencies wherever possible)	Sub-basin Committee with Line Dept and MDPU assistance

2.Stakeholder Discussions & Analysis		
Identification of hardware and software options (all key options should be considered including a no-activity option) Preliminary identification of sites for project activities in consultation with stakeholders	• Sub-basin committee, Line Depts., MDPU Maps with identified sites, options • Preliminary analysis of options (including cost estimates, operation & maintenance implications, successful demonstrations elsewhere, etc.)	Sub-basin Committee with Line Dept and MDPU assistance
3.Sub-basin Plan		
Develop Sub-basin Plan and discuss plan with stakeholders, line agencies and MDPU Appraise Sub-basin Plan from technical, environmental, social, and economic perspectives Ensure plan is approved at all levels	Sub-Basin Plan consisting of: • Finalized Sub-basin Atlas • Summary of Consultations • Summary of Technical Analysis • Proposed Hardware and Software activities as part of Sub-Basin plan with costing, farmer contribution, and implementation arrangements • Economic Analysis (overall costs, benefits, net benefit stream/IRR) using standard spreadsheets • Environment and Social Management Plans (including for resettlement and rehabilitation, dam/tank safety, silt disposal, IPM/INM/organic activities, water saving, gender and vulnerable group activities, grievance, redress, etc.) • Proposed Schedule of Activities (developed with Microsoft Project or equivalent) • Presentation and Discussion of Sub-Basin Plan (to stakeholders, district collectors, line agencies, MDPU and Project Steering Committee)	Development: Sub-basin Committee with Line Dept and MDPU assistance Appraisal: MDPU Approval: Stakeholders, Sub-basin Committee, line agencies, MDPU, Project Steering Committee, World Bank
4.Memorandum of Understanding		
Develop draft MOU Discuss and agree with stakeholders	• Memorandum of Understanding signed by all line departments and stakeholders (e.g. relevant WUAs) at Sub-basin Plan Signing Ceremony to officially launch implementation	Sub-basin Committee with Line Dept and MDPU support
Implementation		
1.Procurement and Financial Management		
Procurement initiated (with appropriate approvals) Works: bid documents prepared Goods: specifications developed Contract staff/consultancy: terms of reference/RFP Bank procurement processes followed as outlined in project documents Financial Management (incl. reimbursement) undertaken	• Procurement implemented (e.g. contracts signed, goods procured, contract staff in place) • Regular accounting/ audits/ reimbursement	Line Departments, MDPU
2. Training/ Capacity-Building		
Training Explore partnerships with other institutions to strengthen implementation and sustainability	• TNIAMP (IAMWARM II)Field Days (across departments) • Study Tours/Awareness Visits • Training activities • Partnerships with other institutions	Sub-basin Committee, Line Depts. and MDPU
3. Implementation Management		
Continuous and close monitoring of project implementation (Project Monitoring Information System continuously updated) Quality Management procedures applied (through stakeholder/WUA social audits, Sub-Basin committee, line agency, MDPU and quality management and monitoring consultants; OK-card system developed to document sign-offs at each stage of implementation by department and	• Updated Project Monitoring Information System • Monthly Sub-basin Project Status Summary by Line Agency • Quality Management and Monitoring Reports • Monthly & Quarterly Progress Report (collated by MDPU) • Final Completion Report by implementing agency (line dept.)	Sub-basin committee, Line Depts., MDPU

stakeholders) Documentation of implementation status and issues for resolution		
Post-Implementation		
1. Documentation & Evaluation		
Develop a Sub-basin ICR (integrated across all line dept. activities) and contribute to project Monitoring & Evaluation Revision for Sub-basin Atlas and inputs to next year's Sub-Basin Plan Adequate trainings on O&M for all WUAs and agencies to be ensured at least for some periods beyond the completion of packages	• Sub-Basin ICR & Workshop • Final Sub-basin Atlas	Sub-basin committee, Line Depts., MDPU
2. Sub-basin committee, Line Depts., MDPU		
Develop any further Sub-basin Partnerships Continue post-implementation monitoring Determine approaches to address any identified gaps in ensuring sustainability of project investments Determine approaches for up-scaling activities (including any follow-up project activities)	• O&M Plan for Project • Revised Sub-Basin Plan & Workshop (indicating partnerships, critical areas for follow-up, ways to enhance sustainability and scale-up adoption of modern water management/ irrigation/ cropping/ livestock/ fisheries/ marketing approaches	Sub-basin committee, Line Depts., MDPU

6.3.2 Mapping of Water Resources Department Activities

The sub basin level implementation process to be facilitated by WRD are mapped below and summarized in Attachment.6.2.

Objectives

The objectives of water resources organization activities are:

(i) Improving irrigation water delivery flexibly and response to farmers need
(ii) Improving the efficiency of conveyance and storage
(iii) Providing irrigation to the gap area of original Ayacut
(iv) Involving farmers in Participatory Irrigation Management through Water Users Associations

Sub Basin Structure

Engineer - In - Chief will identify the Executive Engineers for 66 Sub-basins at one for each sub basin. Executive Engineer (Regional) is the Nodal Officer of the Sub-basin, to coordinate the project related activities of all the line departments in the Sub-Basin. He will identify the field level nodal officers of the line departments, acquaint with them and will establish close rapport with all of them (to ensure convergence-in such a way that they will respond to his call for meetings at short notice)

Baseline Assessment

The Executive Engineer of the sub basins will convene a series of meetings with officers, the stakeholders and agencies like "ATMA "in the Sub-basin. The stakeholders include farmers, traders and reputed and responsible NGOs civil society /community in the Sub-basin. The farmers will be represented by their WUAs if already formed in the Sub-basin or by the progressive farmers in the Sub-basin. EE WRD shall update the register of Irrigation Assets in the Sub-Basin. Consultations with the farmers on the irrigation system

deficiencies and improvements for the needs of modernization of the irrigation leading to possible solutions like:

(i) Modernization of Anicuts and Improving supply channels
(ii) Strengthening and up gradation of tank bunds
(iii) Repairs, renovation of sluices
(iv) Improving surplus course
(v) Lining of channels
(vi) Construction of modern flow measuring devices
(vii) Provision of real time data acquisition system and canal operation mechanisms(pilot model)
(viii) Provision of equipment needed for automated canal operation to improve performance efficiency
(ix) If possible support the line departments in acquisition of the data on average cultivation, gap and reasons for gap etc. and verification with correct statistics from the VAOs later
(x) The existing cropping patterns will be ascertained by the Line Departments

This will help the Agriculture and Horticulture Department Officers to explore the scope for crop diversification and the willingness of the farmers to adopt diversified cropping.

Consultations

In order to have better co-ordination in planning and implementation of the project in line with the field level activity objectives the following cycle of consultations are proposed

(i) Every 5th day of the month – line department meeting at WRD office for updating Sub-basin plans and to assess physical and financial Implementation progress and report to HODs and MDPU on the same day
(ii) Every 20th day of the month – walk through survey & subcommittee meeting
(iii) Every first Monday of the month– district level committee meeting
(iv) During June , July September and October from 11th onwards – MDPU will review the Sub basin development plans with Line Departments (dates will be intimated separately)

Important data to be collected

The Executive Engineer WRD shall then discuss with the Chief Engineer institute for water studies and work out the crop water requirement for the existing and proposed cropping pattern and with reference to water balance studies made by IWS in that basin //Sub-basin. CE, IWS shall also arrange to furnish to the regional Executive Engineer thematic maps pertaining to the Sub-basin /basin for preparing the initial sub basin atlas. The Regional Executive Engineer will also discuss with the Chief Engineer SGSWRDC on the categorization of the Sub-basin with reference to the ground water exploitation and the recommendation the CE, SGSWRDC makes on the possible recharge structures(recharge wells Check dams and Dykes etc.) to be constructed in the Sub basin on scientific basis.

CE, SGSWRDC shall also furnish the Sub-Basin map showing the categorization of the Sub-Basin and the well details. The Superintending Engineer WRD of the basin shall also associate in these activities of consultations and guide the Nodal officer in preparing the Sub-Basin development plans and liaising with other departments' officials. With the data obtained from other WRD units and the line departments' officers the Executive Engineer WRD will appraise the MDPU, through power point presentation, the initial key issues identified in the Sub-Basin, where the specialists shall interact and offer their professional suggestions on modernization of irrigation infrastructure, suitable crop diversification and possibility of the Livestock improvements and fisheries developments in the water-bodies.

Data on livestock status and the productivity of inland fish in the water-bodies will also be collected and the possible interventions will be gathered from the respective line department officers. Thus a macro-level Sub-basin development plan will be arrived at. The macro-level Sub-basin development plan will be projected to the multiple stakeholders during joint walk through survey and the inventory of the assets will also be carried out and economical infrastructure improvements needed will also be mutually decided. The iterative process will be continued and final components for improving the irrigation infrastructure and the strengthening measures required for the tank systems will also be agreed upon. EE will identify the capacity building needs, appropriate awareness visits and locations for motivating the farmers for formation of WUAs and adoption of modern irrigation technologies and water management practices

Sub- Basin Development Plan (SBDP)

The Executive Engineer shall appraise the Superintending Engineer on the demands of the stakeholders and prepare an approximate estimate cost for improving /adding infrastructure Tank /Anicuts wise for improved irrigation efficiency and water management. These plans will then be placed before the Sub-basin subcommittee constituted for their professional inputs. The minutes of this meeting will have to be sent to the Collector, Superintending Engineer WRD, the HODs of Line Departments and the Project Director.

Each department will then start preparing detailed estimates. The Executive Engineer will also discuss with the Environmental unit in the Sub-Basin and identify the Environmental issues to be addressed and the environmental unit shall prepare the estimate for the required interventions .The possible social and environmental issues as in the framework for SEMF developed for the Sub-basin will also be addressed by inclusion of suitable components in the cost estimates. WRD will jointly share the field works with the WRD plan formulation wing and prepare the cost estimates in consultation with the design wing of WRD, IWS and ground water wing with the Regional Chief Engineer concerned convening a meeting of Chief Engineers IWS, SGSWRDC, PLAN FORMULATION and DRCS .The regional Executive Engineer shall collect the development plans and the cost estimates for the interventions proposed by the Line Departments. Detailed reports and plans will be prepared by the Nodal officers of WRD and Line Departments with inputs from the MDPU. If any modifications are made by the MDPU specialist in the Sub-basin development plans the same will be responded to by the sub basin team and EE. The finalized report and estimates will be sent by the regional Executive Engineer to the District Level Co-ordination Committee for ensuring convergence in planning and to facilitate easy monitoring during implementation and to the HODs for forwarding to MDPU and to forward to World Bank for their clearance. As soon as the clearance is received from the bank the concerned Chief Engineer WRD shall arrange for the modifications suggested by Bank if any and submit to the empowered committee for administrative clearance

Implementation

Once the empowered committee clears, Chief Engineer WRD with the support of the project cells in their offices shall take appropriate action

(i) for finalizing the annual work plan
(ii) proper allocation of budget
(iii) preparation of procurement plans (through STEP)
(iv) for the preparation of bid documents
(v) getting cleared by the bank as per norms fixed and agreed in the project and finance agreements for prior review contracts and
(vi) appropriate action to settle contracts as per procurement guidelines of the bank

In the case of post review contracts according to the powers delegated to the officers bid documents will be prepared. The bids will be called for following the procurement guidelines of the bank and contracts concluded in line with the procurement plans approved. After signing of the Agreement by the Contractor, within a Fortnight PERT Chart for the Physical and Financial Progress of the Contract with the work plan and the methodologies of executing the package as mutually agreed upon between the WRD Implementing Officer and the Contractor (by taking into account the working seasons and upper and lower reaches program of work for enabling to monitor the Progress of work effectively and to achieve the objectives of the Project. At this stage the District Collectors should be informed to monitor the implementation through the District Level Co-ordination Committee. MDPU will examine the Annual work plans received from the WRD and line agencies on the ongoing sub plan and for the next year's budget requirements and forward the budget demands to the finance department for inclusion in the state annual budget. The CE through the EE of the sub basin of WRD will simultaneously through the PIM wing in the office of the Engineer-in-chief establish WUAs in the project areas in the phased manner as indicated in the Chapter in Participatory Irrigation Management (PIM) cell.

Scheme cycle

The time lines for carrying out the sub basin level activities are summarized the form of a scheme cycle presented in Table 6.4.

Table 6.4: Sub Basin Level Scheme Cycle (may be for Phase II)

April- May	1st week	line department meeting
June	2nd week	stakeholders and line department meeting
July	1st week	meeting with MDPU with field level officers for preparation of Sub-basin plans
July	2nd week	modifications suggested in MDPU to be attended to by all departments
August	1st week	consultations with project cells of line department for review and comments
August	3rd week	attending to comments of cells and again consulting stakeholders
September	1st week	Plans and designs to be sent to HODs with approved plan to the MDPU
October	1st week	MDPU will finalize the converged Sub-basin plans and the line department to prepare cost estimates
October	4th week	Sub-basin plans and cost estimates and annual work plan including budget will be placed before the appropriate authority
November	1st week	annual Sub-basin work plan and budget estimates to be sent to World Bank and finance department

6.3.3 Mapping of Tamil Nadu Agricultural University Activities

At the sub basin level TNAU will partner with other line agencies to help farmers earn higher income per unit of water. The elaborate mapping is presented below and summarized in Attachment 6.4

1. The major objective of the TNIAM project to promote the climate resilient activities and market led agriculture in the sub – basins of Tamil Nadu.

Specific Objectives:

(i) To increase rice productivity in sub-basins by the promotion of Water Saving Technology viz., "Safe" AWD, SRI or Mechanical transplanting.
(ii) To enhance the pulse productivity and production through the promotion of pulse seed village, Improved Production Technology and value addition.
(iii) To enhance red gram production under precision farming approach.
(iv) Large scale adoption of Drip Fertigation / Precision Farming/SSI in Sugarcane and horticultural crops to improve application efficiency and to increase the WUE.
(v) Popularization of crop diversification options in select crops such as maize, fruits and vegetables in the sub basin commands.
(vi) Testing and large scale adoption of technologies developed on-station to farm conditions
(vii) Promotion of application through Geo – Tagging, Remote sensing based assessment, e-agriculture, Price forecasting and farm advisory.
(viii) Assessment of GHG emission
(ix) Provide necessary trainings through various centers / research stations of Tamil Nadu Agricultural University to the farmers and other stakeholders for capacity building

Roles to be performed

To accomplish the objectives enshrined above, the following components of activities are proposed in the sub basin commands.

(i) Productivity enhancement in Rice in sub- basin through Demonstration and upscaling of water saving technology viz., 'Safe' AWD, SRI and Mechanical transplanting under GM-Rice, Rice follow pulse sequences
(ii) Crop diversification with high value crops
(iii) Large scale promotion of SSI in Sugarcane
(iv) Precision farming in Quick value crops viz., Vegetables/Banana/Pomegranate and Mango
(v) Promotion of pulse production and productivity through producing quality seed and Improved Production Technology.
(vi) Value addition of pulses under supply chain concept by linking with better market.
(vii) Creation of IT advisory cell to implement Geo Tagging, Remote sensing based assessment, e-agriculture, Price forecasting and Farm advisory.
(viii) Promotion of the concept of production of Toxic free vegetables in sub basins.
(ix) Capacity building to stake holders.

Strategies for Replication of Technologies

(i) Delineation of Zone of Influence from the first year
(ii) Organizing Campaign for motivation of farmers
(iii) Arranging Exposure Visit to the locations of Good Agricultural Practices
(iv) Conducting IAM WARM day periodically to redress the grievances at farm
(v) Training to Beneficiary and Non Beneficiary farmers
(vi) Creation of linkages between beneficiary and non-beneficiary farmers

Baseline Assessment

The Scientists nominated by the Head of Research Stations / KVKs shall associate in the joint walk through surveys with multiple stakeholders arranged by the Executive Engineers of the various sub-basins to assess the field conditions. During the survey, the Scientists should examine the conditions of irrigation systems / livelihood status, Potentials

of crop / livestock enterprise etc. To develop Action Plan of more precise in nature, the Sub basin nodal officer shall collect the following details during the month of April – May to support the requirements of stakeholders and the farmers.

(i) Water potential of the sub basin
(ii) Availability of water for the ensuing cropping season
(iii) The existing cropping pattern ,
(iv) Potential markets and market prices
(v) Proposed cropping pattern
(vi) The possibility of field testing of research findings
(vii) Promoting the water saving technologies in field
(viii) Introduction of innovative technologies viz. SRI, Drip and Sprinkler irrigation in consultation with the WUAs or with the prospective farmers in the sub-basin
(ix) Popularization of labor saving implements for rice, maize and groundnut
(x) Scope for establishing seed village for supply of quality seed and seedlings for more diversified agriculture
(xi) Document major issues that are confronting development / technology transfer

Consultations

Nodal Officer TNAU will participate in the multiple stakeholders meeting convened by the Executive Engineer WRD in the month of April – May and share the views of stakeholders covering:

(i) Prevailing conditions of irrigation infrastructure in the sub basin
(ii) Extent of micro irrigation practiced in the sub basin
(iii) Scope for expansion of Micro Irrigation in areas of agricultural and horticultural crops
(iv) Possibilities for crop diversification and on farm development activities etc.,

Dates for Joint Walk Through will be decided to assess the status of irrigation infrastructure, agricultural practices adopted and the possible interventions as required by the stakeholders. A meeting with all the sub-basin representatives from TNAU shall be arranged to form a framework on the frontier technologies to be transferred in each sub-basin and strategize an annual work plan by identifying large scale demonstrations for converged action of WRD and line departments. Consult Agriculture, Horticulture, and Agricultural Engineering Departments to assess the details of area expansion / crop diversification so as to decide the technology needs in the sub basins. Consult with the Agricultural Engineering Department officials regarding their requirement of Machineries for farm mechanization and communicate to the Agricultural Machinery Research Centre.

Consultation with Agricultural Marketing and Agribusiness Department officials regarding transfer of market intelligence information generated by the Agribusiness and Farm Advisory Cell and get the feedback of marketing officials will be held and will inform to the cell.

Draft Sub-Basin Development Plan with special reference to Climate smart activities

- Prepare Sub basin development plan based on the field visit and the needs expressed by the stakeholders and on the basis of water potential available in the sub basin, diversification of high water demanding crops to low water demanding crops, its technological and climatological parameters coupled with the issues on marketing tie ups and based on the latest innovative research findings from the university.
- The Sub basin development plan will be iterated based on consultation with the line departments like agricultural engineering, horticulture, agricultural marketing and agriculture to propose suitable high value crops that will be agreeable to farmers of the sub basin

- The location of demonstration plots are to be identified (tank wise) and consultations with Tamil Nadu Agriculture University / Horticulture and the WUAs should be made
- The above Sub basin development plan developed will then be sent to the HODs (Nodal Officer, Tamil Nadu Agricultural University) by second week of **September** for their perusal and suggestions and also to the District Coordination Committee and the agreed plans to be sent to the MDPU for scrutiny and modification
- This iterative process will go on till a finalized acceptable sub basin development plan for clearance by the Project Steering Committee (PSC) by last week of **September**
- Once the steering committee approves the plan, the sub basin Nodal Officer will prepare the final cost estimates and send to Nodal Officer and Director, TNAU with a copy to the Executive Engineer of sub basin and copy to MDPU by first week of **October**
- The sub basin development plan and the cost estimate will then be forwarded to the World Bank and clearance obtained by MDPU by the Second Week of **October**
- The HODs will place the plans before the Project Steering Committee (Empowered Committee) the estimates through the MDPU before the last week of October
- Draw an annual work plan with details of budget provision needed for the current and new packages to be taken up in the following year and send to MDPU which will forward to finance department by second week of **November.** Highlight the number of outsourcing staff, their working season, job contents and their performance evaluation etc., in the MOU and get the approval of MDPU.

Pre Implementation

- Once the estimates receive Administrative Sanction, the Sub Basin Nodal Officer will prepare the detailed estimates with drawings showing the field numbers where the demonstrations are proposed and the type of demonstrations / activities aimed
- The technically sanctioned estimate will then be perused by the Procurement committee / Procurement Officer with the Project Cell at Nodal Office of TNAU who will either be trained at Administrative Staff College of India (ASCI) Hyderabad or at Chennai and initiate procurement process
- Nodal officer, TNAU shall identify the person to be trained on technological advancement, extension and procurement methods and arrange trainings to them.
- Identify the agencies who are competent input providers for the task outlined in the plan

Implementation

- A Co-ordination committee under the chairmanship of Vice Chancellor, TNAU with the technical directors as members will be formed to monitor, guide the implementation and review the physical and financial progress. Apart from this, technical committee will be formed for the major interventions and IT based activities.

Convergence

- **The Nodal Officer** TNAU to discuss with Horticulture officials and delineate the area of operation with regard to Micro Irrigation to avoid the duplication of similar components in the sub basin
- **Segregate** the villages among TNAU, AED, Agriculture and Horticulture for need based intervention
- **Finalize** the action plan for the season after availing discussion with line departments
- Encourage / Guide Animal Husbandry officials on establishment of green fodder
- Give tips to them on technological aspects for establishing fodder as intercrops wherever feasible

- Nodal Officer to consult with Agriculture / Horticulture officials regarding the cropping pattern, crop diversification proposed and implementation of drip / sprinkler irrigation, precision farming
- In a month, a day may be identified to celebrate TNIAMP day to redress the issues that arose in the sub basin commands and to plan for the next month programs which is amenable to line department
- The Sub Basin Nodal Officer / implementing officer shall attend the zonal workshop and field days arranged by Agriculture department and ensure convergence of activities and advise midcourse corrections to be made by the farmers in the implementation of the project

Creating Awareness

Wide publicity may be given at the sub basin level to create awareness among the farmers about TNAU components proposed for the sub basin through

(i) Discussion meetings at village level
(ii) Awareness campaigns,
(iii) Television, Cable networks
(iv) Handouts, Banners,
(v) Screening movies on Best Agricultural Practices
(vi) Participation in the Model Village /SWIKC

Joint Walk through Campaign should be performed with the line department officials for promoting the relevant components. Handouts, posters depicting the profitability of crop / livestock enterprise so as to make the farmers convinced. Village leaders who are popular among the public shall be approached for appraising the IAMWARM (IAMP) activities and their services may be best utilized for popularizing the project activities among the public to gain quick spread of technologies / social development activities. Identify prospective women folk who excels in microfinance / social development activities may be utilized for awareness creation under TN IAM Project at village level.

Farmer Identification

Get the assistance of WUA in identifying the willing farmers (tank wise) and maintain priority register. Select the area contiguously. Change the demo area / locations every year to extend the benefit of technology to different user. Encourage small, marginal and women farmers also in to the beneficiary fold. A database on the list of farmers who have success stories / Best Agricultural Practices with respect to activities such as drip irrigation, improved crop variety, cross breeding, crop diversification etc., may be prepared and maintained.

Demonstration and Exposure Visits

- The implementing officers at sub basin level with reference to the sanctioned estimate shall arrange demonstration in the selected field, preferably along the road side to have accessibility.
- Mobilization of neighboring farmers also to join the demonstrations so as to have timely replications in their fields
- While conducting demonstrations, see that the line department personnel, farmers of adjacent fields and the critical inputs are available in the spot
- Critical inputs may sufficiently be pooled in the demo plot so as to feed the requirement of farmers of adjacent fields for large scale adoption of the technology within the time frame
- Attend the TNIAMP field days, exposure visits, demonstrations etc. arranged by the WRD / Line departments

- Arrange Exposure Visits on Best Agricultural Practices and conduct demonstrations on improved technologies, precision farming, Micro irrigation etc.

Changing the Mindset

The Objective of TNIAMP PROJECT "is More Income per Liter of Water" should be engraved in the mindset of the implementing officers. Implementation Officers may be given orientation training on the TNIAMP (IAMWARM II) concept so as to ensure effective implementation. Focus on how precision farming and improved production technologies enhance the productivity of the plant increased production and therefore higher income. Invite the Farmer Interest Groups to see live Demo and interaction with the experts on the components / activities.

Farmer – to – farmer interaction may be arranged with the successful farmers for convincing the Farmers Interest Group so as to have quick spread of the technologies. Farmers who need Bank loans for purchasing the components may be guided to have quick spread of technologies. The WUAs may be motivated to create a corpus fund to meet the maintenance expenses of the machinery and the micro irrigation system. Assess the irrigation water potential of the fields of the individual farmer and suggest Micro Irrigation System coupled with suitable cropping pattern and if possible inter cropping arrangements.

Authority, Responsibility, Accountability Issues (ARAI)

Delineation of powers / Decentralization of powers to sub basin Nodal Officers may be examined to accomplish the project goals. The Nodal Officers and Professors at sub basin level are responsible for qualitative and quantitative aspects of the components enunciated in the Sub basin development plan. The report of monitoring and evaluation consultant in respect of each Sub basin may be examined for imparting quality aspects. Action plans may be prepared to fulfill the goals of TN IAM Project to phase the works within the stipulated time. Ensure / Inculcate self-auditing to revisit / recheck the quality aspects of work executed. Motivation Programs like Workshops, Trainings, Exposure Visits, performance incentives may be arranged to the Implementation Officers at sub basin level.

6.3.4 Mapping of Sub-basin Activities by Agriculture Department

The detailed sub basin level activities to be carried out by Agriculture Department have been mapped. A summary of the mapping is also given in attachment 6.4

Objectives

I. Improving the productivity of crops by technology demonstration, training and backstopping
II. The focus will be on SRI and other important crops in the tank command areas.
III. Diversification to high value and water efficient crops
IV. Transfer of technology from lab to farm
V. Popularization and distribution of critical inputs in time for increased productivity and eco – development
VI. Increased efficiency in farm operations and drudgery reduction
VII. Sustainable development of Market led Agriculture

The approach

The focus of agriculture interventions is on optimizing existing crop productivity and diversification of the cropping pattern. The project plans to adopt an extensive approach in optimizing productivity of the existing crops by disseminating improved technology, providing need-based adoption support and piloting of new crops through market led

extension. Promotion and adoption of crop diversification depends upon the opportunity of partnerships with private companies who can provide assured market based on quality standards, agro-climatic suitability of the new crops, availability of technical expertise, etc.The project envisages strengthening of extension services through partnerships with research organizations and other public institutions such as TNAU, IMTI, STAMIN, Farmers Training Centers (FTC), Centre of Excellence for Change Management (CEC) s etc. The project implementation will be built on the experience of these agencies and complementing resources.

Structure

The HOD will identify the Nodal officer and Implementing Officer for preparation and implementation of the Project. In the District level, the Joint Director of Agriculture is the Nodal officer / Procurement officer of the Project in the Sub-Basin.

Planning

Baseline Assessment

IdentifiedNodal officer has to associate with the Executive Engineer WRD / principal coordinator of the Sub-Basin in the first week of April every year and collect the following data of the Sub-Basin.

(i) Water availability.
(ii) Existing irrigation potential.
(iii) Macro level status of water distribution practiced.
(iv) Total irrigation command area in the Sub-Basin.
(v) Average irrigated area.
(vi) The gap area with reasons for the gap area and
(vii) The date for a meeting with the stakeholders etc.

Meanwhile, he will also collect the data on rainfall, existing agriculture practices, technologies adopted, varieties grown, yield, productivity, cost of cultivation, market potential, rate of produces, current cropping pattern, Practices, Issues, Paddy and prospects of diversification and the crop water requirement for the Sub-basin in consultation with the CE - IWS.He will then propose new cropping pattern suitable to the agro-climatic zone in which the Sub-Basin falls and request WRD EE to work out the crop water requirement.

Preliminary stakeholders' consultations

He will participate in the multiple stakeholders meetings at Sub-Basin, village and tank levels convened by the Executive Engineer WRD in the month of April- May-June and share the views of the stakeholders on.

(i) The prevailing conditions in the Sub-Basin on irrigation infrastructure,
(ii) Rainfall pattern, seasons.
(iii) The support they receive from the Agriculture Department for adoption of technologies.
(iv) The cropping pattern (and the reasons for it), availability of inputs in time especially seeds, soil types, labor availability, farm implements, machineries and sprayers availability.
(v) The inputs recommended by the Extension officers and
(vi) Their experience in following their recommendations.
(vii) Important issues.
(viii) Counter measure expected.
(ix) Technologies adopted crops and varieties grown, duration of the crops, yield details, cost of cultivation, marketing details, cost of produces etc.

He will also appraise the WUA meetings about the macro level details he had worked out and interact with them and assess their needs / counter measures for the issues discussed etc. In the multiple stakeholders meetings, a date for Joint walk through survey will be decided (preferably completed by the first week of June) to assess the status of irrigation infrastructure and allied agriculture practices/ technologies adopted, issues discussed and the possible interventions as required by the stakeholders. (The joint walk through and meetings as a random sample should cover at least 30% of the Sub-Basin spread out equally). He will participate in the joint walk through and assess the true picture, of all points, issues and outcomes of the earlier meetings and again interact with the stakeholders which consists of the formal/in-formal WUAs and get the feedback on issues, their needs that the agriculture department to design on the supports to be given on extension activities. Based on the field visit, issues and the needs / countermeasures expressed by the stakeholders and on the basis of water potential in the sub-basin [as discussed with the Executive Engineer WRD] strategy on the introduction of new technologies for increasing crop area, productivity and the possible diversification to high profit less water intensive crops and crops suited to gap areas can be prepared. Such Sub-basin plan will be iterated based on Consultation with the Agri-Marketing, AED, TNAU and Horticulture officers in the Sub-basin in the last week of June to propose suitable marketable crops that will be agreeable to the farmers in the Sub-basin. The above Sub-basin plan developed will then be sent to the HODs by Second week of September for their perusal and suggestions and also to the District Co-ordination Committee (see vide the chapter under District co-ordination committee for more details on its role) and the agreed plans to be sent to the MDPU by HOD for scrutiny and modification. The HODs will place the development plans with cost estimates before Project Steering Committee through MDPU before the last week of October and obtain Administrative Sanction. This iterative process will go on till a finalized acceptable Sub-basin Development plan along with the required training needs both for officers and WUAs is developed with cost estimates and sent to the MDPU for clearance by the Steering Committee by last week of September. Once the steering committee approves the plan, the JDA and the field level officers of line departments will recheck the estimates prepared by them already for any final refinements and send to Sub-Basin committee. Once the Sub-Basin committee clears the proposal, the JDA shall send the plans to HODs with a copy to Executive Engineer, WRD in the basin and. The HODs after scrutiny shall forward to MDPU by first week of October. The Sub-Basin development plan and the cost estimate will then be forwarded to the World Bank and clearance obtained by MDPU by the Second week of October.

Sub - Basin Development Plan

The total sub basin development plan will be the end product of the concerted efforts by all the departments together as at the end of the planning process. The sub basin development plan will include in addition to various proposed interventions by each of the departments, the operation and maintenance of irrigation facilities including tanks, water balance and participatory irrigation management. The different interventions as integrated in the sub basin development plan will have separate DPRs (Detailed Project Reports) to help channelize resources.

Capacity Building

Based on the designs, the Sub-Basin nodal officer shall identify the immediate capacity building needs and organize such small trainings/awareness campaigns. The training shall include,

(i) The identification of appropriate cropping pattern and inputs requirements.

(ii) Latest Innovative Technologies.
(iii) Identification of Farmers for awareness visits.
(iv) Formation of Farmers Interest Group/Commodity Groups.
(v) Identification of trainer from stakeholders.
(vi) The requirement of ICM/IWM/IPM/INM applications.
(vii) Organic farming.
(viii) Large scale demonstrations.

Zone of Influence

Demonstration and beyond-to ensure achievement of the above proposed cropping pattern Tank/Anicut wise number of demonstrations and the input needed are to be worked out. The locations of demonstration plots are to be identified in consultation with the WUAs on the prospects of assured delivery of water to the proposed area are to be ascertained. The District Joint Director of Agriculture (JDA) should lead these activities and consultations and guide the Sub-Basin nodal officers in the preparation and implementation of Sub-Basin development plans.

Suggested Components

(i) The nature, type & crop diversification and alternate cropping strategies.
(ii) Integrated management of soil, water, pest and diseases.
(iii) Enhancing the technical skill and decision making capacity of officers and farmers.
(iv) Educating the farmers on the usefulness of Agricultural Information System Net Work.
(v) Exposure visit: Inter-state and inter- districts to farmers and officers.

The Sub-Basin plan shall consist of:
(i) Finalized Sub-Basin atlas
(ii) Summary of consultations
(iii) Summary of Technical Analysis
(iv) Proposed Hardware and software activities as part of Sub-basin plan with costing, farmer's participation and sharing and implementation arrangements.
(v) Economic analysis
(vi) Environmental and social management plans specifically to be addressed in the Sub-Basin.
(vii) Proposed schedule of activities etc.

Also draw an annual work plan with details of budget provision needed and send to MDPU which will be forwarded to Finance Department by the second week of November.

Pre Implementation

Communication from HOD

The Directorate has to get necessary Government Orders / Administrative Sanction for the following and communicated to the Districts.

(i) The proposed sub - basin activities under the project should be in tune with the State or centrally sponsored scheme norms. The Headquarters TNIAM (IAMWARM II) Project Cell has to scrutinize the sub basin proposals in consultation with the Director of Agriculture and give clearance to the districts. For the development components of activities which are not in tune with the State or

centrally sponsored scheme norms, the Directorate should get necessary Government orders for the same and communicate to the districts for implementation.

(ii) Budget and work plan for TNIAM (IAMWARM II) Project for the year.
(iii) Government order for TNIAM (IAMWARM II) Project.
(iv) Administrative sanction for TNIAM (IAMWARM II) Project.
(v) Project Implementation Plan.
(vi) Government Order for the outsourcing of staff required for district and sub -basin.
(vii) Government Order for the additional infrastructure for district and sub- basin.
(viii) Sub -Basin wise approved procurement plan for the year.

Positioning of additional staff if required in different levels (Headquarters, District, Sub basin) – by HOD

Orientation

One day State level interactive workshop and orientation to the field staff, WUA, traders, Manufactures / processors, concerned with all Line departments – by HOD. HODs meeting with district JDAs / Nodal officers regarding implementation of the project for the year. District JDA / Nodal officers meeting will be with the District Collector for appraisal about the project. District Joint Directors of Agriculture will be meeting with the sub -basin Nodal officers and WUA about the project plan and implementation.

Need assessment and organizing the inputs

Check with the sub-basin procurement plan and assess once again the correct inputs - Physical and financial requirements, component wise by detailed discussion with the Sub - Basin Nodal officers and the ADAs concerned.

Publicity

District Joint Directors of Agriculture to finalize the type of publicity activities needed for successful implementation of the project, in discussion with the sub-basin implementation officers and WUA. Publicity activities will be done as finalized - by the sub-basin Nodal officers and other implementing officers of the sub basin.

Training

District JDA will finalize the training needs including the specialized trainings of the implementation officers and WUA by detailed discussion with the implementation officers and WUA. One day training of sub - basin Nodal officers and other implementing officers on various technologies, procurement procedures etc. as finalized earlier – by Joint Directors of Agriculture. One day training to sub basin WUA / Farmers on various components of activities, transfer of technologies etc. as planned – by sub basin Nodal officers and other implementing officers. The training may be organized in the demonstration field itself covering both skilled and unskilled practices. One day State Level interactive Workshop and orientation to the field staff, WUA, traders, manufacturers / Processors concerned with all Line Departments by HOD. One day Sub-basin Level interactive Workshop and orientation to the field staff, WUA, traders, manufacturers / Processors concerned with all Line Departments by District Joint Director of Agriculture.

Procurement of Inputs and Equipment

Sub-basin wise, package wise finalization of items, cost and supply points including Agriculture Extension Centre (AECs), etc. based on the procurement plan. Preparation of bid documents for ICB, NCB, Force Account, Direct Selection etc. as the case may be, clearly indicating the date of invitation of bid with time, bid opening date with time, evaluation, finalization, issue of supply order, commencement of supply, delivery points etc. Ensure that the full World Bank norms have been followed in each step of preparation of bid document.

Ensure that the items, date of supply to the destination and the firms by which the items have to be supplied etc. have been informed to the AECs or WUAs etc. by duly marking the supply order copy to the concerned. For quality, quantity and date of supply, necessary certificate with stock book entry details from the concerned AECs or WUAs has to be obtained by the JDA before making payment to the firms concerned. For the item of inputs which are to be procured as per the Force Account procedure, it is to be ensured that the items are actually produced, manufactured, cultivated by the Agriculture Department. For the inputs to be procured as per Force Account procedure from the Agriculture Department (AEC production unit, State Seeds Farms etc.) such units or centers or SSFs, to be strengthened well in advance by providing additional funds by the Department and staff etc. anticipating the additional production for the project over and above the normal production each year. Assess the full production capacity of such departmental units, so that other procurement methods/ procedures could also be adopted for the additional quantity required over and above the capacity of such units, so that timely inputs supply could be ensured for the successful implementation of project. While preparing the bid document, the full quantity of inputs required for the whole year covering all the seasons / requirement of the sub-basin may be indicated with clear supply date well before the commencement of each season so that quality inputs / seeds to be supplied to the farmers well in time. HOD will review regularly the progress of procurement work done by the District JDA/Nodal officers.

Implementation

Execution

Once the estimates receive Administrative Sanction, the field implementing officer will prepare the detailed drawings showing the field numbers where the demonstrations are proposed and the type of demonstrations planned. Identification of sub-basin wise, tank wise farmers, clustering of farmers based on activities, size of holding and fields in which componentized project activities to be implemented by sub-basin Nodal Officers and other implementing officers of the sub-basin. According to the delegation of powers, the district Nodal officer shall arrange for technical sanction of the estimate. The technically sanctioned estimate will then be perused by the Procurement officer designated in the Sub-Basin, who will be trained either at the Sub-Basin or at Chennai, and initiate the procurement process (For details Refer Procurement Chapter).The Nodal officer in the Sub-Basin shall identify the personnel to be trained on extension and procurement activities and arrange imparting trainings to them through recognized Training Institutes as approved by the HODs.

The agencies for supplying inputs will be finalized according to the powers delegated powers to the procurement officers. The mobilization of inputs may be organized as per the Model given in Table 6.6.

Table 6.6 : Model for mobilization of inputs

Season	Period in which inputs to be mobilized	Remarks
1st Season (Samba) August – November	June – July	Discuss with the WRD regarding the exact date of water release and mobilize inputs accordingly.
2nd Season (Navarai) December – March	October – November	Discuss with the WRD regarding the exact date of water released and mobilize inputs accordingly
3rd Season (Sornawari) April – July	February – March	Discuss with the WRD regarding the exact date of water released and mobilize inputs accordingly

The JDA/ District Procurement officer will issue supply orders for the supply of Inputs (seeds, MN Mixture, Bio-fertilizers, Bio- pesticides, farm implements and machineries etc) required to the implementing officer to carry out the identified demonstration in the selected field at the right season (vide Annexure - for more details).

Important Steps for successful Diversification of crops

As a first step, the issue may be discussed in detail by the JDA with the concerned Sub-Basin field staff during the Monthly Zonal workshop and fix a suitable date for village campaign(TNIAMP (IAMWARM II)Day), villages to be covered, crops to be diverted, new verities to be introduced etc. Accordingly, inform farmers, local Line Department officials, WRD, Local TNAU scientists, local traders etc. about the village campaigns. Distribute pamphlets, handouts, and booklets about the potentiality of the crops. Display photos, live specimens of the crop, use all possible publicity activities in the campaign to educate the participants. Explain about the potentiality of the new crop to be introduced such as higher yield, lesser cost of cultivation, lesser water requirement, duration of the crop, market potentials, number of by products to be made, probable extra income etc. Ensure that only less water more profit crops are introduced in the place of more water less profit crops as finalized early. Request the innovative farmers who have already grown such crops to share their experience with the fellow farmers, so that the participating farmers could easily get convinced about the potentiality of the crop and income. Involve the local TNAU scientists to share their technical knowledge on cultivation of the crop with the farmers, so that all steps of package of practices or cultivation methods could be well understood by the farmers. Similarly create an opportunity to the local traders and producers / manufacturers concerned to explain about the market potential, price that they could be offered for the produce etc., so that the farmers could convince themselves in cultivation of the desired crops. Let the WRD explain about the time of water release, quantity and duration of water release etc., so that farmers get confidence about the assured water for the entire crop period. Let the local engineers of the AED explain about the services that could be offered to this crop so that farmers will be getting additional interest to take up the crop in the current season itself using lesser water. The representatives of the Agriculture Marketing and Agribusiness Department may also explain about the market potential for the crops at local markets, outside the districts, procurement facilities offered, transport, drying and storage facilities available, value addition possibilities, E kiosk services etc., so that the potentiality of the crop including the extra income could deeply be registered in the minds of the farmers, which will ultimately reflect in easy coverage of the crops in larger areas, besides having multiplier effect in the nearby area. Keep the seeds and other inputs required readily in the AECs for distribution. If possible arrange distribution in the concerned village itself to the farmers or through WUAs. Sub-basin nodal officer and other implementing staff of the sub-basin should ensure the coverage of gap area as per the cropping pattern and as discussed with WRD and finalized early.

Important steps for successful Gap area coverage (Likely to be in the end of First or Second year in the Sub-Basin

Similar to the issue of the diversification and completely linked with it, the issue of gap area coverage in the Ayacut area also to be discussed by the JDA in the monthly zonal meeting as a first step. Discuss with WRD in detail about the date of release of water, period of release of water, number of days in which the water will reach in tail end, approximate period of continuous availability of water to the tail end in the sub-basin etc.

Depending on the length of availability of water to the tail end and the total area that could be covered, the crop / variety may be suggested for gap area sowing / coverage. If the water availability is shorter period only, irrigated pulses of 65 -75 days duration may be

suggested for the gap area. If water availability is for about 3 months, irrigated Groundnut or irrigated Millets/Minor Millets may be recommended for the gap area. If the water availability is more than 90 days in the gap area, Maize, Millets, Minor Millets etc. may be recommended based on WUA choice. These crops could be supplemented by well irrigation if available, depending on necessity. In the case of non-availability of water for the tail end in the sub basin, rain fed Millets & Minor Millets, rain fed Groundnut could be recommended in anticipation of rain, instead of keeping the area fallow. As per the availability of water to the gap area, desired seeds and other inputs may be mobilized and stocked in the AECs for timely distribution to the farmers.

The existing gap area in which wells are there, the medium duration irrigated Groundnut, medium duration irrigated Millets could be recommended with confidence, so that last one or two irrigation could be given through wells. If the WRD expresses inability to supply water for the tail end of the sub-basin for a particular season / period, short duration rain fed Pulses, rain fed Millets & Minor Millets, rain fed Groundnut may be recommended.

Farmers may be educated through publicity, village meetings, village campaigns, WUA meetings etc. about the irrigated crops to be taken up in the gap area depending upon the water availability or rain fed crops to be taken up in the case of non-availability of water. Farmers must be educated and convinced that the gap area of the Ayacut should not be left as fallow without any crop. Some crops whether fully irrigated or partially irrigated or partially substituted with well water or / pure rain fed crops including fodder crops could be taken up.

Frequent interaction with the WRD by the JDA and other implementing officers of the sub- basin is a must to decide the suitable crop for the gap area. For most seasons, the availability of water to the gap area could be predicted only in the last moment by the WRD. Accordingly, the crop seeds and other inputs are to be mobilized quickly.

The sub-basin Nodal officers and other implementing staff of the sub-basin should ensure that the full package of practices is adopted step by step for all the developmental components of activities proposed for the sub-basins.

The Developmental Component Activities

The sub-basin Nodal officers and other implementing staff of the sub-basin should interact at least once in a week possibly in the respective demo site itself with the WUAs / farmers and see that the execution of all activities carried out without any deviation.

The sub-basin Nodal officers and other implementing staff of the sub-basin should co-ordinate with other Line Department field officers and see that their inputs and services are best utilized to carry out each and every operation.

Demonstrations should be in large scale (i.e.) at least 10 Ha, in contiguous areas with some in road sides for easy mobilization of inputs and arranging field days and exposure visits.

Important steps for arranging Field Days / Farmers Meet (TNIAMP (IAMWARM II)DAY)

Common Farmers Meet / Field Days

Preferably, common date for Farmers Meet / Field Days may be fixed by the sub-basin implementing officers, after consulting all the line Department officers, WRD etc., so that all officers concerned could meet on the same date in the sub-basin which may be called as TNIAMP (IAMWARM II)DAY so that the respective issues, points, services, technologies, practices could be discussed with the sub-basin farmers in the same day instead of each line department fixing different date for the same purpose and inviting other line departments to participate which may not work out and serve the purpose.

Involve WUAs/ farmers, Officers, including Line Department Officers, TNAU Scientists, WRD, Traders, District Collector, and Local People's Representative like MP, MLA, Panchayat Presidents, Community Leaders, Local School Children, Teachers and Other VIP in the Sub-basin.

The Sub-Basin Nodal officer should create an opportunity to exchange views, sharing the experience, clarifying doubt, interaction with the stakeholder / farmer by the participants. Nodal officer should also explain the technologies adopted, reasons for the better performance of crops etc., so that participants could be convinced and adopt in their fields, besides convincing the other fellow farmers. This will reflect in multiplier effect. The sub - basin Nodal officers should arrange at least 4 to 5 such field meetings so that rapid TOT could be made easy.

The date and time for Field Days are to be informed well in advance to all the targeted group of participants.

Record the stage of crop, outcome of the particular technology, views of the participants etc. in the presence of the participants. This could be printed and issued for educating other farmers for adoption. If possible, the Field Day activities may be covered with photos and video.

Maintain register of participants in each Field Day for different field operation of the same field.

The tentative Model activity chart for the Major crops to conduct Farmers Meet and Field Days:

At least 3 – 4 Farmers Meet (FM) may be arranged for each major crop depending upon the duration of the crop, during critical stages of the crops or field operations. The date, time and location of the Farmers Meet may be fixed in consultation with WRD, Line departments and communicate the same to the concerned well in advance for effective participation.

1st Farmers Meet

It should be just before the commencement of each season, to decide the crop / variety to be taken up based on season, cropping pattern, water availability, agro climatic suitability, market potential, productivity, profitability and income etc.

2nd Farmers Meet

This meet may be during the sowing / planting periods, or on important agronomic / cultural practices, field operation periods or during application of critical inputs etc.

3rd Farmers Meet

This meet may be one month before the harvest or during the important cultural or agronomic practices or application of critical inputs or during adoption of any important technologies or operations.

4th Farmers Meet

This meet may be conducted preferably near harvest day, so that the performance of crop (yield) and the effects of technologies adopted could be well understood by the farmers. Market potential, rate of the produce, value addition possibility, probable income etc. could be discussed and explained to the farmers and other participants by the Line Department staff, scientists, traders, manufactures and produces etc. so that it may induce the participant farmers to take up the crop again and again. In this meet, next season crops and practices could also be discussed to create interest and confidence among the farmers to take up the next season crop.

Model Activity Chart

A Model activity chart prepared for major crops of focus in the sub basins is presented in 6.7.

Table 6.7: Model Activity Chart for Major crops (for 1st season crops)

Stage of the crop	Paddy	Maize	Minor Millets	Pulses	Oil Seeds	Remarks
Before sowing / planting	FM- 1 May–June	FM- 1 May–June	FM- 1 Nov-Dec	FM- 1 July-Aug	FM- 1 Nov-Dec	Sub-basin implementing officers should fix the correct date based on ground reality in consultation with line departments and WRD.
Sowing / growing / critical operations / adoption of important technologies	FM- 2 June– Aug	FM- 2 Jun–July	FM- 2 Dec–Jan	- -	FM- 2 Dec–Jan	
Growing / critical operations / adoption of important technologies	FM-3 Aug – Sept	FM-3 July- Aug	FM-3 Mar - Aug	FM-2 Aug-Sept	FM-3 Mar - Aug	
Maturing / harvest stage	FM-4 Oct- Dec	FM-4 Aug-Sept	FM-4 Sept- Oct	FM-3 Sept	FM-4 Sept- Oct	

FM- Farmers Meet

Note: For the 2 & 3 season crops, similar activity charts may be prepared by the respective sub basin implementation staff based on ground realities for easy adoption and necessary follow up

Feedback and Reporting

After each Farmers Meet / Field Days, necessary feedback about the outcome of the meet, crop wise, activity wise is a must to the HOD and MDPU for perusal and guidance. Hence, it is the responsibility of the JDA concerned to give timely feedback. The implementing officer, with reference to the sanctioned estimate, shall arrange demonstration in the selected field, preferably near road sides WUAs wise and tank wise by mobilizing the neighboring farmers to join the demonstrations and reap the benefits of such demonstrations to help replications in their fields. The implementing officer will report to the HODs, Executive Engineer WRD, District Level Co-ordination Committee and to MDPU on the Physical and Financial progress periodically as prescribed (Monthly, Quarterly, Semester) and shall inform the bottlenecks experienced during implementation. The District Collector shall review implementation convening monthly/ Emergent Meetings and resolve the issues. The implementing officer should ensure that the works are completed as per time schedule agreed in the contract with the suppliers as well as in the approved procurement plan. The implementing officer shall arrange monthly zonal workshops and field days to ensure that the farmers follow the extension advices promptly and to advise any mid – course corrections along with the EE, WRD and other departments' field officers.

Simultaneously, the implementing officer shall take up a macro level impact caused by these demonstrations with frequent WUAs meetings and document them for perusal by the Monitoring and Evaluation Consultant to be employed by the MDPU as given below.

(i) The area shifted to diversified crop.
(ii) The extent of adoption of INM, IPM, and organic farming practices.
(iii) The increase in productivity of the crops and the consequent additional agriculture income to the farmers in the Sub-Basin.
(iv) The notable change in the Lifestyle of the farmers due to the developmental activities in the Sub-Basin.

With the reports received from the field officers the Project cell in the HODs office shall prepare a comprehensive report and send to MDPU which will consolidate all such reports from all the Sub-Basins and in consultation with the Monitoring and Evaluation Consultant shall forward to Government and to World Bank.

6.3.5 Mapping of Sub basin Activities by Horticulture Department

The detailed mapping of activities to be carried out by the Horticulture Department is presented. A summary is also given in attachment 6.4.

Objectives

The objectives with which the Department of Horticulture and plantation crops will be implementing sub basin activities are:

(i) To improve the productivity of Horticulture crops by technology and training in the sub basins.
(ii) To improve returns to farmers through development of better market linkages and promotion of business development services.
(iii) To facilitate cost reduction through demonstration of appropriate technologies, agronomic practices and collective inputs procurement
(iv) Diversification to high yielding and water efficient crops adopting new technologies by farmers
(v) Facilitating the introduction of market driven crops through diversification
(vi) Popularizing the hybrid varieties in vegetables, spices and quality grafts in fruit crops, for better economic returns.
(vii) Sustaining soil health by promotion of INM/IPM.
(viii) Promoting reduced pesticide village's concept to produce vegetables in clusters.
(ix) Promotion of Hi-Tech Irrigation Technologies by installation of micro irrigation with fertigation for efficient use of water and increase the productivity and quality of the produce.
(x) Promotion of Climate Risk Resilience Technologies through Poly green Houses and Mulching.
(xi) To promote water saving crops to improve Water Use Efficiency.
(xii) The focus will be on short duration HB vegetables and other Horticulture crops in the sub basin command areas.

The approach

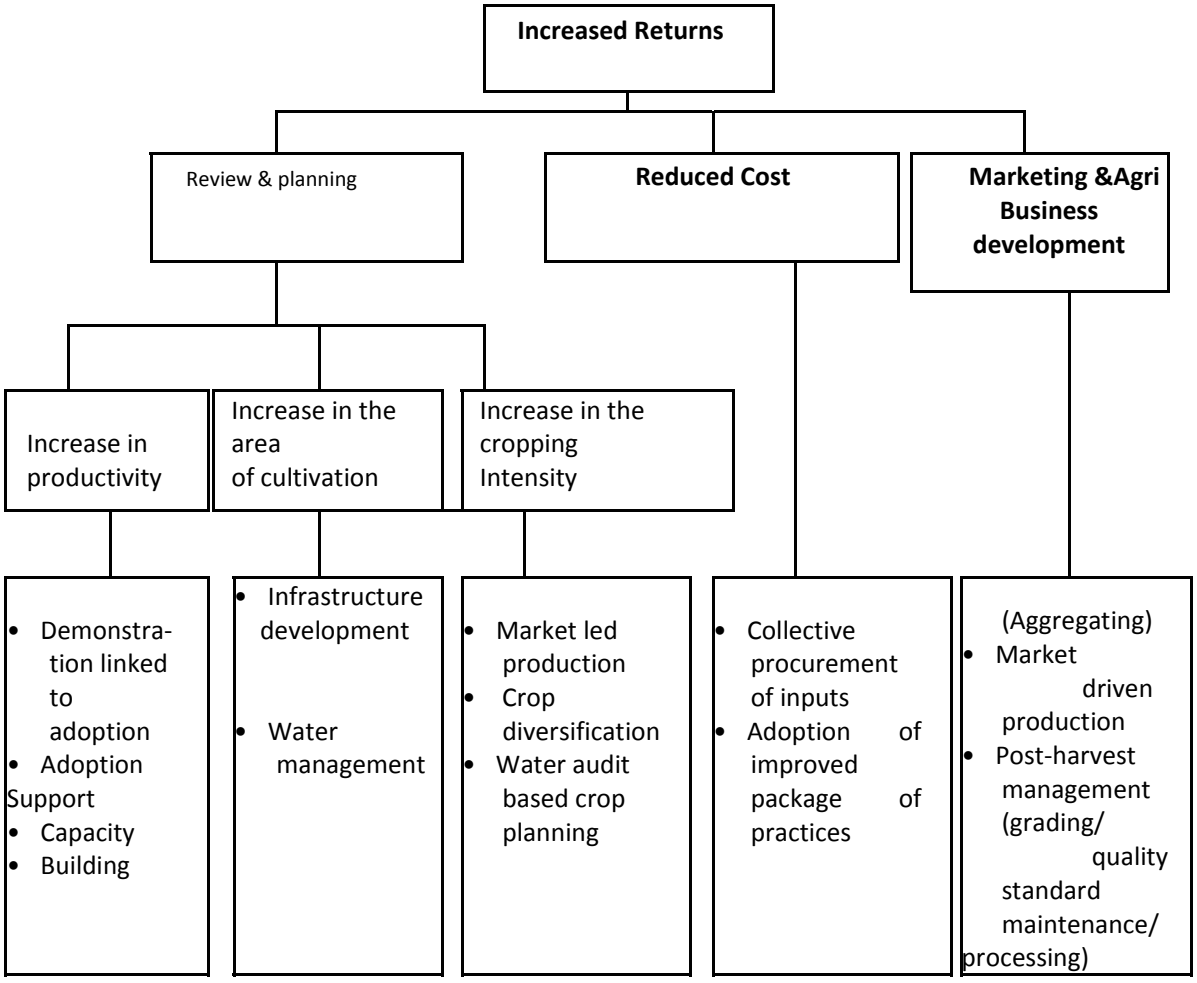
The focus of horticulture interventions is on optimizing the existing crop productivity and diversification of the cropping pattern. The project plans to adopt an extensive approach in optimizing productivity of the existing crops by disseminating improved technology, providing need-based adoption support and piloting of new crops through market led extension.

Promotion and adoption of crop diversification depends upon the opportunity of partnerships with private companies who can provide assured market based on quality standards, agro-climatic suitability of the new crops, availability of technical expertise, etc.

The project envisages strengthening of extension services through partnerships with research organizations and other public institutions such as TNAU, Krishi Vigyan Kendras (KVK) etc. The project implementation will be built on the experience of these agencies and complementing resources.

The horticulture sub-component adopts the broad livelihood framework of the project which is presented in the figure 6.3

Figure 6.3: Livelihood frame work for Horticulture



Structure

(i) The HOD to identify the Nodal officer and Implementing Officer for preparation and implementation of the Project in the 66 Sub-Basins.

(ii) In the District, JDH/Deputy Director of Horticulture is the Nodal officer and Procurement officer of the Project for a Sub-Basin or a cluster of sub –basins

(iii) The Nodal officer shall then identify the implementing officers of each Sub-Basin (Horticulture officer and the Assist Horticulture officer of the concerned Block in the Sub-Basin)

Baseline Assessment

The identified implementing officer will have to associate with the Executive Engineer WRD of the Sub-Basin who is the Principal Co-coordinator in the month of April-May every year and collect data on the following aspects:

(i) Existing area of different horticulture crops

(ii) Soil maps, fertilizers and pesticides used by farmers

(iii) Sub-basin details on Hydrology,

(iv) Water availability,

(v) Macro level status of water distribution practiced,

(vi) Total irrigation command area in the Sub-Basin, average irrigated area, and the gap area with reasons for the gap area

(vii) The meteorological data
(viii) Date for a meeting with the stakeholders etc.

Meanwhile he will also collate the data on current cropping pattern available in his department and the crop water requirement for the Sub-basin in consultation with the CE IWS WRD

He will work with MDPU to prepare a power point presentation on the Sub-Basin status including initial identification of key issues He will then propose new horticultural cropping pattern suitable to the agro-climatic zone in which the Sub-Basin falls and in line with the National Horticultural Mission & MIDH targets and norms and request Executive Engineer WRD to work out the crop water requirement

Focus crops specific to the Sub-basin are to be decided at macro level by the Agriculture, Horticulture, TNAU and Agri-Marketing officers in the meeting and a date for joint walk through survey will be fixed.

Consultations

District JDH/DDH and ADHs of the concerned block will participate in the multiple stakeholders meetings at Sub-Basin level; village and tank levels convened by the Executive Engineer WRD in the month of April-May and share the views of the stakeholders on

(i) the prevailing conditions in the Sub-Basin on irrigation infrastructure,
(ii) on the support they receive from Horticulture extension officers on the adoption of technologies
(iii) the cropping pattern and the horticultural crops raised in the sub basin and its extent
(iv) the inputs recommended by the Extension officers
(v) and their experience in following their recommendations.

District JDH/DDH and ADHs of the concerned blocks will assess in the forum the macro level details of demands of the stakeholders for introducing/increasing the extent for diversification to Horticulture crops

In the meeting a date for Joint walk through survey will be decided (preferably completed by the first week of June to assess the status of irrigation infrastructure and allied Horticultural practices adopted and the conditions of horticulture crop diversification and the possible interventions as required by the stakeholders.(the joint walk through and meetings as a random sample should cover at least 30% of the Sub-Basin spread out equally)

ADHs and other technical officers of the concerned block will participate in the joint walk through and assess the true picture, interact with the stakeholders which consists of the formal/in-formal WUAs and get the feedback on their needs that the Horticulture department to design on the supports to be given on extension activities such as

(i) Possibility of revised cropping pattern
(ii) Addressing problems in cultivation packages
(iii) Ensuring better seeds, Hybrids, plants (Grafts, Layers, Tissue culture banana and
(iv) Immediate training needs /awareness campaigns / capacity building etc.

Sub Basin Development Plan

The District JDH/DDH will identify the immediate trainings and capacity building and organize such trainings. In the office, based on the field visit and the needs expressed by the stakeholders and on the basis of water potential in the Sub-Basin are discussed with the Executive Engineer WRDwho designs on the introduction of new technologies for increasing the horticultural crop area, introduction of Hybrid varieties and quality grafts, layers and Tissue culture banana. Calendar of operations for increased productivity and the possible diversification to crops of less water intensive can be prepared.

The above draft plan will be iterated based on Consultation with the Agri-Marketing and TNAU Scientists in the Sub-basin in the last week of June to propose suitable marketable crops that will be agreeable to the farmers in the Sub-Basin is to be made

Zone of Influence

To ensure the above proposed cropping pattern tank/Anicut wise is successful the number of demonstrations and the input needed are to be worked out in a similar manner and how the command area is going to be influenced to take up this diversified crops.

The location of demonstration plots are to be identified in consultations with the EE, WRD and the concerned WUAs on the prospects of assured delivery of water to the proposed area are to be ascertained.

The above sub –basin plan developed will then be discussed in the Sub-Basin committee and sent to the HODs by for their perusal and suggestions and also to the District Co-ordination Committee (vide for more details on the role of this committee in the Chapter on District Co-ordination Committee) and the agreed plans to be sent to the MDPU for scrutiny and modification.

This iterative process will go on till a finalized acceptable Sub-Basin development plan along with the required training needs both for officers and WUAs is developed together with the approximate cost estimate and sent to the MDPU for clearance by the Steering Committee by last week of September.

Once the steering committee approves the plan, the field level officers will prepare the final cost estimates and send to HODs with a copy to EE, WRD in the basin and to MDPU by First week of October.

The Sub-Basin development plan and the cost estimate will then be forwarded to the World Bank and clearance obtained by MDPU by the second week of October. The Sub-Basin development plan will consist of

(i) Finalized Sub-Basin atlas
(ii) Summary of consultations
(iii) Summary of Technical Analysis
(iv) Proposed Hardware and Software activities with costing and participation and sharing by farmers
(v) Economic analysis
(vi) Draft MOU

The HOD will place the plans before the Project Steering Committee, the estimates through MDPU and obtain Administrative Sanction

Draw an annual work plan with details of budget provision needed and send to MDPU which will be forwarded to Finance Department by the second week of November.

Implementation

Once the estimates received, for Administrative Sanction the Sub-Basin nodal officer will prepare the detailed estimates with drawings showing the field numbers where the demonstrations are proposed and the type of demonstrations planned. According to the delegation of powers the district Nodal Officer (DDH) shall arrange for Technical sanction of the estimate through HOD. The Technically sanctioned estimate will then be perused by the Procurement officer designated in the Sub-Basin, who will be trained either at the Sub-Basin or at Chennai, and initiate the procurement process for settling the agency for the execution by NCB or Shopping Procedure as the case may be in consultation with the State level Procurement officer in the Head office (vide chapter on Procurement for more details)

The Nodal officer in the Sub-Basin shall identify the personnel to be trained on extension and procurement activities and arrange imparting trainings to them through

recognized Training Institutes as approved by the HOD. Necessary agencies for supply of inputs will then be finalized according to the powers delegated to the procurement officers

The district Procurement officer will issue supply orders for the supply of Inputs (seeds, Hybrid seeds, Plants, Tissue Culture banana , MN Mixture, Bio-fertilizers, Bio-pesticides etc.) required to the implementing officer to carry out the identified demonstration in the selected field at the right season. JDH/District Deputy Directors of Horticulture has to finalize the type of publicity activities needed for successful implementation of the project, in discussion with the sub basin implementation officers and WUA.

Publicity activities will be done as finalized - by the sub basin Nodal officers and other implementing officers of the sub basin. One day sub basin level interactive workshop and orientation to the field staff, WUA, local traders manufactures, producers concerned with all Line department – by JDH/District Deputy Directors of Horticulture

The JDH/District DDHs shall organize a Signing Ceremony to initiate the project implementation by inviting Regional Officer (JDH) of DHPC & Senior officers in the line departments and the District Collector

The implementing officer, with reference to the sanctioned estimate shall arrange demonstration in the selected field, preferably near road sides WUAs wise and tank wise by mobilizing the neighboring farmers to join the demonstrations and reap the benefits of such demonstrations to help replications in their fields

The implementing officer will report to the HODs, Executive Engineer WRD, and District Level Co-ordination Committee and to MDPU on the Physical and Financial progress periodically as prescribed (Monthly, Quarterly, Half yearly) and shall inform the bottlenecks experienced during implementation. The District Collector shall review the implementation convening Monthly/ Emergent Meetings and resolve the issues

The implementing officer should ensure that the works are completed as per time schedule agreed in the contract with the suppliers as well as in the approved procurement plan. Simultaneously the implementing officer shall take up a macro level impact caused by these demonstrations with frequent WUAs meetings and document them for perusal by the Monitoring and Evaluation Consultant to be employed by the MDPU.

6.3.6 Mapping Sub Basin Activity by Agriculture Marketing Department

The major crops grown in the 66 selected sub-basins include Paddy, Pulses (Black gram, green gram, red gram, horse gram, cowpea), Oilseeds (Groundnut, gingelly and Coconut), Millets (Maize, minor millets), Cotton, Sugarcane, fruits like Banana, Mango, Guava, Sapota, Grapes, Lemon, Vegetables like Brinjal, Bhendi, Tomato, Gourds, Cole crops, green chilies, onion, greens, tapioca, watermelon, etc.. Spices like turmeric, chilies and flowers like jasmine, chrysanthemum, marigold, crossandra, tuberose, rose, nerium, etc. are also grown. In these areas, the farmers will sell their food grains, oilseeds and cotton through channels such as regulated markets, Direct Procurement Centre (DPC especially for Paddy in Delta districts), private trader/commission agents. Perishable commodities like fruits, vegetables and flowers are usually sold through farmers market (daily market), rural market (weekly market), whole sale agents/commission agents whereas Sugarcane is sold mainly through co-operatives and private sugar mills.

Price information and forecasts are being broadcast to farmers through radio, newspapers, televisions, neighbors, SMS from AMI&BPC, Kissan Call Centre (KCC) in these areas etc. Nonetheless, the farmers in the State usually suffer from various constraints pertaining in the following areas:

- Market led technology transfer to farmers.
- Market intelligence and price forecasting among farmers on real time basis.
- Lack of awareness or wherewithal's regarding about post-harvest technology (grading, sorting, packing activities) and value addition among farmers.

- Inadequate availability of credit which pushes farmers to depend on the wholesale/commission agents for financial resources to meet out cultivation expenses, often forcing to sell their produce at lower price to these informal creditors.
- Farmers selling their produce at farm gate itself to wholesale/commission agents/local traders at less than optimal price owning to for reasons like meeting their immediate cash needs, for reducing post-harvest losses due to storage and to obviate transport/agro logistics arrangement by themselves.
- Absence of coordinating facilitation for monitoring the market linkages between farmers and private market players.
- Lack of credit avenues from financial institutions for farmers various on farm and off farm activities.
- The lack of ease of doing business in regulated markets due to various reasons including logistics, cumbersome procedure, etc….

Objectives

(i) To enhance farmers' linkages to markets by providing alternative marketing channels and improve farm level post-harvest management and value addition.
(ii) To develop Agri-Business Promotion Facility for serving as knowledge depository and also for promoting enterprises.
(iii) To facilitate investment in supply chain integration, and enable market-led agricultural extension which will promote diversification.

The interventions planned under the project are grouped as,

i. Improving Farmer Access to Markets
ii. Promoting Agri-Enterprises
iii. Institutional Strengthening and Capacity Building

Project Design:

This project has visualized the future need for increasing the number of agricultural marketing channels for remunerative price recovery at the farmers end. Therefore, the project design aims at two types of marketing channels viz., traditional and alternate marketing channels. In the category of traditional marketing channel, it is proposed to modernize 3 regulated markets with state-of-the-art facilities by providing infrastructural investment which will encourage diversification of crop from paddy.

To foster alternate marketing channels, it is proposed to form Farmer Producer Companies in 18 sub-basins during first year, 18 sub-basins during second year, 20 sub-basins during third year and 10 sub-basins during fourth year besides supporting existing FPOs which are viable and ready for business expansion.

Pre-implementation Planning:

- At sub-basin level, a Sub-basin Committee will be constituted by Executive Engineer (WRD) with all Nodal Officers of line departments as members.
- The Sub-basin Committee will convene an "IAMWARM Meet" in the sub basin to initiate discussion with sub basin lead farmers, stakeholders, traders, agro processors, agro-entrepreneurs and other civil society associations.
- Sub Basin Nodal Officer (SBNO) will participate in WUA meetings; walk through survey and other preliminary consultative session, in consultation with Executive Engineer (WRO) and stakeholders.
- SBNO will participate in the multiple stakeholders meetings convened by the Executive Engineer WRO at Sub-Basin, village and tank levels.
- Given below are the outcomes envisaged on account of the various project interventions in contrast to the existing scenario:

Sl. No.	Details	Existing Marketing practices followed	a) Problems / Constraints experienced	Remedial measures suggested
1.	Marketing Channels a. Regulated Market	Providing facilities to the notified commodities. In RMs transactions of farmers produce happened in traditional methods. Hence the payment other modalities delayed.	b) Facilities not available for the selling of fruits and vegetables c) Modernization and computerization for automation is required to speed up the process	On pilot basis provision made in this project to provide infrastructures for selling of fruit and vegetables. Provision of facilities for Modernization, computerization for automation
2.	Farmer Producer Companies	Farmer sold out produce directly to RM, Commission mandi and local traders.	Collective marketing, cleaning, sorting/grading, selling are less practiced	Formation of FPO will do collection, cleaning, grading, processing and collective marketing
3.	Price Discovery	Farmers' produce bought at the RMs are put through a process of bidding by traders present, using manual	Price discovery mechanism is manually done, time consuming, prone to delays and human error and susceptible to cartelization of traders	The bidding process will be computerized leading to quick and fair system, eliminating errors and shaving off process time and improving ease of doing business. Introduction of e-trading and subsequently online e-trading through e-NAM will lead to better price discovery.
4.	Post Harvest Management	Post harvest management is traditional and is labour intensive	Lack of post harvest management knows how and low level of mechanization compromise the volume and quality of commodities handled.	Increased level of mechanization support by the project will improve the post harvest management.
5.	Value Addition	Most products are sold without adequate level of value addition.	Lack of value addition limit the price that a commodity can fetch	Capacity training program given to sub basin farmers' in recognized institutes.
6.	Agri Entrepreneurs	Limited support system for agri entrepreneurs and food processing enterprises.	Lack of organized mechanism to guide hand-hold and incubate agro entrepreneurs.	Providing incubation support to develop rural entrepreneurs by technical training and financial grant. Special attention is given to women entrepreneurs.

- Sub Basin Nodal Officer (SBNO) will also collect the data on the scope for improving marketability of the existing crops and the possible better opportunities for diversified crops, value addition required to attract profitable marketability (such as threshing floor, improvement to existing storage godowns, solar drier and cold storages) and transport facilities etc.,

Zones of Influence

- The locations of Post-harvest infrastructure facilities for improving marketability and profitability of the diversified crop would be identified at sub basin level which is the primary zone of influence.
- Ascertain the assured delivery of water in consultation with WRO engineers and WUAs concerned.
- Assess the potential for forming Commodity Groups and Farmer Producer Companies will be assessed based on the marketable surplus of agro commodities produced in the sub-basin.

Planning for Implementation:

- District Level Deputy Director of Agriculture (Agri Business) will prepare the Detailed Project Report (DPR) with final cost estimates, District level Deputy Directors of Agriculture will prepare DPR with final cost estimates of district and district level DPR will be consolidated by the Sub-Basin Nodal Officer (SBNO).
- Executive Engineer, WRO of the sub-basin who is the Principal Nodal Officer shall send a consolidated DPR send to the MDPU for further process.
- The Agri Business nodal officer, viz., DDA (AB) will coordinate with him for incorporating the following details in respect of agriculture marketing in the DPR:

1. Infrastructure
2. Present Marketing Scenario
3. Sub-basin wise Marketing plan

Infrastructure

(i) Storage facilities, threshing floors, pack houses, collection centers, weighing scales, cold storages etc.
(ii) Processing facilities such as decorticators, oil extraction (private/ public)
(iii) Agro based Enterprise i.e. sago, resins, pickle, pulp, bio input manufactures etc.
(iv) Market Intelligence systems with IT network facilities etc.,
(v) Regulated markets, farmers markets, etc.,
(vi) Transport facilities and market access.
(vii) Adoption of latest Pre and Post harvest technologies.

Present Marketing Scenario

(i) Current Marketing Facilities
(ii) Marketable Surplus of Agri/Horti commodities
(iii) Glut/shortage of produce
(iv) Price fluctuation of commodities
(v) Quality control measures
(vi) Accessibility to pledge loan or other financial resources

Sub Basin wise Marketing Plan

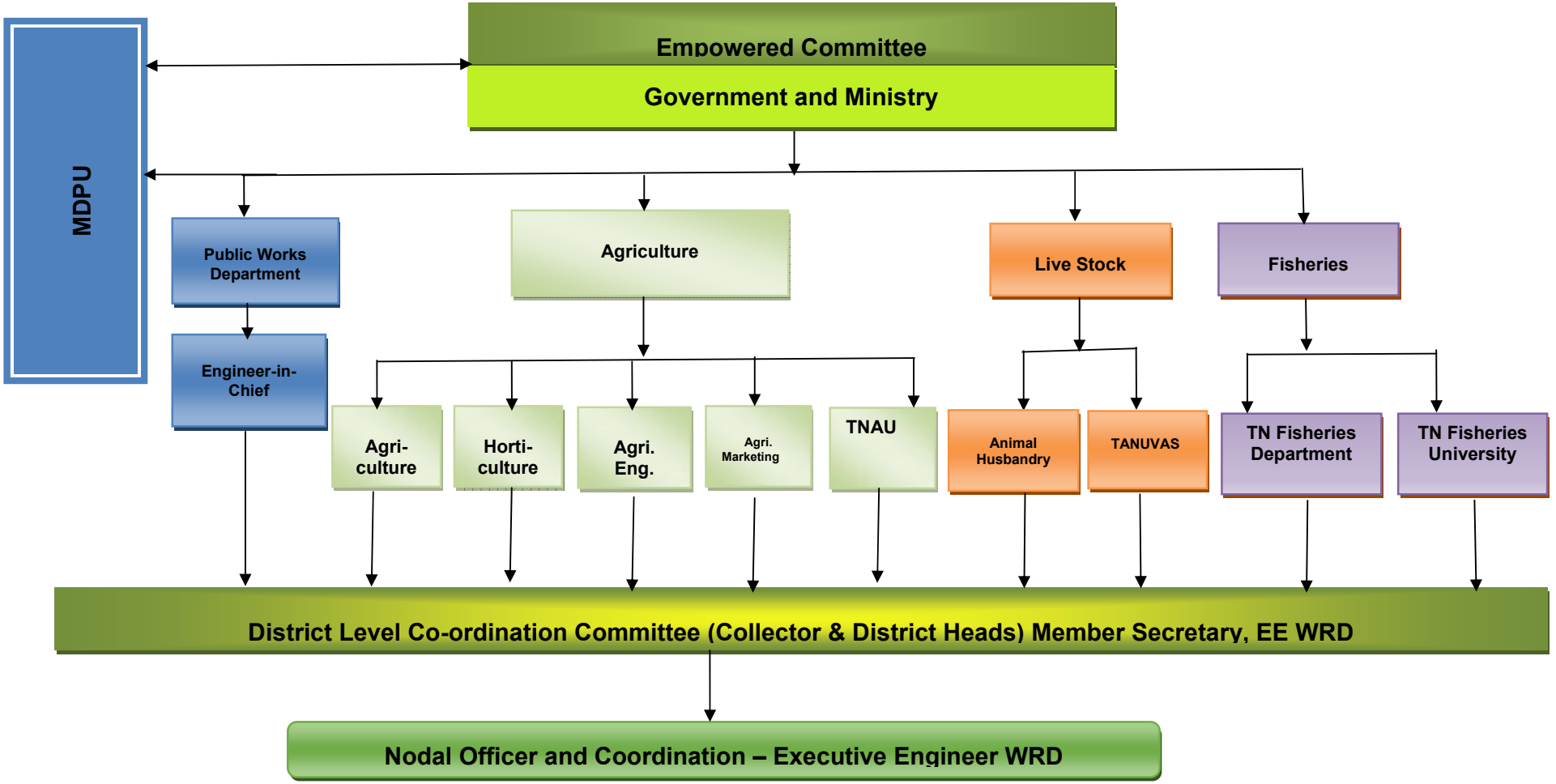
- Based on felt need of stakeholders ascertained from field and various factors like marketing potential, introduction of new technologies for increasing value addition methods and expected to increase in profitability to the growers, a marketing plan would be prepared on the following lines:

Sl. No.	A Few common Problems / Constraints	Suggested Remedial measures	
		Software components	Hardware components
1	Lack of Primary processing facilities and delay in transaction in the existing marketing channel.	Provision of ICT tools for transaction in the regulated market.	Provision of need based infrastructure facilities for primary processing facilities in the regulated market.
2	Inadequate knowledge on agri business promotion and entrepreneurship	Establishment of ABPF cell by appointing a consultancy firm. Training activities and conducting studies, conducting interface workshop, seminars, consultative meetings for entrepreneurship development	-
3	Lack of collective marketing, timely supply of inputs and services	By Formation of FPOs, collective marketing power created to the individual farmers	Provision of infrastructure facilities for business transaction to the FPOs.
4	Inefficient supply chain management	-	Collectivize the produce and market the produce to the consumers without middleman by providing infrastructure facilities.
5	Production glut or shortage of produce	-	By providing infrastructure facilities for e-negotiable warehouse receipt.

- Interactions will also be made independently with the WUAs, Commodity Groups, etc., to explore market availability and market tie-ups on contract basis and to establish agri-business development facilities through small and medium size Agro-entrepreneurs.
- The Sub basin development plan will be finalized in consultation with the Agriculture, TNAU and Horticulture and WRO officials. The Sub-basin marketing plan should propose suitable marketable crops and should also incorporate views of farmers in the Sub-Basin.
- This iterative process will go on till a finalized acceptable draft Sub-Basin development plan along with the required training needs both for officers and WUAs is developed and sent to the MDPU for final clearance by the Steering Committee.
- The holistic integrated implementation of the project in each sub basin will be through a consolidated DPR/Sub-Basin development plan and the cost estimate will then be forwarded to the World Bank and clearance to be obtained from the MDPU.
- The HOD, based on Steering Committee approval, will send proposals for Administrative Sanction and obtain Government Orders. HOD will also ensure issue of Technical Sanction by Competent Authorities.
- Based on Steering Committee approval, World Bank clearance and Administrative Sanction, the Budget Provision will be requested by HOD with Government.
- An integrated Implementation Plan will be prepared at sub basin level with WRO and Line Departments for smooth implementation and monitoring purposes.

Implementation

Once the Steering Committee approves the plan, the field level officers will prepare the Detailed Project Report (DPR) with final cost estimates, get the clearance of the District Co-ordination committee and send to Executive Engineer WRD in the basin and to MDPU. The Sub-Basin development plan and the cost estimate will then be forwarded to the World Bank and clearance obtained by MDPU. The HOD, based on Steering Committee approval, will send proposals for Administrative Sanction and obtain Government Orders. HOD will also ensure issue of Technical Sanction by Competent Authorities. Based on Steering Committee approval, World Bank clearance and Administrative Sanction, the Budget Provision will be requested by HOD with Government. An integrated Implementation Plan to be prepared at sub basin level with WRD and Line Departments for smooth implementation and review purposes.


MDPU
Empowered Committee
Government and Ministry
Public Works Department
Engineer-in-Chief
Agriculture
Agri-culture
Horti-culture
Agri. Eng.
Agri. Marketing
TNAU
Live Stock
Animal Husbandry
TANUVAS
Fisheries
TN Fisheries Department
TN Fisheries University
District Level Co-ordination Committee (Collector & District Heads) Member Secretary, EE WRD
Nodal Officer and Coordination – Executive Engineer WRD

The proposed implementation arrangement will help WRD and other implementing agencies to converge different component activities at the sub basin level.

7.1 Overall Implementation Arrangement

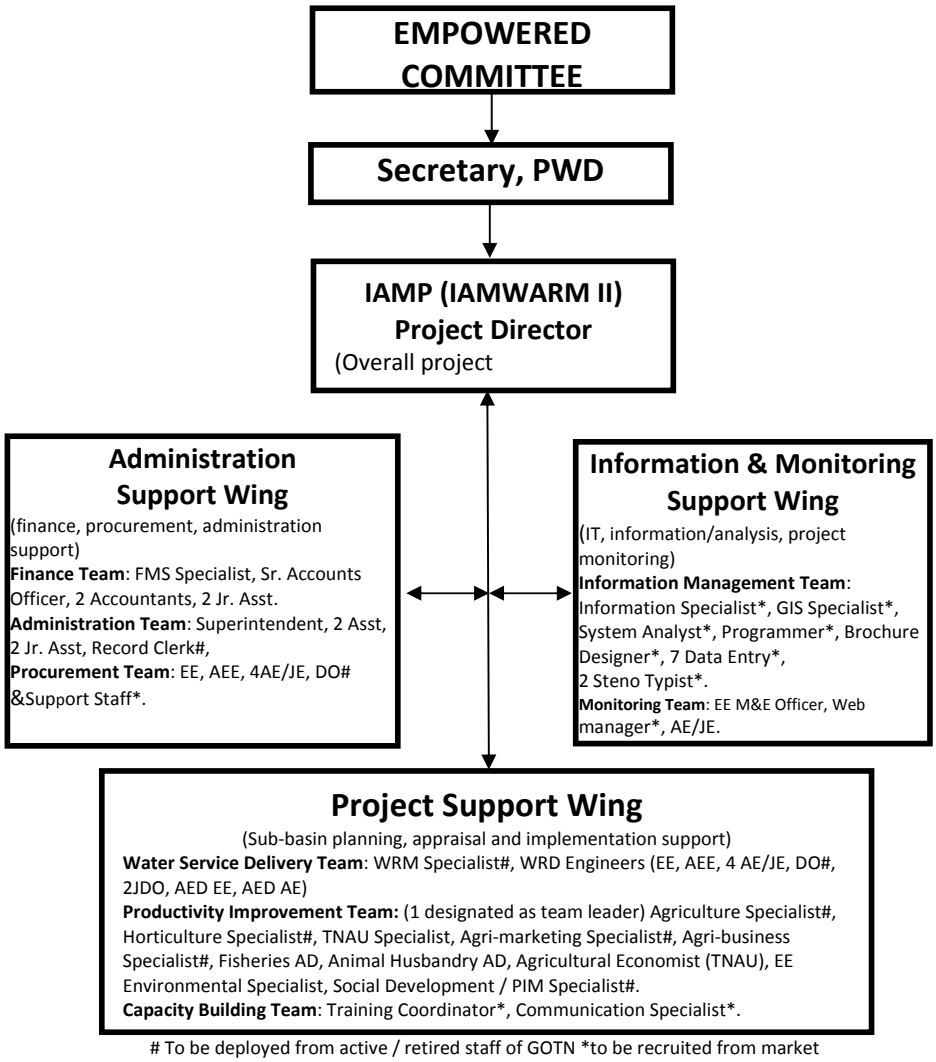
1. As already explained in the implementation process, the project involves multiple stakeholders led by Water Resources Department under the administrative jurisdiction of Principal Secretary, Public Works Department, and Government of Tamil Nadu. An empowered committee chaired by the Chief Secretary will monitor project implementation and ensure inter agency coordination. The Other implementing agencies will be the Departments of Agriculture, Agricultural Engineering, Agricultural Marketing and Agribusiness, Horticulture, Animal Husbandry and Fisheries; Tamil Nadu Agricultural University, Tamil Nadu Fisheries University, and Tamil Nadu University of Veterinary and Animal Science. The Multi-Disciplinary Project Unit (MDPU) headed by the Project Director and located in WRD will provide management support and co-ordination. Nodal officers have been designated in all the implementing agencies for coordinating implementation of project activities pertaining to their department and university. The overall implementation arrangement is shown in Figure 7.1.

Figure 7.1 : Overall Implementation Arrangement(To be modified)

7.2 Institutional Model for Coordination and Monitoring (MDPU)

The overall coordination will be done through the Multi-Disciplinary Project Unit (MDPU) headed by the Project Director and consisting of Nodal Officers from the implementing Departments and University. The overall organizational structure is given in Figure 7.2.

Figure 7.2: Overall MDPU Organizational Structure



To be deployed from active / retired staff of GOTN *to be recruited from market

7.3EmpoweredCommittee

A Project Empowered Committee (PEC) chaired by the Chief Secretary and comprising the Principal Secretaries/Secretaries to the Government of Tamil Nadu for Finance, Agriculture, Animal Husbandry and Fisheries with the Principal Secretary PWD as Member Secretary will review the progress of the TNIAMP every six months and provide strategic directions, guidance on policy matters, promote inter-agency coordination and resolve implementation issues. This is as per G.O. (Ms) No 182 dated 26-12-2016

MDPU will render assistance to the empowered committee. The empowered committee will have the following functions:

(i) Providing strategy and policy guidance to ensure effective implementation and coordination of project activities;
(ii) The Committee shall accord administrative sanction for all individual schemes/packages with estimate upto Rs 20 Cr each within the overall Project outlay approved by the World Bank
(iii) The Committee shall consider all proposals received from the respective Line Departments and Multi Disciplinary Project Unit requiring orders of Government inclusive of those involving financial expenditure to give clearance for speedy implementation of the Project by simplifying procedures so as to avoid delay caused by departmental scrutiny of the proposals.
(iv) Ensuring compliance with all policies, rules and guidelines;
(v) Reviewing project progress and ascertaining performance of different stakeholders;
(vi) Approving the annual work plan and budgets;
(vii) Ensuring smooth coordination among implementing entities; and
(viii) Resolving implementation and coordination issues including grievance and conflict redress

7.4Multi-Disciplinary Project Unit (MDPU)

The main functions of MDPU are:

(i) It will work in the model of multi departmental coordination management & convergence.
(ii) It will be responsible for preparation & coordination of overall project annual budget, Sub basin development plans & implementation progress reports.
(iii) It will provide M&E, procurement fiduciary support to project agencies with department

There are three wings to the MDPU: (i) Administration Support Wing; (ii) Information & Monitoring Support Wing and; (iii) Project Support Wing. The three wings will be staff through either deployment from serving / retired staff of GOTN or will be recruited from the market on a case by case basis. The MDPU will have representation in all the disciplines that are part of this innovative project, and in procurement, financial management and safeguards aspects. These would include external specialists and the deputed line agency personnel. At present, several specialists deputed by the participating agencies and retired personnel on consolidated pay work in the MDPU. Additional specialists in environment, social development, media and communications, market intelligence, etc. would be recruited when the project becomes effective.

A fully strengthened MDPU will have

7.4.1 Administration Support Wing

The Administration Support Wing consists of: (i)Finance Team - FMS Specialist Sr. Accounts Officer, 2 Accountant, 2 Jr. Asst.; (ii) Administration Team- Superintendent, 2 Asst, 2 Jr. Asst. Record Clerk3; and (iii) Procurement Team - EE,AEE,4AE,JE, DO# Support Staff.

7.4.2 Information & Monitoring Support Wing

Information and Monitoring Support wing consist of : (i) Information Management Team- Information Specialist, GIS Specialist, System Analyst, Programmer, Brochure Designer, 7 Data Entry, 2 Steno Typist; and (ii)Monitoring Team - EE M&E Officer, Web manager, AE/JE.

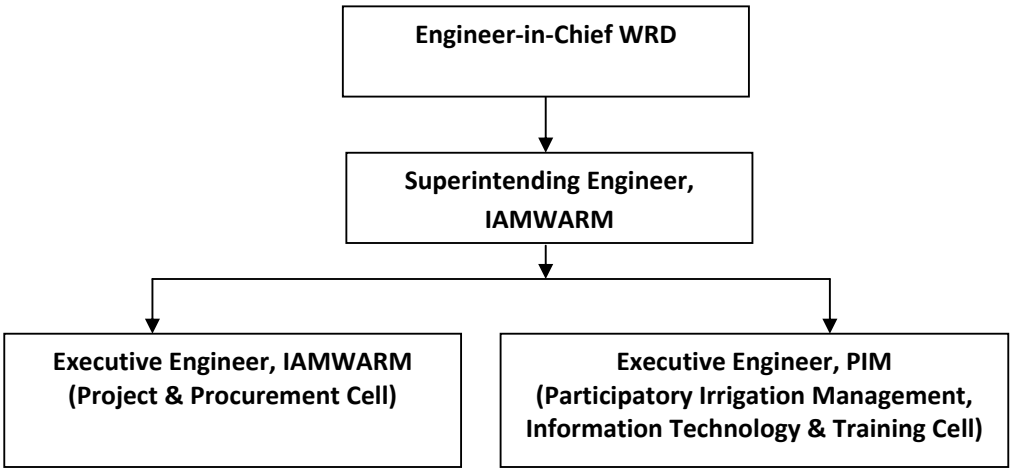
7.4.3 Project Support Wing

Water Service Delivery Team: WRM Specialist, WRD Engineers (EE, AEE, 4 AE/JE, DO, 2JDO, AED EE, AED AE) Productivity Improvement Team: (1 designated as team leader) Agriculture Specialist, Horticulture Specialist, TNAU Specialist, Agri-marketing Specialist, Agri-business Specialist, Fisheries AD, Animal Husbandry AD, Agricultural Economist (TNAU), EE Environmental Specialist, Social Development / PIM Specialist. Capacity Building Team: Training Coordinator, Communication Specialist.

7.5 Implementation Arrangement for Sub Component A1, A3 and A4

These three sub-components will be primarily executed by WRD with support from other participating agencies in the formation and capacity building of WUAs. The Participatory Irrigation Management (PIM) Wing in Engineer-in-Chief's office will lead the efforts in formation and capacity building of WUAs. Synergies with other participating agencies will be pursued. The PIM wing will recruit CSOs/agencies for mobilizing the communities. The PIM wing will also be responsible for providing computers, network connectivity and other infrastructure to WUAs and single window information and knowledge centers. Modernization of information and communication technology across WRD offices and WUAs will be implemented by the Participatory Irrigation Management, Information Technology & Training Cell created in Engineer-in-Chief's office. The SWARMA and the IWS under WRD will be responsible for policy analysis, expanding knowledge base and providing technical support for water resource management. Tamil Nadu Irrigation Management Training Institute will undertake capacity building and training of line department staff, WUAs and farmers.
Two cells will be formed within WRD as shown in Figure 7.3.

Figure 7.3: Organization of WRD



Correct number of cells recommended by EIC is to be incorporated here with minimum requirements as discussed on 29-12-2016

7.5.1 Project and Procurement Cell

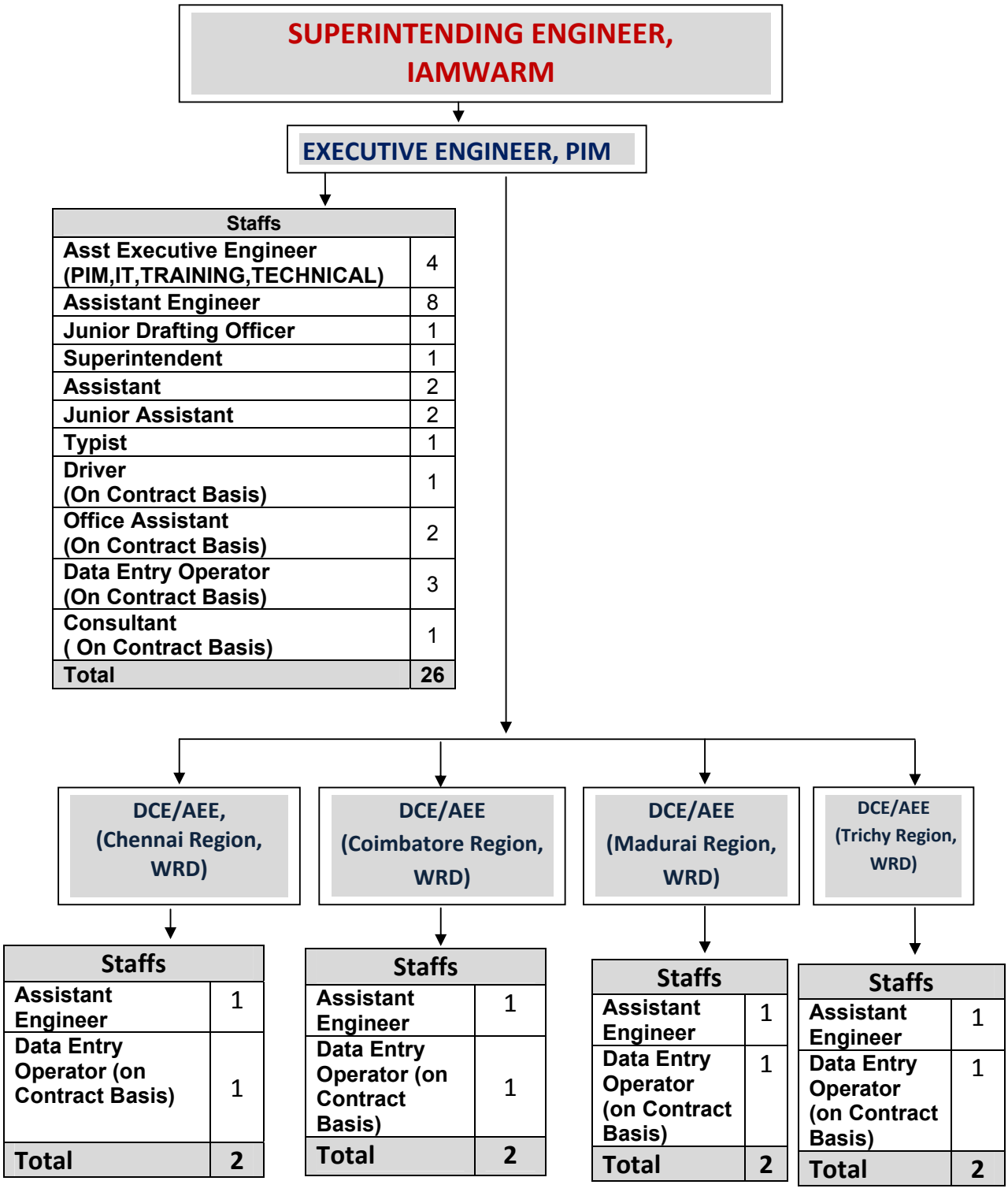
This cell will function as a technical secretariat to Engineer-in-Chief. One Superintending Engineer will head this cell supported by one Executive Engineer, six Assistant Executive Engineers, twelve Assistant / Junior engineers, one Head Draughting Officer, two Draughting Officers, one Junior Draughting Officer, two budget Assistants, two Junior Assistants and one Superintendent, 2 typists, 2 Drivers (on contract basis), three office Assistants (on contract basis) and three Data Entry Operator (on contract basis. The budget unit will consult the technical unit in the cell and arrange to get suitable head of accounts, sub-heads, minor heads from the Finance Department for seeking funds for various components to be implemented with the assistance of the Financial Management Specialist in MDPU who will liaise with the Finance Department. This cell shall scrutinize the Sub-basin development plans and the hydrology aspects, design of structures, cost estimates with due clarifications obtained from the Chief Engineers Concerned.

Procurement plans prepared by the Regional Chief Engineer will be vetted and submitted to MDPU through STEP. The draft bid documents for prior review contracts will be scrutinized before sending to bank for getting NOC. The contract documents and evaluation reports from the Regional and Functional Chief Engineers will be scrutinized before sending to Tender Award Committee. After approval bid document and evaluation reports with the minutes of the tender award committee will be forwarded to World Bank for their clearance in the case of prior review packages. Once the NOC is received from the bank/ TAC cleared, the regional Chief Engineer will arrange to conclude necessary agreements and commence the works sticking to the procurement plans which will be monitored by this cell. The budget unit in the cell shall take timely action to place requisite funds under LOC system to the concerned Executive Engineers. The cell will also frame suitable modalities for the operation of the Irrigation Research Fund and monitor it. The PERT Chart of the works to be obtained from Regions and the progress to be monitored ensuring that milestones and completion targets to avoid levying of any penal service / commitment charges by the World Bank on the unutilized Budget provisions. The cell shall monitor the entire expenditure of the WRD components. The monthly physical and financial progress report and are consolidated and send to MDPU for forwarding to World Bank and Government. The budget unit shall get the accounts reconciled periodically with Accountant General and arrange to file reimbursement claims promptly and follow it up till reimbursement communication from the World Bank as well as from the Government of India is received. This cell will also associate with various consultants (such as baseline, Monitoring and Evaluation, I.T consultant to be employed and share/arrange supply of data). Annual budget plans will be discussed among the regional and field level officers and prompt reports on budget allocation needed for current year/be for the next year will be compiled and sent to the Project Director enabling him to, send to finance department by November middle of every year. The cell shall arrange to get the data on the performance indicators as in the PAD from the regional Chief Engineers and forward to MDPU.

7.5.2 Participatory Irrigation Management Wing

The PIM wing will have a composition as given in Figure 7.4

Figure 7.4: Composition of the PIM Wing



It shall be headed by a Superintending Engineer supported by one Executive Engineer, four Assistant Executive Engineers, eight Assistant / junior engineers, one Junior Drafting Officer, one Superintendent, two budget Assistants, two Junior Assistants, one typist, one Driver (on contract basis), two office Assistants (on contract basis) and three Data

Entry Operator (on contract basis) and one consultant (on contract basis).The deputy Chief Engineer in each region is the nodal officer of the PIM wing of the Region concerned to monitor and report.

The PIM wing will perform the following functions:

1. The PIM wing through the Regional Chief Engineers shall arrange for the elections to WUAs in the project area before March 2018. It shall assess the existing WUAs whether formal /informal. The cell shall also strengthen the existing WUAs.
2. The cell shall design the capacity building arrangements for all WUAs and the WRD and line department officers on roles and responsibilities of the farmers and the department in maintaining the irrigation system efficiently and also the benefits of diversification of crops to save water.
3. The cell shall arrange for the notification of the TNFMIS act to be operable in the project areas & suggest for modifications / amendments for any improvement.
4. Identify the required number of WUAs to be newly formed in the project areas.
5. It shall arrange through the Regional Chief Engineers for the documentation of the WUAs hydraulic boundary maps, members list, voters' list, election rules etc.
6. It shall arrange for completing the election process for formation of WUAs in the entire project areas before March 2020
7. The cell shall develop a mechanism through NGOs, ATMAS Regional WRD engineers and field officers of Line Departments to motivate the farmers to undertake Agri business activities
8. It shall design suitable methodologies for change management – enabling – environment for all officers itself acting as a facilitator
9. The cell shall arrange setting up of suitable buildings for WUA or a cluster of WUAs with kiosks to educate the farmers on the market intelligence to enable them for growing diversified crops
10. To design the capacity building for the WUAs and all officers of the departments engaged in the implementation of the project
11. Information Technology activities shall also function under the Executive Engineer (PIM) with the support of the same staff. WRD shall engage a I.T consultant for advising on the modalities for installation and testing of computers and communication infrastructure in all offices up to section level including the kiosks arrangement in the WUAs and in the line departments and creation of web-based information management system. Estimates for the same will be prepared by this cell and procurement process will be completed before September 2018. Agency fixed shall have to complete the execution before December 2018.
12. Training activities shall also function under the Executive Engineer (PIM) with the existing support staff in co-ordination with IMTI. It shall develop suitable modules for training (CAPACITY BUILDING) of officers of WRD and line departments and arrange for these through various training centers in and outside states. International training will also be identified and suitable nominations for the year program will be finalized at least 3 months in advance, in consultation with the Superintending Engineer (IAMWARM) in respect of WRD and in consultation with the heads of Line departments should be arranged through IMTI. Annual work plans and budget requirements will be worked out and forwarded to the MDPU for consolidation and sending to Finance Department for inclusion in the State Budget promptly every first week of November. Once the budget allocations are made it is the responsibility of the EIC in respect of WRD and the HODs of line departments to comply with the schedules of trainings approved in the budget and periodical reports (Monthly and Quarterly) to this Cell and to MDPU to facilitate easy monitoring and take corrective actions .The common budget unit in the Project

&Procurement Cell of TNIAMP formed in the EIC office will attend to budget and reimbursement aspects

7.6 Implementation Arrangement for Sub Component A2, Component B

Implementation of Subcomponent A.2 and component B constitute bulk of project investments involving modernization of tank systems, anicuts, water distribution canals and on-farm development, as well as demonstration of improved technologies related to agriculture, horticulture, animal husbandry and fisheries, organization of farmers into commodity groups, producer organizations/companies, training of farmers and fishers, renovation of markets, promotion of market linkages and agri-business development. These tasks will be organized in sub-basin framework.

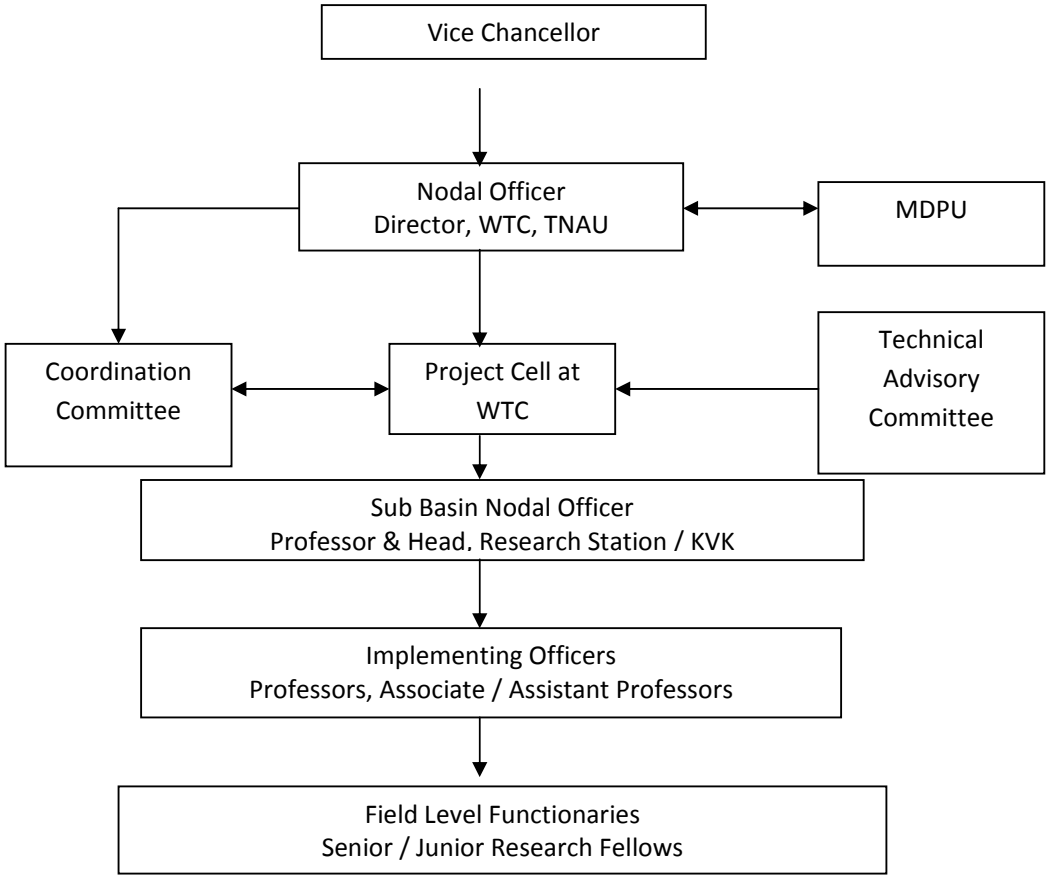
7.6.1 Sub-Basin Level Coordination

The Executive Engineer of WRD has been designated the nodal officer for each sub-basin or a cluster of sub-basins where the command areas are small. A team of specialists deputed at the field level by the participating agencies will work with the nodal officer and prepare and update sub-basin development plans (SBDPs) every year. A nodal officer in WRD and MDPU will monitor and facilitate tank-related investments.

7.6.2 Organogram for TNAU

TNAU is responsible for implementing on farm technology assessment, validation and main streaming activities of Sub Component B1.The Organogram for the project cell of TNAU is given in Figure 7.5.

Figure 7.5: Organogram for TNAU Project Cell



The Vice Chancellor will be the Chief Executive Officer for the purpose of the project, to guide, advise and supervise its successful implementation. Director, Water Technology Center (WTC) shall be the Nodal officer at State level for both planning and implementation of IAM Project. Director WTC in consultation with the Vice Chancellor shall designate the Project Cell Scientists and a Procurement officer in the Project cell. The Project Cell of TNAU consists of members as given in Table 7.1.

Table 7.1: Composition of Project Level and Sub basin level TNAU Cell

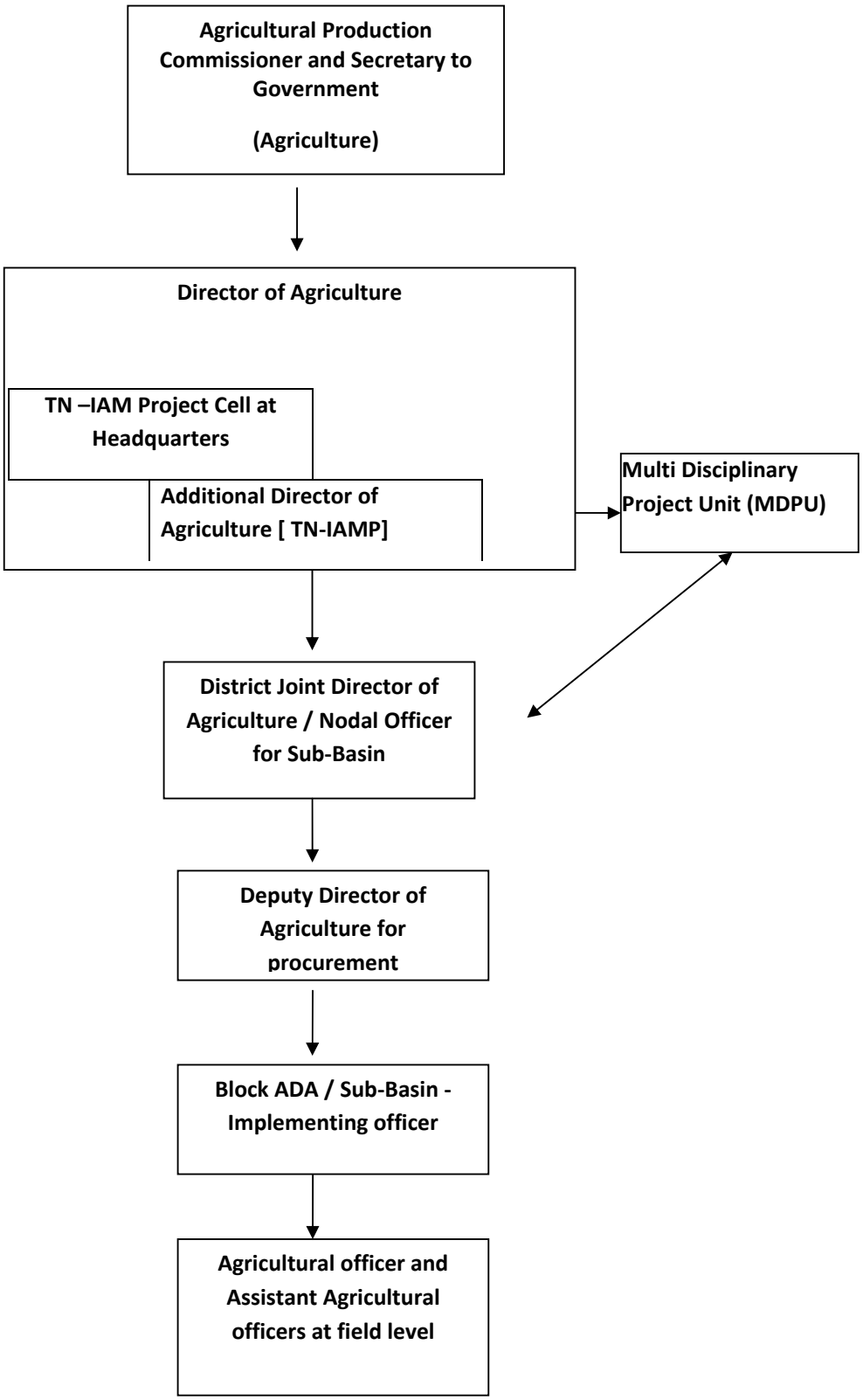
S.No	Members	Designation	Role
1.	Director, Water Technology Centre	Nodal Officer/ Chairman	Monitoring and Supervision of IAM WARM activities
2	Professor	Member	Over all Procurement Supervision & Coordination
3	Professor in Agronomy	Member	Overall Coordination and Supervision, Demo and Up scaling of SRI, Drip Fertigation
4.	Professor	Member	Area Expansion, Varietals diversification, Precision Farming Technologies and its Up scaling
5	Professor in Soil and Water Conservation	Member	Supervisory & Coordination Quality Management in Drip Fertigation Systems
6	Professor in Agricultural Economics	Member	Marketing Tie Ups, Market Potential Assessment, Monitoring and transformation of Market Intelligence Information and Agribusiness Development
Project Cell at Sub Basin Level:			
1	Professor & Head of Research Station / KVK / Departments	Sub Basin Nodal Officer	M & S of Implementation of Plans
2	Professors, Associate Professors / Assistant Professors	Implementing Officers	Implementation of activities as per Detailed Project Report of sub basins
3	Senior Research Fellows / Data Entry Operators	Field level Functionaries	Assisting in Implementation of sub basin components and documentation

7.6.3 Organogram for Department of Agriculture

The TN–IAM Project is implemented by the Directorate of Agriculture. A TN–IAM Project cell at Headquarters in the Directorate of Agriculture is formed and is headed by the Additional Director of Agriculture (TN-IAMP] as the Nodal Officer at the State level. He is supported with the following staff namely one Assistant Director of Agriculture (TN-IAMP) and one Agricultural Officer from the Department of agriculture. One Agriculture Technical Input Provider, one Accounts Officer and one Computer Data Entry Operator as Contractual Staff funded by the TN-IAM Project for planning, implementation, co-ordination and monitoring of the Project.

At the Sub-Basin level, the District Joint Director of Agriculture is the Nodal officer / Procurement officer of the Project. He is supported by the Deputy Director of Agriculture [State Schemes] and the Agricultural Officer [State Schemes] for implementation and monitoring of the Project activities.

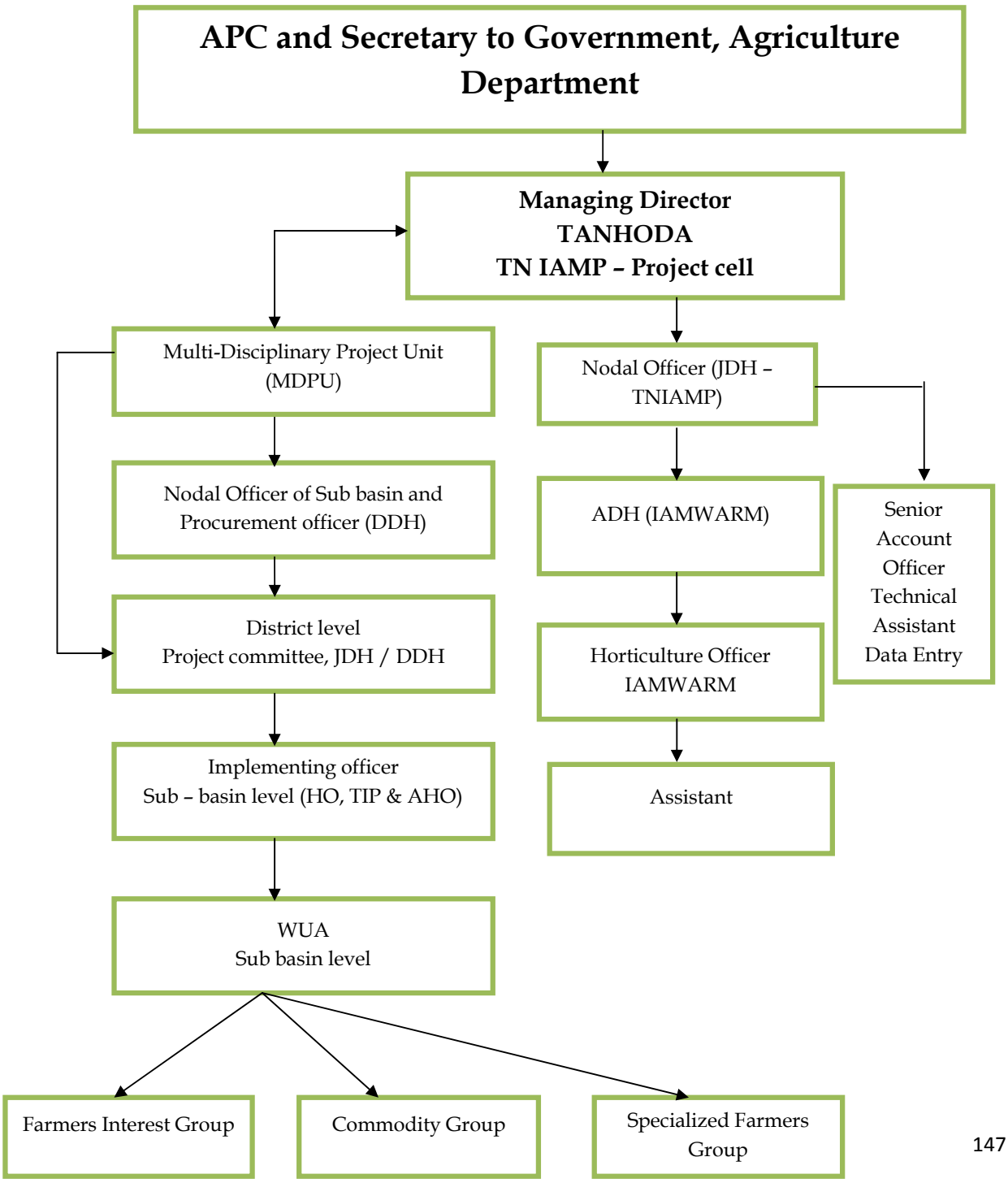
At sub basin, Block level, Block Assistant Director of Agriculture is the project implementing officer and executes the project components at the field levels with the assistance of Agricultural Officer/Deputy Agricultural Officer and Assistant Agricultural Officers.


Agricultural Production Commissioner and Secretary to Government
(Agriculture)
Director of Agriculture
TN –IAM Project Cell at Headquarters
Additional Director of Agriculture [TN-IAMP]
Multi Disciplinary Project Unit (MDPU)
District Joint Director of Agriculture / Nodal Officer for Sub-Basin
Deputy Director of Agriculture for procurement
Block ADA / Sub-Basin - Implementing officer
Agricultural officer and Assistant Agricultural officers at field level

7.6.4 Implementation Arrangement for Horticulture

The HOD will identify the Nodal officer and Implementing Officer for preparation and implementation of the Project in the 66 Sub-Basins. In the District, JDH/Deputy Director of Horticulture is the Nodal officer and Procurement officer of the Project for a Sub-Basin or a cluster of sub –basins. The Nodal officer shall then identify the implementing officers of each
Sub-Basin (Horticulture officer and the Assist Horticulture officer of the concerned Block in the Sub-Basin). The Organogram for horticulture is given in Figure 7.6.

Figure 7.6. Implementation setup for Horticulture

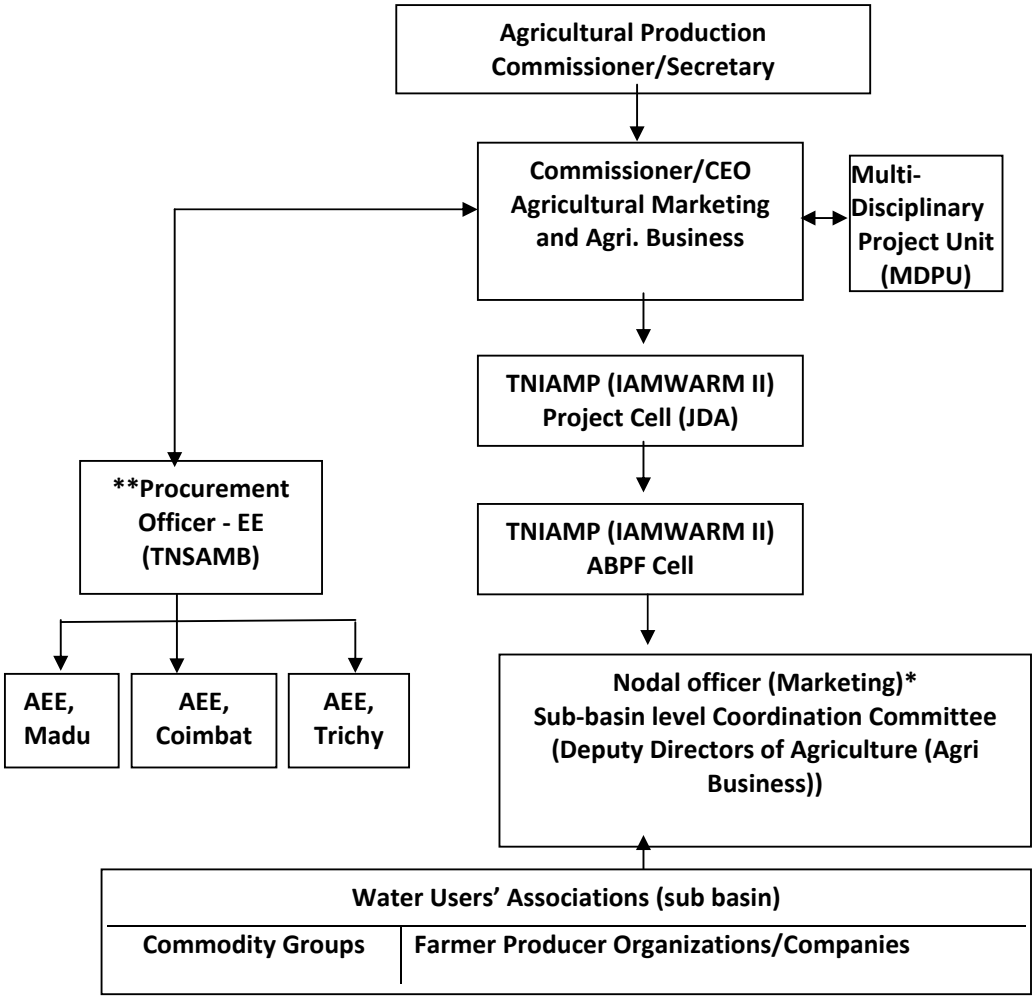


7.6.5 Implementation Arrangement for Agriculture Marketing

6.1 Organization Structure

- A special TNIAMP (IAMWARM II) project cell at the Commissionerate of Agricultural Marketing and Agri Business with the existing staff will be formed for planning, implementation, co-ordination and monitoring purposes. Besides the staff already in place, Agri Business Specialists and other needed consultancies will be engaged on contract basis to assist the cell and the implementing officers at sub basin level.
- At the District level, the District officer, viz, DDA (AB) will be the nodal officer for the basins falling under his district. Wherever a sub basin falls in more than one District, the District officer with larger project area will be designated as Nodal Officer for that sub basin
- The flow chart below explains the structure of Agricultural Marketing and Agri Business functioning, under this project.

Flow chart – TNIAM (Marketing)



- Nodal officer: Deputy Director of Agriculture (Agri Business) will be the 'designated officer' at the District level for planning, implementation and monitoring of activities under the project for the entire Sub Basin, and he shall ensure coordination various Implementing Officers of the relevant line Departments.

7.0 Procurement officer:

A. In TNIAMP, the Commissioner of Agricultural Marketing and Agri Business is the Procurement Officer for hiring of consultancy firm/consultant for

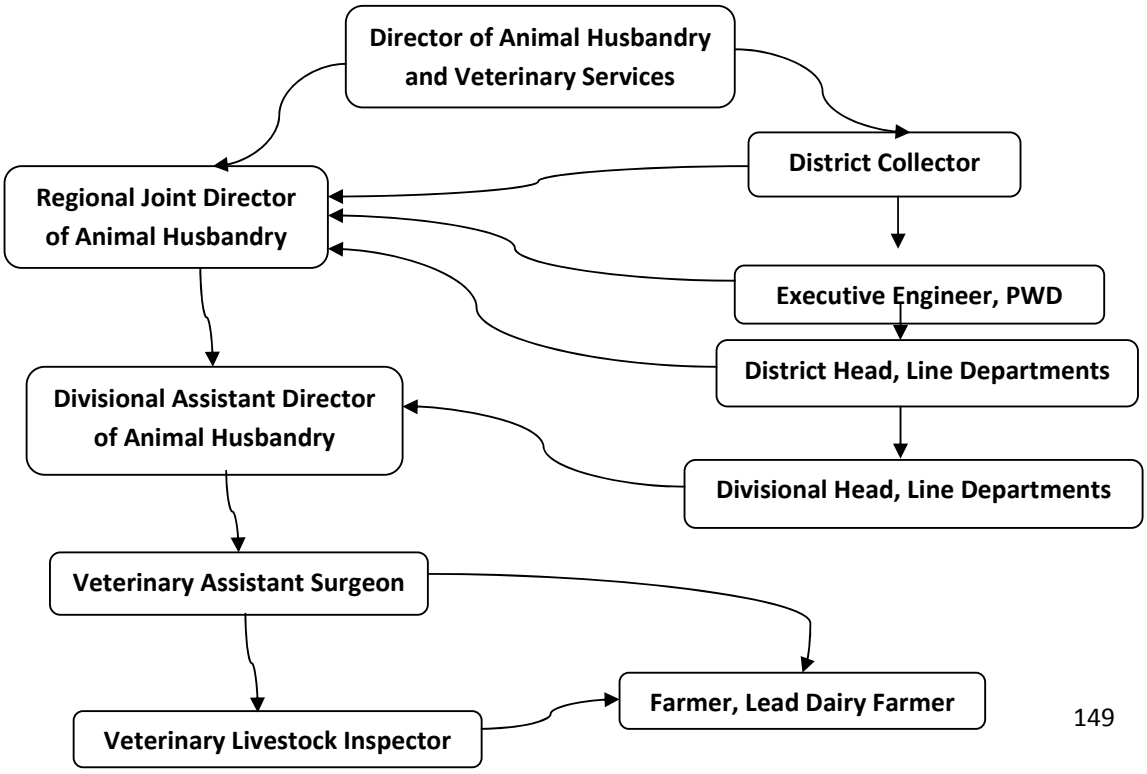
1. Establishment of ABPF,
2. TNIAMP Cell,
3. FPO formation and business plan development and
4. Studies

The Executive Engineer is the Procurement Officer for infrastructure development and for procuring of materials for civil works, for purchase of post-harvest equipment/materials in the Regulated Market and for purchase of materials and equipment for TNIAMP Cell and ABPF Cell within the financial limits accorded to him as per extant rules of the State Government. In case of procurement beyond Executive Engineers' power, the Procurement Officer will be the next higher level officers as per appropriate financial delegation sanctioned by Government of Tamil Nadu.

7.6.6 Implementation Arrangement for Animal Husbandry

An IAMP cell (nodal unit) headed by Additional Director (Special Schemes) will be set up in DAH. This unit will help in smooth implementation of the program and act as a liaison between the project office and the field offices in the department. The project will provide the logistic support and incremental operational costs of this nodal unit. The Cell will be provided with necessary infrastructure like computers, printers and accessories; furniture and man power engaged on contract basis. The implementation arrangement for animal husbandry is given in Figure 7.8.

Figure7.8 :Implementation arrangement for Animal Husbandry



Roles and responsibilities of different actors involved in livestock development

Lead Dairy Farmer (DAIRY INTEREST GROUP)

- Mobilizing the farmers for better animal management
- Arranging for pregnancy verifications by the concerned VAS
- Assisting AHD in conducting fertility management camps
- Supporting AHD staff in disease surveillance
- Liaising between farmers, WUA and local AHD technical staff

Veterinary Livestock Inspectors

- Carrying out artificial insemination
- Assisting the VAS in identification of Dairy Lead farmer
- Assisting the VAS in Conducting camps
- Assisting the VAS in identification of beneficiaries for all the interventions

Veterinary Assistant Surgeon

- Carrying out artificial insemination
- Identification of Dairy Lead Farmer
- Conducting camps
- Identification of beneficiaries for all the interventions
- Conducting training and exposure visit
- Motivating the farmers in adoption of new technology
- Maintaining the health profile of the livestock in their jurisdiction

Divisional Assistant Directors (Implementing Officers)

- Preparation of the divisional plan
- Implementing all the activities in their jurisdiction
- Coordinating with trainers/training agencies for effective implementation of training
- Supervision of the project activities through regular field visits in their jurisdiction
- Coordinating the exposure visits in their jurisdiction
- Periodical review of the progress of project in their jurisdiction
- Coordination with line departments
- Collecting the bills / vouchers from the field and sending it to Sub basin Nodal Officer within the stipulated time for encashment
- Monitoring the documentation of field activities as stipulated by the World Bank
- Monitoring the sending of stock entry certificate for drugs, equipment, etc.
- Documentation of good practices for the area of their jurisdiction
- Planning of field visits during the World Bank Mission, Head of Department, District Collector, Project Office, etc.

Deputy Directors (Cattle Breeding and Fodder Development)

- Timely supply of breeding inputs like semen and LN2
- Timely supply of fodder inputs
- Ensuring provision of ultrasound scanners during the conduct of camps

Regional Joint Directors (Nodal Officers)

- Preparation of overall sub basin plan.
- Coordinating with Head quarters Project Cell, District Collectorate and district Line departments.
- Coordinating with trainers/training agencies for effective implementation of training
- Monitoring of activities implemented through regular field visits.

- Periodical review of the progress of the sub basin
- Over all control and reporting of expenditure for the entire sub basin
- Monitoring the sending of monthly physical progress report
- Monitoring the settling of bills from the field within the stipulated time
- Monitoring the sending of stock entry certificate for drugs, equipment, etc.
- Documentation of good practices for the entire sub basin
- Planning of field visits during the World Bank Mission, Head of Department, District Collector, Project Office, etc.

Regional Joint Directors (Co-ordinating Officers)

- Liaising with Sub basin Nodal Officer in the preparation of overall sub basin plan.
- Coordinating with Sub basin Nodal Officer, Head quarters Project Cell, District Collectorate and district Line departments.
- Coordinating with trainers/training agencies for effective implementation of training
- Monitoring of activities implemented through regular field visits.
- Periodical review of the progress of the area of their jurisdiction
- Monitoring the sending of monthly physical progress report to Sub basin Nodal Officer
- Monitoring the sending of bills from the field to Sub basin Nodal Officer within the stipulated time
- Monitoring the sending of stock entry certificate for drugs, equipment, etc.
- Documentation of good practices for the area of their jurisdiction
- Planning of field visits during the World Bank Mission, Head of Department, District Collector, Project Office, etc.

Administrative Officer / Manager in Regional Joint Director (Nodal Officer) Office

- Control and distribution of funds to Implementing Offices.
- Monitoring and Reporting of expenditure for the entire sub basin
- Sending of monthly physical progress report to Head quarters Project Cell, District Collectorate and district Line departments.
- Sending of monthly un-reconciled and reconciled MIS report by due date to Head quarters Project Cell.
- Rectification of discrepancies pointed in financial report of AGs figures with the sub basin
- Rectification and sending of all audit reply
- Sending of stock entry certificate for drugs, equipment, etc. to Head quarters Project Cell

Nodal Unit at Office of Director, AH department

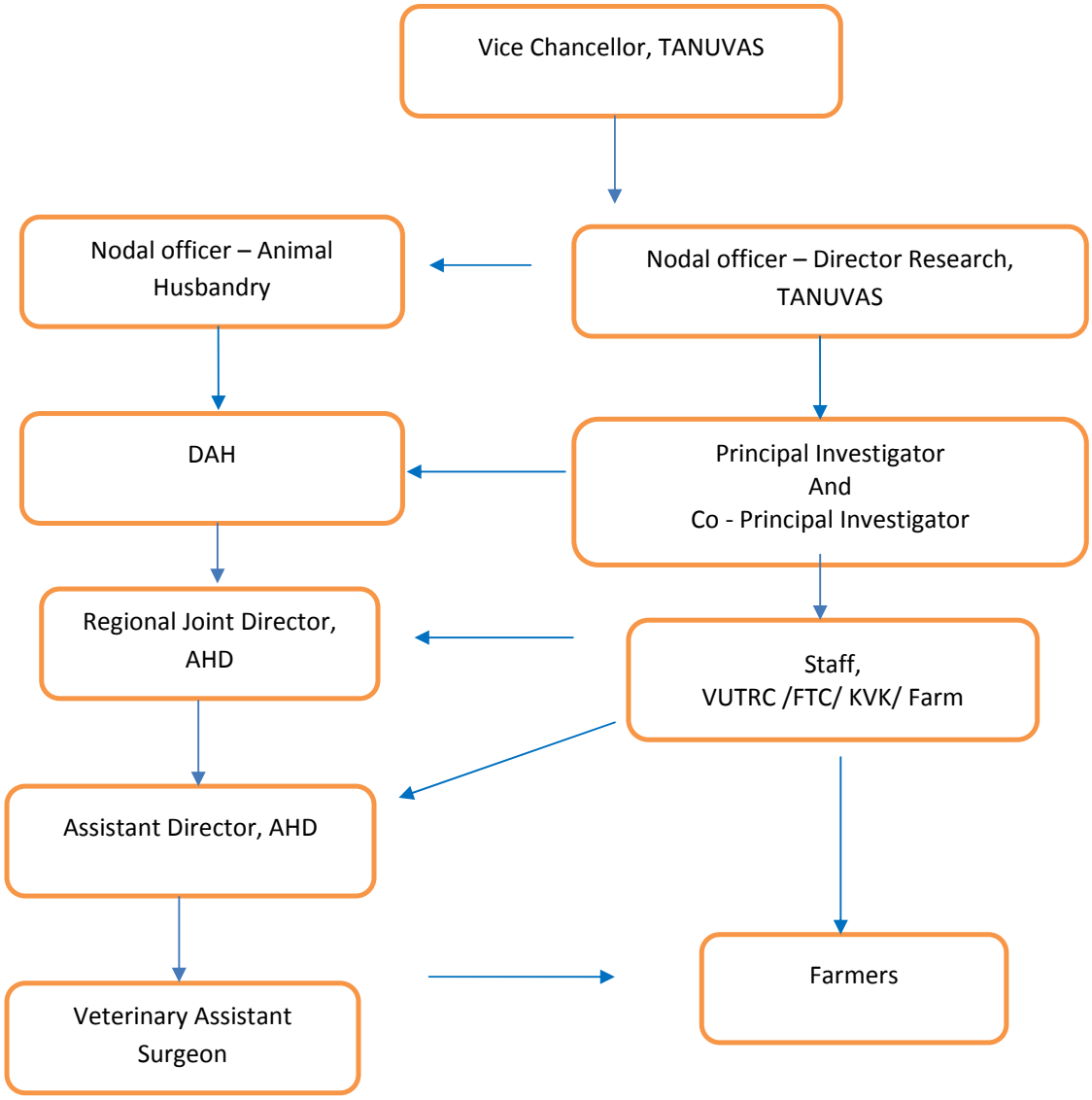
- Coordination with district and sub district line department units for effective implementation
- Over all supervision and monitoring of the project
- Organizing the trainings of project staff
- Documentation of good practices
- Coordination with Project Office

Implementation Arrangement at TANUVAS

The Vice chancellor (TANUVAS) shall delegate sanction to the officers for the implementation of the Project at TANUVAS. Director of Research (TANUVAS) shall be the Nodal officer in coordinating with nodal officer identified by Animal Husbandry department and MDPW for implementation of the project.

Principal investigator, Professor, TANUVAS) and Co principal investigator (Assistant Professor, TANUVAS) shall be responsible for planning and implementation of the project. The staff of the various farms, KVK's, VUTRC's, FTC's will coordinate with Principal investigator, Co-principal investigator, line department staff (VAS) and farmers for implementing the project. The arrangement is shown in Figure 7.9

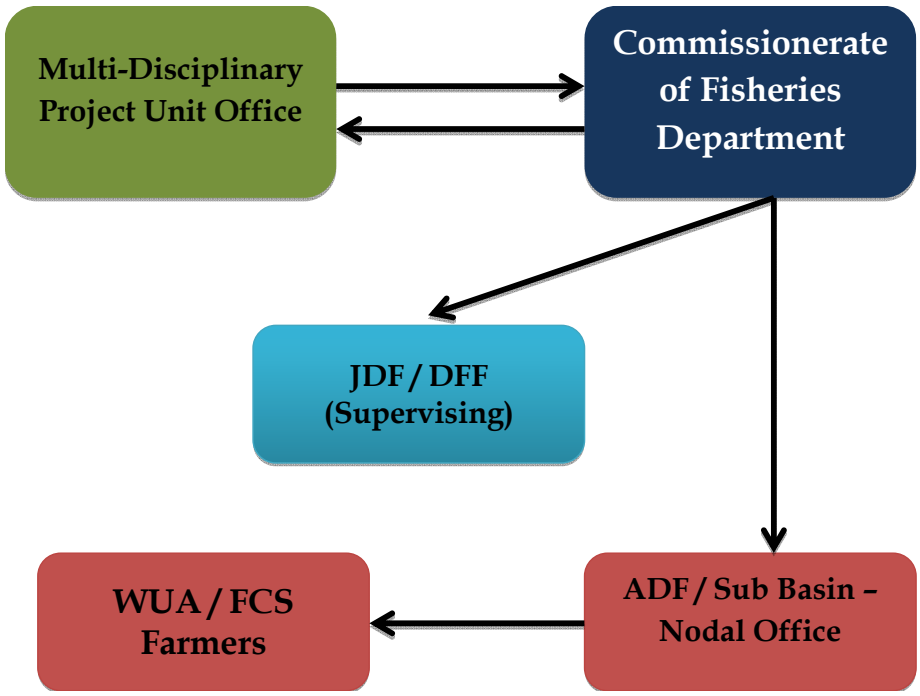
Figure 7.9 : Implementation Arrangement for TANUVAS



7.6.7 Implementation Arrangement for Fisheries

Commissioner of fisheries/HOD will be overall in charge of operating the budget and project implementation. IAMWARM Cell at HOD office at Chennai will monitor the progress and implementation. Nodal officers at the sub basin level will be in-charge of Sub basin DPR preparation, action plan and execution. Field Officers at the sub basins attached to Nodal officer will assist in implementation. Beneficiaries/Target group will be identified by the sub basin nodal officers. WUA, progressive SHG, Fishermen co-operative, Farmers, Inland Fishers or existing informal groups in respective tank command will be the target group. The implementation is shown in Figure 7.10.

Figure 7.10: Implementation Arrangement for Fisheries



Chapter 8
Financial Management Arrangement

The project is largely to be implemented by various line departments and based on the experience of the recently closed TNIAMARM Project, the financial management arrangements will, to a large extent rely on GoTNs systems for budgeting, funds flow, accounting, internal control and external audit, with project specific arrangements agreed for (i) works & activities to be executed by WUA's; (ii) grants to Producer Groups/ Producer Companies and (iii) activities to be carried out by the three new universities i.e. TNAU, TNFU and TANUVAS. Arrangements for these will be assessed and agreed prior to appraisal, which will include preparation of an FM handbook documenting arrangements for WUA's and producer companies.

8.1 Overall, project financial management arrangements

The project envisages implementation by eight line departments/Directorates (i) Water Resources Department (WRD); (ii) Agriculture Department; (iii) Agriculture Engineering Department; (iv) Agribusiness & Marketing Department. (v) Horticulture Department; (vi) Fisheries Department; (vii) Animal Husbandry Department and (viii) three Universities TNAU, TNFU and TANUVAS. With the exception of the three universities and activities to be executed or for which resources are to be transferred to WUA's and Producer Companies/ Groups, all the line departments operate under a common state financial management framework i.e. budgeting, funds flow, internal control, accounting, reporting and audit arrangements, which can be relied upon for the project financial management arrangements.

8.1.1 Budgeting

The project activities would be budgeted under the respective demand for grants of line departments involved in the project; however, the Annual Work Plan (AWP) and budget proposals would be reviewed, approved by the MDPU before forwarding to the Finance Department to ensure consistency and coordination of plans/ budgets the various departments. The budget would be incorporated in the State Budget by sub-basin using the minor head/ sub head in the GOTN budget code, consistent with the project adopted under the closed TNIAMWARM Project (Budget to be provided in state budget for FY 2017-18). The MDPU will submit the detailed budget estimates for the FY 20017-18 to Finance Department in line with the budget cycle i.e. by December 31, 2016. As regards three University the budget provision would be made as grant in aid in the demand for grants for the Agriculture, Fishery and Animal Husbandry Dept. respectively.

8.1.2 Funds Flow

Finance Department will allocate budget to the all line departments based on the approved budget in respective demand. Since externally aided projects are exempted from quarterly expenditure control, no significant delays are expected in funds flow. GoTN has stopped the mechanism of Letter of Credit for works department w.e.f. April 1, 2016 and now all payments are processed through the treasury and payments made electronically. The WRD and line departments will in turn re-allocate the allotted budgets to the Divisions and District/ Block units for incurring actual expenditure. Funds to the TNAU/TNFU/ TANUVAS/WUA's and Producer Groups/ Companies will be provided as grant in aid based on approved activity / business plans, agreement with WUA's/ PC/PGs and periodic financial reporting.

8.1.3 Accounting & Internal Control

Books of accounts by the WRD, Line Departments will be maintained under the standard Government Accounting Systems and monthly accounts will be rendered to Auditor General (AG) (by Line Departments through the treasury). These are required to be reconciled with the AG (A&E) on a monthly basis. The annual financial statements would be prepared only after the reconciliation with the AG (A & E). Funds released to TNAU/TNFU/TANUVAS and grants to WUA's/ Producer Groups/Companies and Agriculture Marketing Board will be considered as advance for project purposes (even though the Government accounting would record this as an advance) and will be considered as expenditure only on receipt of quarterly expenditure and progress reports. The three universities will open a separate Bank account for the project funds to keep it distinct from the funds received from GOTN funds for establishment costs. The universities will consolidate the expenditures from its various field units and send a consolidated report to the MDPU on a monthly basis. Parking of funds in Personal Deposit, Public Ledger Accounts would not be permitted. WUA's and producer groups are envisaged to receive funds for execution of project activities for the first time. Accordingly necessary FM arrangements including basic triggers for fund release, banking arrangements, accounting, reporting and audit arrangements have to be agreed and documented in a FM Handbook. In addition these will need to be supplemented by capacity building, especially WUA's, for overall governance, participative decision making and transparency.

8.2 Finance Staffing

The staffing structure for the MDPU will include an officer from the Treasury & Accounts Service, supported by a Superintendent from the WRO and two/ three accountants either on deputation or on contract basis. The MDPU currently has one officer from the Treasury & Accounts service deputed and this arrangement is expected to continue. The existence of a fully functional MPDU including the finance unit is a legal covenant. In each of the line departments the Financial Advisor/ Chief Accounts Officer will be responsible for financial reporting to the MDPU. Based on the experience of TNIAMWARMP, a FM support consultant will be provided in each of the PMU of the departments for coordination and collection of financial reports, reconciliation with AG(A&E) from various sub-basins and DDO's which at a peak are expected to be close to 500 disbursing units and following up on addressing audit observations.

8.3 Financial Reporting

The financial reporting (interim financial reports) under the project would be by the project components broken down by sub-basins. These are closely linked to the budget codes agreed with the finance department and would be based on the expenditures recorded in the AG (A&E) books of account. In addition the WRD, AED, Horticulture, Agri Marketing etc., would provide a statement on security deposit with-held and paid to the contractors and grants provided and utilized by WUA's. The finance unit in the MDPU will have the responsibility of obtaining expenditure reports from the various line departments and preparing and submitting the consolidated interim and annual financial reports to the Bank. The interim financial reports would be used as the basis for disbursement.

8.4 External Audit

The Comptroller and Auditor General of India (CAG) - who is considered as acceptable auditor through its offices in Tamil Nadu will carry out the external audit of the project financial statements for the activities carried out by line departments. For expenditures incurred by TNAU, TNFU and TANUVAS, the audit will be carried out by the Local Fund Audit Department. The audits will be carried out as per the standard terms of

reference for audit agreed between the DEA, C&AG and the Bank. The audit report will be submitted to the Bank within nine months of the close of each financial year. The audit reports on project implementation are summarized in Table 8.1.

Table 8.1 : Project Audit Arrangement

Implementing Agency	Audit	Auditors
Government of TN	Project Audit	Comptroller and Auditor General of India,
TNAU	Project Audit	Local Fund Audit Dept
TN Fishery University	Project Audit	Local Fund Audit Dept
TN Veterinary & Animal Sciences University	Project Audit	Local Fund Audit Dept
CAAA	Special Account	Comptroller and Auditor General of India

8.5. Internal Audit

The project will have an internal audit by the Chartered Accountants firm. The scope of internal audit will be to ensure that the internal control procedures (reconciliations, timely settlement of advances drawn, balances, if any, in personal deposit accounts, physical verification of assets provided to WUA etc.) are being adhered to at the project level i.e. line departments at various levels including State, District, Divisions and Block level and identify any bottlenecks or constraints in the implementation. The terms of reference will be reviewed by the Bank. The internal audit is expected to be in place within six months of effectiveness of the project.

8.6Disbursement Arrangements

Funds from the World Bank will be made available to GOTN (through the GOI) under the standard terms of on-lending between GOI and the States. The Bank may provide an initial advance will be transferred by GOI to the GOTN. The advance will be enhanced subsequently proportionate to the increased level of expenditure. Subsequent releases will be on re-imbursement basis, based on Bank's share of eligible project expenditure.

Chapter 9: Procurement

Procurement for the proposed project will be carried out in accordance with the Bank's Procurement Regulations for Borrowers for Goods, Works, Non-Consulting and Consulting Services dated July 1, 2016 and applicable to Investment Project Financing (IPF) here in after referred to as "Regulations". The project will be subject to the Bank's anticorruption Guidelines3, dated October 15, 2006, and revised in January 2011 and as of July 1, 2016.

9.1 Procurement Methods for Works and Goods

- International Competitive Bidding (ICB)
- National Competitive Bidding (NCB)
- Shopping (S)
- Direct Contracting (DC)
- Force Accounts (FA)

9.2 Procurement Methods For consultant's Services

- Quality and cost based selection (QCBS)
- Quality-based Selection (QBS)
- Selection under a Fixed Budget (SFB)
- Least Cost Selection (LCS)
- Selection based on Consultant's Qualification (CQ)
- Single Source Selection (SS)
- Individual selection by comparison of qualification of at least 3 candidates

9.3 Procurement of works

To be procured by WRD and include the following items:

- Restoration, revival and modernization of selected existing Irrigation Infrastructure such as
  - Rehabilitation of Anicuts
  - Improvements to main canal
  - Improvements to supply channel
  - Improvements to tanks
  - Construction of check dams, artificial recharge wells
  - Replacement/provision of cross regulators, head works, cross masonry works
  - Improvements to service roads
  - Lining the channels
  - River regarding works
  - Civil works for construction of office building for MDPU, Basin Boards, WUA buildings, kiosks, modification to existing building to accommodate the proposed SWaRMA institute

- To be procured by the concerned departments
  - On-farm development works, livestock productivity and fisheries productivity improvement demonstration works, Agri marketing and Agri-processing related civil works etc.

All these packages will be procured through NCB /National shopping(quotations based)

9.4 Procurement of Goods and Equipment

This will include

- Office and IT/MIS equipment (desktop and laptop computers, printers, servers, GIS packages, scanners, UPS, photocopiers, fax machines, LAN, VAN etc) (By the Project and Procurement Wing in EIC office)
- Training and communications equipment (multimedia Projectors (**Participatory Irrigation Management Wing (PIM, Information Technology & Training Cell)**
- Soil survey equipment (Agri)
- GPS, digital cameras (MDPU)
- Office furniture (MDPU)
- Audio/ Video equipment (MDPU)
- Modern Survey equipment (CE PF)
- Satellite imagery maps (CE IWS)
- Laboratory equipment (Agri, TNAU)
- Vehicles (MDPU, WRD)
- Seeds, plants, saplings, fertilizers, bio fertilizers etc. (Agri, Horticulture, TNAU, AHD)
- Farm implements (Agri,)
- Micro Irrigation (Horticulture and TNAU)
- Medicines, Drugs, Hormones, Supplements, Frozen Semen Straws, Diagnostic kits, Sterilizer, Refrigerator, Castrator, Microscope for Animal Husbandry)
- Procurement of machinery, equipment etc., for erection of mineral production plant for TANUVAS
- Cages, fish seeds, (Fisheries)
- Post-Harvest equipment and materials (Agri- Marketing)
- Value addition machineries (Agri. Marketing)

These will be procured under ICB, NCB, Shopping, Direct contracting and Government of India procedure for Micro Irrigation according to the value of packages through decentralized processing each Sub-Basin and according to the delegation of powers of the respective identified procurement officers of the line department

9.5 Selection of Consultants

The key consultancies to be procured under this project include:

- Monitoring and Evaluation (MDPU)
- Information management System
- Participatory Irrigation Management Wing (PIM, Information Technology & Training Cell)
- Design support for Modernization of Irrigation System (CE PF)
- Construction Quality Management and Technical Supervision (CE PF)
- Basin planning including Decision Support System development for selected Basins (CE IWS)
- Internal Audit Capacity Building (Finance department) (MDPU)
- Other small consultancies (Concerned officers)

The services of Government Training Institutes, TNAU, IMTI, and STAMIN will be utilized for Trainings. For Training in these institutes only the cost of per-diem to be paid to the participants, their travel boarding, training materials to be made available to them and to the faculty hired specifically for the training and paid will be reimbursed by the Bank. However for the training institute /organization selected on competitive basis the contractual price payable to it will be funded by the Bank.

Thresholds for Procurement Approaches and Methods	Thresholds (US$ equivalent)
Open International (Goods, IT and non-consulting services)	>3 million
Open National (Goods, IT and non-consulting services)	> 100,000 and up to 3 million
National Request For Quotation (Goods / Works)	Up to 100,000
Open International (Works)	> 40 million
Open National (Works)	> 100,000 and up to 40 million
Direct Selection	No threshold; For Goods / Works / non-consulting services: As per paragraph 6.8-6.10 of Regulation. For Consultants: As per paragraph 7.13-7.15 of Regulation.
Shortlist of National Consultants	Up to 800,000

The following are the activities involved in the procurement process

- Appointment of Procurement Officer
- Preparation of procurement plan as per World Bank Guideline
- Preparation of Bid document
- Bank's NOC in case of prior review cases or the clearance from the State level procurement cell in the HOD office
- Bid invitation
- Bid opening date
- Bid evaluation and award` recommendation to the Procurement cell in HOD office
- Approval of the award by the competent authority after review by the said procurement cell in case it is not a prior review package
- In the case of prior review package the HOD shall get the approval of World Bank
- Upon receipt of a NOC from Bank necessary Agreement will be concluded and the work orders will be communicated
- The copy of the concluded agreement will then be sent to the Bank which will allot a WBR number which will be quoted in all application for Reimbursement claims

MDPU procurement cell will be strengthened. MDPU shall obtain procurement plans from the WRD and Line departments each year along with the annual work plan, review and consolidate and send to Finance department and Bank not later than 15th November of each year .The Nodal Procurement Officers of the Line Departments and the Procurement staffing in the TNIAMP (IAMWARM II)cell to be trained at ASCI, Hyderabad/ IIM.

MDPU to give orientation training to all field officers identified as Procurement officers in the line departments. Procurements Workshops will be held at Chennai and other WRD Regions Headquarters with Bank's procurement Consultant with the approval of the task leader World Bank. Frequent orientation trainings to be imparted to new officers as and when they take position. Internal Auditors and staff of Finance Departments also to be trained at ASCI, Hyderabad and in Workshops conducted by World Bank Procurement Consultant. MDPU Procurement cell to be strengthened

The Bank will also carry out Post review contracts through separate consultants engaged by it. The supervision mission from World Bank shall also review the procurement activities and suggest corrective measures.

9.6 Systematic Tracking of Exchanges in Procurement (STEP):

The project will implement STEP, a planning and tracking system, which would provide data on procurement activities and establish benchmarks. The details of the

procurement activities, presently prepared in the procurement plan would be transferred in the STEP system. Initial training on the operation of the STEP system has been provided to the procurement staffs of the Implementing Agencies (IAs).

9.7 E-procurement System:

The IAs will be using the NIC e-procurement system for all ICB / NCB procurements with a threshold limit. The NIC e-procurement system assessment was carried out against the multilateral development banks' requirements and has been accepted for use for procurements under Bank-funded projects. This is likely to increase efficiency and transparency of procurement. All WRD packages are likely to use NCB. Piloting this system will be attempted during the progress of implementation.

9.8 Procurement capacity:

The Multi-Disciplinary Unit (MDPU) established under the previous project will serve as the management and coordination unit for the new project. Many of the officials of MDPU and other 8 line departments and agencies responsible for implementation of different components/sub-components were also involved in last phase of the project and they are well conversant with World Bank procurement procedure and have gained substantial experience in the project implementation; however, as current Project involves to implement new and innovative aspects of the project, in particular those related to promoting of climate-smart agriculture, enhancing farmers' access to market, etc., this will be more challenging than the last project. Apart from delays in procurement process, contract management delays and disputes are potential problem areas.

9.9 Procurement Planning:

For each contract to be financed by the Loan, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame will be reflected in the Procurement Plan to be agreed between the Borrower and the Bank project team. The capacity building plan will also be reflected in the procurement plan. The Procurement Plan as agreed will be uploaded in STEP. The procurement plan is currently being developed.

9.10 Procurement Training:

Key staff will be sent for trainings at IIM Luck now / ASCI, Hyderabad / NIFM, Faridabad. The project could also avail of the free Massive Open Online Course on public procurement (www.procurementlearning.org) offered by the Bank as well as the paid Professional Diploma in Public Procurement course delivered through the Charter of Public Procurement Studies. MDPU shall arrange for the following:

(i) Training to all Nodal procurement officers of all line departments and the WRD procurement cell will be at ASCI, Hyderabad or similar institute NIFM.
(ii) Procurement workshops will be held in Tamil Nadu for all SEs and EEs of Sub-Basins and Nodal officers of the line department and new substitute posted in their positions.
(iii) Annual refresher courses will be held to train any new entrant to the Project.
(iv) The bank will also organize workshops one in each region where officials of all departments involved in the project may participate.

Chapter 10: Environment and Social Safeguard

10.1 Environmental Safeguards

1. The proposed project will be implemented in 66 sub-basins of Tamil Nadu, including the areas experiencing droughts, floods and other climate/natural shocks, particularly in coastal areas. Though the project will largely have positive impacts, key potential adverse impacts anticipated from the proposed interventions are:

- Likely use of higher quantities of agro-chemicals, especially pesticides, due to increase in agriculture productivity
- Disposal of construction waste could affect water and land quality
- Disposal of tank bed material
- Disposal of liquid and solid waste from dairy
- Pollution impacts on fisheries

2. An Environmental and Social Impact Assessment (ESIA) was undertaken that identified the key risks associated with poor construction management and disposal of silt and other wastes, increased use of agro-chemicals, particularly pesticides. Environment safeguard policies on Environment Assessment (OP4.01), Natural Habitats (OP4.04), Pest Management (OP4.09) are triggered. To reverse and manage any potential impacts, an Environment and Social Management Framework (ESMF) has been developed and templates of Environment Management Plans (EMP) for sub-projects on irrigation infrastructure rehabilitation and Pest Management Plan (PMP) have been prepared.

3. The ESMF has been developed to ensure that the projects activities are identified planned and implemented are socially responsive and environmentally sound. These guidelines serve as a tool to guide the project implementers the optimal project interventions required to address social and environmental concerns, prepare mitigation plans, and to ensure complete integration of social and environmental concerns and mitigation measures in the design of the project activities. The ESMF recognizes the need for an early environmental and social assessment, during pre-planning stage of activities at the field level, to identify any adverse impacts, plan for mitigation measures and help in mainstreaming these aspects throughout the implementation phase. The ESMF will be applied to all project components, through the different stages of the project cycle. The proposed ESMF interventions are designed on the basis of the current understanding of the social and environmental issues. During project planning and implementation, experience and learnings will be used to alter ESMF, if required.

4. ***This chapter summarizes the implementation strategy on environmental management and how it needs to be coordinated with various project activities. It needs to be read in conjunction with ESMF***. ESMF includes the following:

- A negative list of investments that the project will not finance
- A screening criteria for measuring the risk of sub-projects
- A Pest management plan, giving details of process and action steps to improve pesticide use (procurement, handling, storage, use and disposal)
- Template of EMP for sub-projects on large irrigation infrastructure
- Environmental Codes of Practices and sector/theme specific best practices
- An Integrated Pest and Nutrient Management (IPNM) approaches for reducing the use of pesticides and other agro-chemicals
- A monitoring and evaluation strategy for safeguards
- A capacity building and training plan for different stakeholders
- A communication strategy that will help implementation of identified mitigation measures.

5. **Negative List:** Activities that could lead to irreversible and significant negative impacts will not be financed by the project. A list of these activities is given below as per the ESA undertaken. Further, activities could be added to this list based on actual project implementation experience:

- Activities that will result in land salinization
- Procurement/use of pesticides that are listed in the banned lists published by the World Health Organization and National and/or State lists
- Any activity that is in violation of national and state legal provisions
- Refilling of rehabilitated tanks with groundwater
- Activities that require land acquisition or that of private properties, including voluntary land donation and eviction of encroachments and/or relocation of people
- Establishing new tanks in forest areas, coastal areas, and on existing wetlands and important Birding Areas as well as on mangrove areas
- Major loss of common property resources affecting the livelihood systems of local people
- Activities that restricts access to water and other natural/common property resources for those dependent on these resources, over and above of the existing provisions/regulations in place

6. **Environmental and Social Screening:** In order to facilitate proper identification of potential environmental and social risks and mitigate and manage potential impacts, sub-projects to be financed under the project will be placed into one of the three categories -I, II or III. The categories are developed based on the extent, magnitude and duration of potential adverse impacts. As per categorization of sub-projects, the various safeguard instruments/tools – EMP, ESMF and RPF will be applied. To assist with identification of full range of potential impacts and for managing the risks an Environmental Impact Identification Tool is provided in Annexure-VIII of ESMF, which will help provide a quick overview of potential impacts. In addition, an Environmental Screening Tool and Forms have been developed and given in Annexure-IX and X of ESMF respectively. This will help measure potential risks under each component, sub-component and specific kind of sub-projects/activities and accordingly provide an appropriate risk category (1, 2 and 3) and implement the mitigation action.

7. **Screening Process and Procedure for Approval:** Environmental and social requirements are linked with project steps and there are environmental and social requirements at the time of project application. Environmental and social requirements in project steps are given below:

Table: Environmental and social requirements

Sub-project is developed
⇩
✓ Environmental Screening Tool is applied for categorizing the sub-project by the concerned line department ✓ If sub-project in negative list – drop the sub-project • For category 1 sub-projects – undertake an environmental assessment to prepare the EMP following the available templates • For category 2 sub-projects – use the ESMF and follow the ECoPS as well as PMP and other project specific strategies • For category 3 sub-projects – no requirements and proceed for implementation
⇩
✓ Categorized sub-project is screened by Environment Cell in WRO and category endorsed ✓ EC in WRO will ensure that budget and monitoring mechanism is in place while approving sub-projects
⇩
Sub-project approved and enter into implementation
⇩
Regular monitoring to ensure that safeguards provisions/mitigation actions are implemented during sub-project implementation

8. **ESMF:** The ESMF shall be applied to all proposed project components, through the different stages of the implementation cycle. The proposed ESMF interventions are designed on the basis of the current understanding of social and environmental issues identified and discussed in the previous chapters. As the project planning and implementation gains momentum, more learning shall be generated, and the ESMF will be revised accordingly. The proposed ESMF interventions during the implementation cycle of the project components/activities cycle for irrigation, horticulture, dairy and fisheries are provided as additional guidance below:

Table : Environment and Social Management Framework

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
Irrigation and construction related		
Tanks ▪ Strengthening of tank bunds ▪ Removal of vegetation and invasive species from, bund slopes, surrounding areas ▪ Wage and labour opportunities ▪ Movement of heavy vehicles	▪ Silt/sand deposition on agricultural fields, low lying seasonal wetlands, choking of natural draining/water courses ▪ Distribution and use of toxic silt due to non-point pollution sources ▪ Disposal of construction debris on farmland, water courses etc. resulting in blocking natural drainage ▪ Lowering of water quality due to disposal of wastes from fish seed farms, oil from machinery, dumping of construction waste etc. ▪ Impact on ambient air quality due to dust during rehabilitation and noise ▪ Breach of tank bund, overspill due to excess rain etc. ▪ Tree cutting, unauthorized removal of native species along with invasive species ▪ Local vulnerable and poor labour left out from work opportunities ▪ Accidents/disease incidents for workers and in labour camps and lack of amenities ▪ Possibility of engagement of child labour, unequal wages to women workers ▪ Soil compaction on fields/farms due to movement and parking of heavy machinery	▪ Silt is normally not being conveyed out of the tank ▪ Check quality of removed silt and tank bed material before allowing farmers to use it ▪ Ensure that local vulnerable groups and extreme poor have access to employment opportunities as labors ▪ Refer to Environment Management Plan (EMP) related to canal and tank rehabilitation ▪ As far as possible, use silt (if suitable) in strengthening the tank bunds ▪ The debris of the dismantled structures to be used for leveling borrow areas ▪ Ensure compliance with national Act on child labour and minimum wage Act ▪ Ensure first aid and medical support at labour camps and ensure hygiene by providing toilets, waste disposal system etc. ▪ For construction activities, refer to health and safety guidelines, and provide protective equipment (helmets, protective gloves and shoes, welding goggles etc.) as may be needed ▪ Plan heavy vehicle and machine movement route that avoid productive fields;

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
	▪ Pollution of tanks due to unregulated dumping of domestic sewage ▪ Incidence of local water logging and stagnation of water leading to increased mosquito breeding and spread of vector borne diseases	and if soil compaction on farmer's field is unavoidable, compensate economically and also plough field after construction phase is over ▪ Avoid night operation of heavy machinery; provide personal safety gear to workers against noise, dust and other injuries ▪ Prepare heavy machinery maintenance chart and user to ensure safe working of machines ▪ Use phytoremediation approaches for reducing pollution and improve water quality ▪ Ensure that approved anti-mosquito methods are used in case of observance of breeding mosquito population near construction and rehabilitation sites
Silt removal from supply channel and canal lining	▪ Risk of disposal of polluted silt on farmlands ▪ Storage of construction material on farmlands adjacent to canal ▪ Non-working of canal during repair works particularly when irrigation is required as contractual delays can result in extension of contract period ▪ Pollution due to domestic sewage inlet	▪ Prepare the EMP as per the template provided and apply the mitigation accordingly ▪ Ensure that silt is tested before given away to farmers ▪ Silt disposal on farmlands only after consultation reached with either individual farmer or with WUA/Gram Panchayat ▪ Ensure that canal is not closed without consultation during cropping season when irrigation is required; plan repair period and manage contract accordingly
Reconstruction and Repair of sluices and weirs	▪ Dumping of Iron and concrete debris within canal and/or near banks ▪ Sewage and solid waste generation due to congregation of labour population	▪ Identify proper disposal sites/designated landfills and mechanism for debris and cost it as part of vendor contract ▪ Ensure proper monitoring of debris disposal during

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
	▪ Air pollution and noise pollution due to increased vehicular movement and construction equipment	contract period ▪ Implementation of measures to control air pollution and noise from various sources ▪ Providing ear plugs and other safety equipment to protect workers
Agriculture and Horticulture related		
Agriculture – production and diversity	▪ Crop intensification resulting in change of land use and risk of encroachment of common lands ▪ Soil and water pollution due to increased use of agro-chemicals, particularly pesticides ▪ Increased groundwater extraction for enhancing productivity and from shifting from single crop to multi-cropping ▪ Use of short-duration high yielding varieties that generally result in increased use of agro-chemicals ▪ Bringing new areas under horticulture also pose risk of increased use of pesticides	▪ Ensure that common lands are identified and protected from encroachment; as far as possible the project should work with and support farmers through WUAs ▪ Translate the Pest Management Plan (PMP) and awareness to be increased ▪ Project should assist in prior assessment of pests and crop diseases with help from TNAU ▪ Adopt, apply and monitor the implementation of PMP ▪ Develop IEC material in local language for generating awareness regarding safe use of pesticides ▪ Use extension services for soil testing followed with right dosage of agro-chemicals ▪ Promote wide application of safe and bio-pesticides, wherever possible ▪ Propagate use of sprinkler system, including underground micro-irrigation ▪ Promote expansion of System of Rice Intensification (SRI) to reduce water demand ▪ Work with WUAs in encouraging market based non-water intensive crops where possible and for promoting conjunctive use

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
		of water resources ▪ Establish groundwater recharge wells and protect aquifers in semi-critical, critical and over-exploited groundwater blocks ▪ Measure and/or monitor groundwater levels through the project or in association with groundwater department ▪ 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 ▪ Organize in project areas awareness program on Pest-Agri ▪ Ensure that marginal farmers and poor households are also covered for such demonstrations and training ▪ Encourage that pesticide application is done using proper equipment and in accordance with the available guideline
Agriculture related infrastructure and Marketing		
Rehabilitation and modernization of existing agricultural markets	▪ Lack of civic amenities in new markets developed for sellers and customers ▪ Lack of transparency in weighing and paying systems ▪ Intensive use of energy/electricity due to poor market design, poorly planned loading/unloading decks etc. ▪ Issues with respect to waste disposal ▪ Risk of disturbance to natural areas (wetlands, streams etc.) in locating new markets	▪ Use anti-mosquito sprays/fogging during construction and in labour camps ▪ Market design shall have adequate public conveniences (toilets with septic tanks or connected with sewage system) ▪ Plan exposure visits to Maharashtra where operations of private and APMC markets have been reformed to introduce transparency in transactions ▪ Ensure vermi-composting

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
		pits are made to prepare good quality compost from organic wastes of the markets ▪ As far as possible develop design for markets with adequate introduction of green building norms – natural light, cross ventilation, use of solar power of lighting etc. ▪ Sites for establishing any new markets are free from natural features
Value chains and postharvest management, including infrastructure	▪ Generation of waste material – organic waste due to grading and sorting and plastic and other waste due to packaging and marketing ▪ Use of artificial means (chemicals) for ripening and wax for polishing (especially fruits) ▪ Farmer Producer Organizations with little or no representation of poor and marginal farmers – risk of exclusion ▪ Poor gender representation in decision making in farmer groups (and WUAs) ▪ Construction and/or rehabilitation of warehouses ▪ Warehouse construction and increased use of energy/electricity, including promotion of cold storage facilities	▪ Organic waste should be collected and subject to composting (vermi-compost pits) ▪ Plastic and other packaging wastes should be disposed as per existing state rules with proper tie up for disposal; these should be made part of standard operation procedures ▪ Follow the project's gender strategy for ensuring proper representation of women across all levels of decision making ▪ Ensure that right of way is not affected during construction/repair of warehouses ▪ Introduce for warehouses – provisioning of adequate natural light, ventilation and use of solar power of lighting etc. (also for cold stores)
Livestock and Dairy Related		
Livestock rearing and management	▪ Increased possibility of greenhouse gases from livestock ▪ Odour from dairy sites ▪ Spread of contactable diseases ▪ Lowering of water quality due to disposal of solid and liquid wastes from dairy activities	▪ Involve TN Veterinary University for various technical inputs ▪ Identified community professional if employed should be trained at reputed institutions ▪ Provide livestock management training to a wide range of livestock

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
	▪ Poor and marginal farmers left out of project benefits ▪ Inability of wage workers to undergo offsite training on livestock management ▪ Depletion of vegetation and forage resources on common property lands resulting in increased soil erosion	owners, particularly women who tend to animals – make training available at doorstep as women are often not able to leave homes for offsite training for long duration ▪ Ensure regular animal checkup through extension services and organize animal health camps in project supported sub-basins ▪ Promote stall feeding and provide technical support for developing low cost animal sheds ▪ Work with communities for revival of common pastures and prevent encroaching of common lands – introduce, wherever required, rotational grazing and provision of water at grazing lands to avoid wider degradation of natural vegetation
Fisheries Related		
	▪ Local depletion of larval and juvenile organisms for pond stocking ▪ Clearing/conversion of coastal wetlands for construction of ponds ▪ Use of explosives and poison in tanks for fishing ▪ Unfair selection and award of fishing contracts at tank ▪ Restrictions imposed for fishing by poor and marginalized and for those with traditional rights	▪ Examine of larvae and juveniles in nurseries or hatcheries should be ensured ▪ Examine of ponds in area of particular ecological significance ▪ Prohibition of illegal practices, such as, use of explosives and poison, and enforcement of regulation ▪ Ensure community monitoring of fishing in tanks ▪ Fairness in contracting tanks for fishing to private vendors – access to fishing by the poor and marginalized should be ensured

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures
Stakeholder Participation		
Community mobilization	▪ Non-use of publication material, brochures in local language ▪ Few and ill-timed awareness campaigns resulting in inadequate coverage of potential beneficiaries ▪ Non-involvement of PRIs	▪ Ensure that local NGOs, field level officers who are engaged for motivation and awareness building are properly oriented about the scope of the project ▪ Use local language publication material ▪ Involve innovative approaches like street plays, awareness camps. ▪ Attract larger crowds to programs ▪ Inform the communities, including PRIs well in advance through public announcements and posters regarding date, time and place for such events ▪ Promote participatory monitoring by community and introduce social audits for maintenance and other works undertaken by the community
Forming WUA, election and other process	▪ Infiltration of influential farmers for taking benefits from assured irrigation ▪ Non-transparent selection of WUA presidents resulting in early disassociation of WUAs	▪ Implement the process as per the WUA Act and ensure proper awareness and time for adequate participation and representation of various groups
Training of line department staff and community members	▪ Ad hoc approach for training resulting in mismatch of training and demand and low participation of trainees	▪ Undertake Training Needs Assessment ▪ Prepare a training calendar and widely disseminate it

9. **The Environmental and Social Management Plan (ESMP)** for tank rehabilitation: integrates the baseline conditions, impacts likely to occur, and the measures which need to be implemented for amelioration of adverse impacts for proposed sub-projects. Generic ESMP for rehabilitation of tanks & canals is presented below. The ESMP shall give particular attention to project sustainability issues such as excavation and disposal of silt, strengthening of bund, EHS, construction camps and site office, prevention of pollution, user conflicts, etc. ***This detail is to be included in Bid document and to be implemented by the prospective Contractor.***

Table: Generic ESMP for Sub-projects on Canal and tank Rehabilitation

S.No.	Potential Environmental Impacts	Mitigation measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
Pre-construction Phase					
1.	Establishment of Construction Camp and site office (Applicable for site where the number of labour residing exceed 100)	• Should be identified in consultation with the individual owners in case of private lands and Engineer in charge case of government lands. • Layout of construction camp, including indicating various structures to be constructed such as the temporary structures to be put up, site roads, drainage, lighting, equipment storage units and other facilities, should be furnished to the Engineer-in-charge. • Living units of adequate space as prescribed in Labour and Environment Acts with proper ventilation shall be provided for the labour engaged. • Construction camps should have access to Drinking water, Sanitation, first aid and waste disposal facilities.	Prospective Contractor	One time	Department
2.	Construction water	Contractor will make his own necessary arrangement for procuring construction water: • In case of community water source, Contractor should carry out consultations with villages/GPs for use • In case of private source, Contractor should not utilize the water unless written consent is obtained from other owners of the land parcel. • In case of new bore wells, permits should be obtained as per requirements of State Ground Water Board regulations especially for critical and over-exploited blocks • In case of surface water bodies, necessary permission from concerned department or administrative clearances should be obtained.	Prospective Contractor	One time	Department

S.No.	Potential Environmental Impacts	Mitigation measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
3.	Storage sites (for large and long time storage)	Contractor shall provide details for storage of: • Petrol/Oil/Lubricants: Brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage. Cement: Damp-proof flooring, as per IS codes	Prospective Contractor	One time	Department
4.	Borrow Areas	Shall be identified by the Engineer during implementation	Department	One time	Department
5.	Disposal sites	• Shall be identified by Engineer during the implementation • Debris Disposal site will be identified by the Engineer during implementation.	Department	One Time	Department
6.	Waste disposal	• The sewage from the labour camp site shall be disposed off in line with the Environmental (Protection Act) in soak pits			
7.	Site Restoration	Contractor shall restore construction sites and site office to the satisfaction of the Engineer in charge.	Prospective Contractor	One time	Department
8.	Tree Cutting	• Necessary clearance for cutting of trees should be obtained by Engineer in charge.	Department	One time	Department
Construction Phase					
9.	Construction Sites (Applicable for site where the number of labour residing exceed 100)	• It should be kept free of water logging • Protective guards should be provided across the areas where workers may fall or could face an impalement hazard. • Store tools and materials neatly and out of the way in storage bins or lockers and keep flammable or hazardous wastes, if any, in covered, segregated waste containers • Keep form and scrap lumber away from work areas, passageways • No loose material should be allowed to leave unattended, and sites should be properly finished after completing the work	Prospective Contractor	Once in a month	Department

S.No.	Potential Environmental Impacts	Mitigation measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
10.	Public Safety	• Warning sign boards should be provided along the construction sites in Tamil/ English	Prospective Contractor	Once in a month	Department
11.	Occupational Health & Safety	• Safe access to the job sites should be provided to all workers • Passage ways, walkways, and ramps should be kept free of materials, scraps or obstructions • First Aid box should be readily available at construction sites • Contact with nearest nursing homes/clinics/primary health centre should be maintained by the Contractor to deal with any emergency at site • A vehicle should be readily available at construction site to meet emergency situation • The contractor should comply with all the precautions as required for the safety of the workmen as per Labour Laws as applicable to this project • The contractor should strictly follow the statutory child labour act • Personal Protective Equipment such as helmets, hand gloves, safety shoes, nose masks, safety goggles should be provided to the workers as per Act.	Prospective Contractor	Once in a month	Department
12.	Water Pollution at Labour Camp site	• Solid waste shall be disposed at authorized sites identified • SW and GW quality to be tested for any fecal contamination	Prospective Contractor	Quarterly	Department
13.	Soil Pollution	• Measures to prevent accidental spills of oils and other lubricants • Disposal of waste and wastewater shall not be done on open land.	Prospective Contractor	once in a month	Department
14.	Air Pollution	• Properly functioning construction equipment to	Prospective Contractor	Once in a month	Department

S.No.	Potential Environmental Impacts	Mitigation measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
		minimize exhaust shall be maintained • Idling of machines and equipment shall be minimized • Cover stockpiled silt and trucks hauling silt, sand, and other loose materials or require trucks to maintain at least two feet of freeboard			
15.	Landscape Degradation	• On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site and shall be handed over to the Department in good condition.	Prospective Contractor	One time	Department

10. **Use of Agro-chemicals:** Pesticide, fertilizer and other agro-chemical consumption might increase due to increased water availability for irrigation, diversification of crops, intensification of agricultural production and other project activities. To minimize the associated impacts, a Pest Management Plan (PMP) has been prepared that includes an Integrated Pest Management strategy (Annexure VII of ESMF).
11. **Other tools:** Environment Code of Practices (ECoPs) and Good Practices provide general guidance on management/ mitigation of potential impacts of project activities which are included in Annexure IV and V of ESMF respectively. The Environmental and Social Clauses to be included in the Bid document (under Technical Specification) is given in Annexure VI of ESMF.
12. **Institutional Arrangements:** The WRD, the primary implementing agency, has developed some capacity in managing environmental impacts under IAMWARMP, but needs further improvements when it comes to monitoring and reporting of environmental management aspects. Given that new engineers and officers would be in place, provisions have been made for providing adequate orientation and technical training for managing adverse environmental impacts and implementing recommended mitigation actions. MDPU will hire a qualified and experienced full time environmental expert to facilitate the implementation of the ESMF and adoption of EMPs. The responsibilities of Environmental Expert are as described in ESMF. In addition, the Engineer-in-Chief of the Water Resourced Department will also have a qualified Environmental Engineer at headquarters and will designate DCE as Nodal Officer for Environmental and Social Framework in each region. Similarly, for the line departments, the district Joint Director/ Deputy Director shall be designated as Nodal Officers for safeguards. Based on the actual experience and requirement during implementation, additional support of external environmental experts to facilitate the implementation of mitigation actions will be taken. The MDPU will include a section on reporting on the suggested environmental indicators and on the progress of implementing the ESMF in the regular project progress reports every six months.

13. **Environmental Monitoring**: Environmental Monitoring Programme has been designed for the 66 sub-basins with the following objectives:

- Assessment of the changes in environmental conditions, if any, during pre-construction, construction and operation stages of the project.
- Monitoring the effective implementation of mitigation measures.
- Assessment of any significant deterioration in environmental quality so that additional mitigation measures may be undertaken.

The important monitoring parameters for the proposed components in 66 sub-basins are water quality, soil quality, agriculture related issues, socio-economic aspects and project implementation monitoring aspects. Suggested monitoring details are outlined in the ESMF.

14. **Capacity Building:** The capacity building program for the officials of PWD/WRD and other line departments shall be as follows. Further details are provided in ESMF.

- An orientation program should be organized at the State level. The workshop shall be organized once in six months during the project implementation phase, one prior to start of the project and then during the mid-term review.
- The next level of training should be arranged for lines depart members and sub-basin district line department representatives. This shall be organized once a year to acquaint all experts with the project with respect to environmental and social sensitivity, monitoring and auditing

10.2 Social Development and Gender

15. The key beneficiaries of the project include farmers, female members of their families and vulnerable sections of farming communities in sub basins. Mainstreaming of gender is one of the strengths of the project and targeted focus of this would center on female members of Community Based Interest Group Organizations (CBIGO) such as Water Users Associations (WUAs), Commodity Groups, Farmer Producer Companies (FPOs), those enjoying the benefits of Model Village-centered Convergence for Improved Service Delivery and also activities related to livestock development, fishery and horticulture

16. Since new CBIGOs are yet to be mobilized and organized and as the existing ones are to be revived through fresh open and participatory processes of election and/or selection, no baseline data and actual cumulative number of project beneficiaries including by gender are available at present. Nevertheless, gender disaggregated and other baseline data will be prepared as part of organization of CBIGOs, planning of project related activities and monitored through project implementation cycle. This will further increase project effectiveness and also project outcomes and outputs that would be measured through available quantitative cumulative data. The MDPU / EIC will have at least two Social Development Specialists as consultants to facilitate, plan, and monitor the social development and gender aspects of the project and document them for dissemination.

17. The Beneficiary Feedback/Citizen Engagement mechanism would be rooted on Community Based Interest Group Organizations (CBIGOs). These CBIGOs would be horizontally linked at the levels of sub-basins and regions and federated at project level. This would involve representatives of multi-level CBIGOs participating at project level annual workshops to provide their feedback on project benefits, their impacts, particularly social impacts on women and suggestions for further improvement of project effectiveness. In addition to representatives of these CBIGOs, other beneficiaries of the project such as Government and non-Government stakeholders including those from Private Sector related to agri-business, marketing, training for skills development, Tamil Nadu Agricultural University (TANU), Tamil Nadu Fisheries University (TNFU), Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) will also participate in

feedback mechanism. The other key Government stakeholders also include State Ground and Surface Water Resources Data Centre, State Water Resources Management Agency, and Government of India's NABARD. Private sector entities that are a chain of departmental store also participating in marketing of agriculture/horticulture produce and products. All these stakeholders will actively participate in project's annual beneficiary feedback workshops and provide feedback on project benefits and suggestions for further improvements, if necessary so that the beneficiary feedback mechanism becomes an open and participatory process.

10.3 Social Safeguards

18. As far as social safeguards are concerned, the project will not trigger the World Bank's policy on Indigenous Peoples. The project, however, triggers the World Bank's policy on Involuntary Resettlement. The project will not resort to acquisition of private land and other assets under the provisions of RFCTLAR&R Act. The Policy is triggered primarily to deal with exceptional cases, where irrigation tanks with encroachment inevitably need rehabilitation and the RPF has been prepared to deal with such circumstances. The sub-projects such as irrigation systems modernization will require land and in order to ensure that water-bodies/irrigation tanks are free from encroachments, public use, claims etc. the project would undertake public, participative and transparent social screening involving all stakeholders, when the Bank's social safeguard policies will also be explained. The WRO/PWD would designate an Assistant Executive Engineer in each sub-basin, an Executive Engineer for each Region and another Executive Engineer located in Trichy but as a member of E-in-C's office as Nodal Officers for social safeguards. In addition, an Assistant Executive Engineer in the Environmental Team will also be designated as Social Safeguards Nodal Officer. As part of institutional strengthening for social safeguards management, the project will also conduct training programs for staff of PWD/WRO designated as Social Safeguards Nodal Officers at the levels of sub-basins, Regions and the headquarters. Such training programs, will facilitate identification of vulnerable tanks, undertaking of public and participative social screening, their documentation and use for planning of sub-projects that require land and inclusion of findings of social screening in DPRs/Bid Documents and preparation of Rehabilitation Action Plans, where required in accordance with ESIA and Resettlement Policy Framework.

19. The initial ESIA was disclosed in-country on January 12, 2017 and the revised ESIA, Resettlement Policy Framework, and Pest Management Plan were disclosed on March 21, 2017 through Info Shop.

10.4 Grievance Redress Mechanism

20. The Project will establish a multi-level feedback and grievance redress mechanisms including the structures and processes at different levels. Grievances related to various aspects of participatory irrigation and water management will be at the regional level of Chief Engineers of WRD while grievances related to other project activities will be redressed by the District Collector. In addition to these, there will be a Departmental State-level Grievance Redress Mechanism.

21. The structure and processes of these mechanisms including their scope, memberships, procedures for receiving, documenting grievances received, decisions to redress, communication of redress, periodicity of meetings to redress, right to resort to judicial system to seek redressal and multi-level public disclosure have been included in Resettlement Policy Framework that has been publicly disclosed.

10.5 Bank Grievance Redress

22. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

10.6 Recommendations of ESIA

The ESA Report highlights the findings of various positive and negative impacts due to the proposed TN-IAMWARM-2 project to be implemented in 66 sub-basins covering all districts of Tamil Nadu and recommends suitable mitigation measures for reducing the negative impacts. A comprehensive Monitoring and Evaluation (M&E) strategy is proposed for smooth implementation and co-ordination amongst the various line departments.

The suggestions included in this ESA Report are designed to avoid environmental and social damage and alleviate impacts in accordance with the safeguard policies of the World Bank. The suggested mitigation measures include the best environmental and social management practices. These suggestions have to be diligently implemented by PWD/WRO and various line departments to safeguard the environment of the project sub basin areas. Based on the findings, it is evident that project components and sub-project activities under the TN-IAMWARM-2 project will result in agriculture modernization, developments in irrigation, restoration of water bodies and better management in livestock and fisheries sectors and social benefits to intended beneficiaries as envisaged.

Based on the project details and the baseline environmental and social status ascertained through data collected from primary and secondary sources, potential impacts as a result of the implementation of project components under the TN-IAMWARM-2 project have been identified. The proposed project is likely to exert both positive as well as negative impacts likely to accrue during various phases of implementation of the proposed project in the study area covering the representative twelve sub basins in twenty one districts of seven Agro-Climatic Zones.

Based on the impacts certain mitigation measures have been discussed in the earlier chapters. Few Potential Positive and negative Impacts and suggested measures of the proposed project are:

- Improved crop productivity
- Increase in groundwater recharge and reduction in groundwater abstraction
- Increase in use of agro-chemicals
- Solid waste generation from labour sheds

These impacts can be mitigated through suitable mitigation measures such as implementation of IPM, INM, SRI, SSI micro irrigation with fertigation etc and proper solid waste management etc.

The brief tasks that are to be carried out by the line departments are as follows.

Agriculture Department	• Implementation of INM and IPM (organic practices)
Water Resources Department PWD	• Strengthening institutions and instruments dealing with Water Resource Management
Horticulture Department	• Precision farming for horticultural crops and conducting need based trainings
Agriculture Engineering Department	• Introduction and promotion of water saving Micro Irrigation systems like Drip & Sprinkler Irrigation and solar powered pumps
Agriculture Marketing	• Value addition – drying, processing etc • Promotion of agri – entrepreneurs and FPOs
Tamil Nadu Agriculture University(TNAU)	• Development of Precision Farming Techniques ,demonstration of SRI method, conducting trainings • Develop Model Seed Village Concept to generate good quality and hybrid seeds
Animal Husbandry Department	• To ensure total health cover both preventive and curative. • Reduce the gap between the requirement and availability of green fodder through promotion of fodder cultivation
Fisheries Department	• Development of Aquaculture in Irrigation Tanks by establishing Fish Seed Bank, development of Ornamental Fish Culture

It has been found that the positive impacts outweigh the negative impacts as the project is beneficial to all the categories of farmers, agricultural labourers and other vulnerable groups.

- The project considerably focuses on reducing the gap area that will be brought under irrigated agriculture and this will significantly improve climate resilient crop area, diversity, intensity and the yield.
- Increase in the vegetal cover due to increase in irrigation is expected. This will in turn increase the biodiversity in the study area with the reduced GHGs
- The continuous cropping over barren and mono-cropped land would act as soil binder and reduce the soil erosion rates.
- The proposed project will promote conjunctive use reducing the groundwater abstraction. The increased groundwater recharge would also replenish the groundwater resources.
- The proposed project would lead to augmentation of the water resources, which will increase the cropping and irrigation intensities.
- Increased availability of fodder for livestock shall reduce the pressure on the existing forests or vegetation of the area, which is a significant positive impact.
- As a part of Environmental and Social Management Framework, appropriate control measures in the form IPM and INM measures have been recommended. The project functionaries will popularize the use of Farm yard and green manures in the command

area being irrigated by the project. These practices are likely to improve the yield with minimal impact on the environment and reduce the cost of cultivation.

- The project implementation will enhance overall employment opportunities in the project area and reduce the out migration rate.
- There will also be an increase in the income for both agricultural labourers and vulnerable groups through enhanced number of employment days and wage rate at which they work.
- Continuous need based training programmes proposed in the project will increase the skill and capacity of the farmers to adopt sustainable and modern farming practices to adopt climate resilient activities.
- Enhanced income shall enable beneficiary households to purchase new farm implements and modernize agriculture. This will increase efficiency in farm operations and reducing the drudgery.
- The formation of community based organizations like WUA; FPOs will encourage collaborative water management for economic and judicious use of scarce water resources. Also it shall lead to effective implementation of the project through collective action, participatory management of the irrigation system and farmers entering in to direct marketing of the produce.
- Addressing gender concerns and facilitating of the active participation of women farmers in the project activities would enhance the socio economic status and empower the women farmers.

Chapter 11: Result Monitoring and Evaluation

The comprehensive results monitoring and evaluation system will be imparted on the project, which would consist of: (i) impact evaluations with base-line, mid-term, and end-of-project surveys; (ii) a reporting system on monthly, semi-annual, and annual reporting system. The project will also adopt ICT-based system to record beneficiary feedback, day-to-day monitoring of project activities. The system will also monitor gender inclusion and gender impacts of project activities.

11.1 Monitoring and Evaluation System Methods and Tools

A results-based M&E system would monitor project processes using the following methods and tools: (a) a Results Framework that is derived from clearly identified goals, objectives, outputs and activities with corresponding indicators, means of verification and key assumptions; (b) M&E strategy regarding information requirements, tools and methodologies for data collection, analysis and reporting; (c) comprehensive M&E plan with clear roles and responsibilities with respect to data collection and reporting; and (d) internal and external periodic assessments and evaluations, which include baseline studies, beneficiary assessments, mid-term evaluations, ex-post evaluation and impact evaluations. The M & E systems will be defined in the form of an M&E guideline.

11.2 M&E Staffs

M& E specialist at the MDPU will be appointed to coordinate monitoring activities by the line departments and to oversee activities by the M& E agency.

The nodal officers in participating line departments will be responsible for process and performance monitoring of individual activities and will consolidate and analyze all M&E data provided by field level offices. The nodal officers will monitor all field level activities, identify issues, and propose needed actions for the management to address them. The nodal officers will produce monthly reports for their management and MDPU.

11.3 Monitoring Mechanism

The Project will have state level and sub basin level monitoring mechanism as summarized in Table 11.1.

Table 11.1 : Project Monitoring Mechanism

Field Inspection by HOD / MDPU members:		
Project Cell has greater role.		• HOD to have random visit to the sub basin area at least once in 3 months. • The project cell formed at HQ to visit the project area and monitor the progress. • MDPU members to make random visits to sub basin area at least once in 6 months for technical guidance. • QIR on inspection / field visits by HOD and report to be furnished to Govt. with copy marked to MDPU.
Sub Basin Level Monitoring:		
Weekly Inspections should be performed.		• Nodal officers of the Sub-basins to have continuous monitoring of the project implementation. • to make regular weekly field visits • Monthly inspection report should be furnished to HOD.

11.4 Project Reporting Mechanism

The Project has a pre designed reporting mechanism as outlined in Table 11.2 and detailed report Calendar presented in Table 11.3.

Table 11.2 Project Reporting Mechanism

Quarterly / Monthly Progress Reports should be furnished in time		• to furnish fortnightly, monthly and quarterly progress reports to the HOD (Physical & financial reports) • Reporting format containing all required information should be prescribed by HOD. • Calendar for reporting to the higher authorities is as given below.

Table 11.3 : Project Reporting Calendar

Description	From whom	To whom	Date of furnishing
Fortnightly Progress Report	Sub-basin Nodal-Officer	SE/Regional Officer	15th of every month
	SE/Regional Officer	HOD	18th of every month
	HOD	Govt. & MDPU	25th of every month
Monthly Progress Report	Sub-basin Nodal-Officer)	SE/Regional Officer	25th of every month
	SE/Regional Officer	HOD	Last working day of every month
	HOD	Govt. & MDPU	5th of following month
Quarterly Progress Report	Sub-basin Nodal-Officer	SE/Regional Officer	Last working day of every quarter
	SE/Regional Officer	HOD	5th of following month
	HOD	Govt. & MDPU	10th of following month
Weekly Progress Report	Sub-basin Nodal-Officer	SE/Regional Officer	Every Friday
	SE/Regional Officer	HOD	Every Saturday
	HOD	Govt. & MDPU	Every Monday
Annual Work plan	Sub-basin nodal officer	SE/ Regional officer	31st October
	SE /Regional officer	CE/HOD	5th November
	CE/HOD	MDPU	10th November
	MDPU	Finance department /World Bank	15th November

11.5 Project Result Monitoring

The project has developed results frame work and monitoring arrangement which is given in Attachment 11.1. The PDO level indicators and Intermediate results indicators for each of the components along with target values to be achieved during the project period are depicted in the results frame work. The frequency of reporting, data sources and methodologies along with responsibility arrangements are included. The detailed results chain developed is given in Attachment 11.2

11.6 Base line and Periodic Surveys

The project will maintain a master register of all basic data through a data base be collated by the Implementing Departments and furnished to MDPU to assess progress and to have comparison. Periodic survey will be conducted by the Implementing Departments and furnished to MDPU. Post project survey will be done on completion of the program for accurate evaluation of project impact.

11.7 Internal Evaluation

The project will undertake internal evaluation by all implementing agencies. MDPU will have computerized Monitoring Information system to consolidate and manage data received from the various implementing agencies. HOD to form an Evaluation team of second level officers for evaluating and furnishing an Annual Report by June of the following year, to Govt. with copy marked to MDPU. The year wise outcome indicators mentioned in the (PAD) will be the basis for the internal evaluation.

11.8 Concurrent Evaluation

MDPU will assign this task to some independent agency. All Implementing Departments should provide necessary data to this independent agency and cooperate for successful evaluation.

11.9 Implementation Completion Report (ICR)

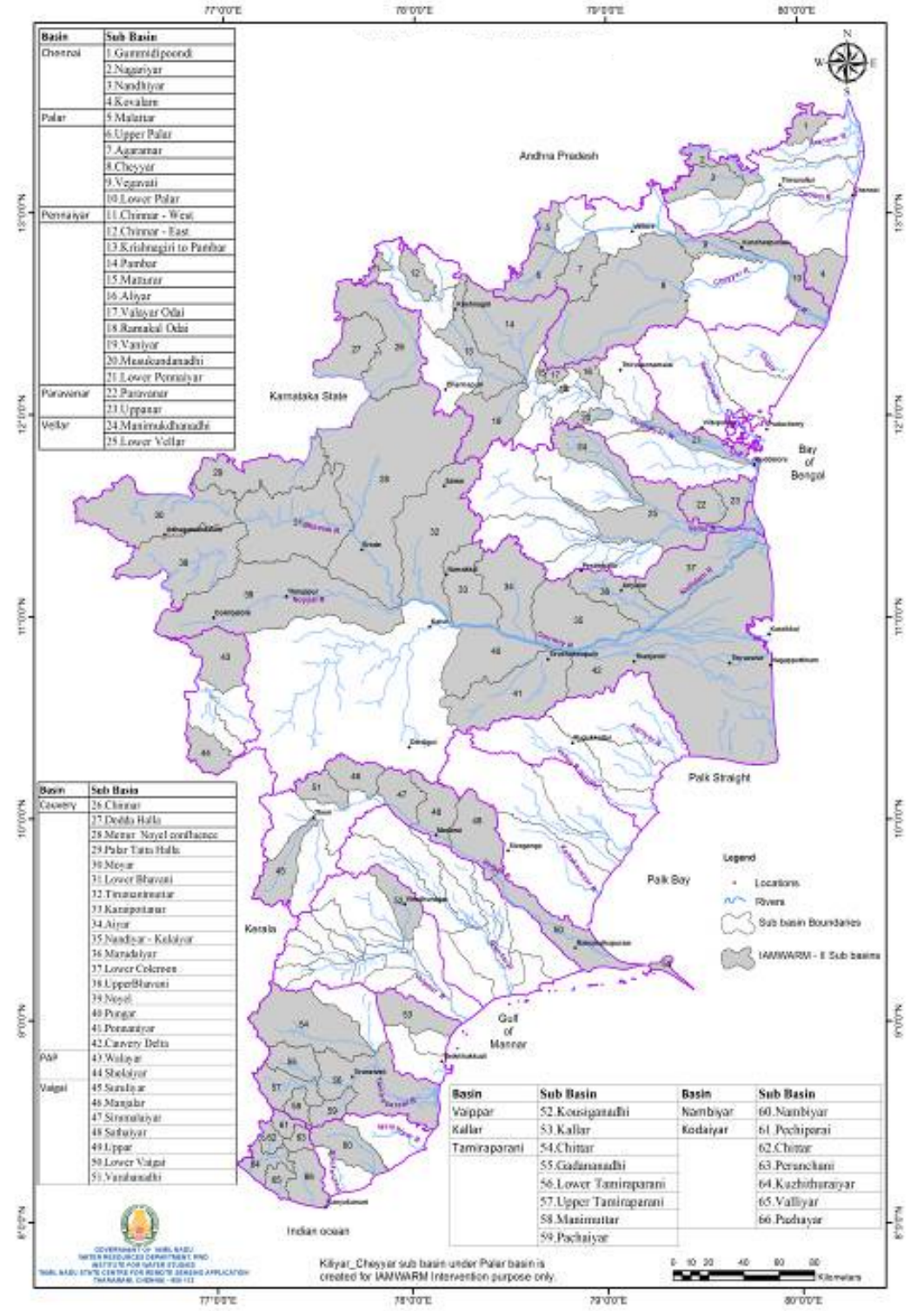
Necessary inputs for preparation of ICR for each sub basin should be furnished to MDPU.

11.10 Documentation and Knowledge Management

The success stories on the problems encountered, solutions offered and the end results will be collected and documented for each WUA preferably. Photos exhibiting the pre and post scenario of the program will be taken up. Necessary provision may be included in the estimate for these activities. An Annual Report on the success stories will be furnished to MDPU by end of June of the following year.

Attachment2.1: Mapping of Project Sub basins

The Map may be full A4 size



Basin	Sub Basin
Chennai	1.Gummidipoondi
	2.Nagariyar
	3.Nandhiyar
	4.Kovalam
Palar	5.Malattar
	6.Upper Palar
	7.Agaramar
	8.Cheyyar
	9.Vegavati
	10.Lower Palar
Ponnaiyar	11.Chinnar - West
	12.Chinnar - East
	13.Krishnagiri to Pambar
	14.Pambar
	15.Mattatar
	16.Aliyar
	17.Valiyar Odai
	18.Ramakal Odai
	19.Vaniyar
	20.Manickandanadhi
	21.Lower Ponnaiyar
Paravanar	22.Paravanar
	23.Uppanar
Vellar	24.Manimukthanadhi
	25.Lower Vellar

Basin	Sub Basin
Cauvery	26.Chinnar
	27.Dodda Halla
	28.Mettur Noyel confluence
	29.Palar Tatta Halla
	30.Moyar
	31.Lower Bhavani
	32.Tirumanimuttar
	33.Karuppatturar
	34.Aiyar
	35.Nandiyar - Kalaiyar
	36.Maradaiyar
	37.Lower Coleroon
	38.UpperBhavani
	39.Noyil
	40.Pongar
	41.Ponnaniyar
	42.Cauvery Delta
Palk	43.Vaiyar
	44.Sholaiyar
Vaigai	45.Suruliyar
	46.Manjalar
	47.Sirumaliyar
	48.Sathaiyar
	49.Uppar
	50.Lower Vaigai
	51.Varahanadhi

Basin	Sub Basin	Basin	Sub Basin
Vaippar	52.Kousiganadhi	Nambiyar	60.Nambiyar
Kallar	53.Kallar	Kodaiyar	61.Pechiparai
Tamiraparani	54.Chittar		62.Chittar
	55.Gadananadhi		63.Perunchani
	56.Lower Tamiraparani		64.Kazhudhurayar
	57.Upper Tamiraparani		65.Valliyar
	58.Manimuttar		66.Pudhuyar
	59.Pachaiyar		

Attachment 2.2 List of Project Sub basins

List of 66 Sub Basins for IAMWARM - II			
Sl. No.	Sub Basins	Sl. No.	Sub Basins
1	Gummudipoondi	34	Upper Tamirabarani
2	Kovalam	35	Manimuthar
3	Nagariyar	36	Gadana Nadhi
4	Nandhiyar	37	Chittar
5	Upper Palar	38	Pachaiyar
6	Malattar Palar	39	Lower Tamiraparani
7	Agaramar Palar	40	Nambiyar
8	Vegavathi Palar	41	Kuzhithuraiyar
9	Lower Palar	42	Chittar (Kodayar)
10	A. Chinnar	43	Pechiparai
11	B. Chinnar	44	Perunchani
12	Pambar	45	Pazhayar
13	Vanniar	46	Valliyar
14	Musukundanadhi	47	Upper Bhavani
15	Aliyar	48	Moyar
16	Krishanagiri to Pambar	49	Lower Bhavani
17	Lower Ponnaiyar	50	Minnattu Halls
18	Manimukdha Nadhi	51	Dodda Halla
19	Lower Vellar	52	Chinnar (Cauvery)
20	Paravanar	53	Mettur Res to Noyal
21	Uppanar	54	Noyarl
22	Valaiyar	55	Thirumanimuthar
23	Kodavadi Ar	56	Karuvetaur
24	Sholaiyar	57	Ayar
25	Suriliyar	58	Pungar (Upper Coleroon)
26	Varahanadhi	59	Ponnaniar
27	Manjalar	60	Nandiar-Kulaiyar
28	Sirumalaiyar	61	Maruthaiyar
29	Sathaiyar	62	Lower Coleroon
30	Uppar River	63	Cauvery Delta
31	Lower Vaigai	64	Mathur Ar
32	Kousinga Nadhi	65	Valayar Odai
33	Kallar	66	Ramakkal Odai

Attachment 2.3: Component wise costs

COMPONENT A: IRRIGATION AND WATER MANAGEMENT

Sub Component A1 - INSTITUTIONAL STRENGTHENING AND CAPACITY BUILDING FOR WATER MANAGEMENT

Components	Unit	Physical								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Strengthening overall WRD /a																		
Technical Experts	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	250	25.00	37.50	37.50	37.50	37.50	37.50	37.50	250.00
IT & Lab Hardware/Software/Digitization/Equipment/Furniture/Videoconference	lump sum	-	0.8	-	-	-	0.2	-	1	750	-	600.00	-	-	-	150.00	-	750.00
Building Refurbishment	lump sum	-	0.3	0.7	-	-	-	-	1	500	-	150.00	350.00	-	-	-	-	500.00
Training/Workshops (incl. TN Waterweek)	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	400	40.00	60.00	60.00	60.00	60.00	60.00	60.00	400.00
Incremental Operating Costs (e.g. vehicle hire/travel, internet, consumables, etc.)	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	300	30.00	45.00	45.00	45.00	45.00	45.00	45.00	300.00
e-WRO App Development Consultancy	lump sum	-	0.1	0.4	0.5	-	-	-	1	250	-	25.00	100.00	125.00	-	-	-	250.00
E-IMS Rollout and Support	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	250	25.00	37.50	37.50	37.50	37.50	37.50	37.50	250.00
Subtotal											120.00	955.00	630.00	305.00	180.00	330.00	180.00	2,700.00
B. Strengthening Water Resources Management Institutions (SWARMA, IWS, State Ground & Surface Water Data Center) /b																		
Technical Expert (GIS Analyst)	person-year	1	1	1	1	1	1	1	7	6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	42.00
Technical Expert (Remote Sensing & Photogrammetry)	person-year	1	1	1	1	1	1	1	7	6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	42.00
Technical Expert (Agronomist)	person-year	1	1	1	1	1	1	1	7	6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	42.00
Technical Expert (Digital Cartographers)	person-year	4	4	4	4	4	4	4	28	3	12.00	12.00	12.00	12.00	12.00	12.00	12.00	84.00
Technical Expert (Data Entry, Geotagging)	person-year	6	6	6	6	6	6	6	42	2.4	14.40	14.40	14.40	14.40	14.40	14.40	14.40	100.80
Technical Expert (Modeling)	person-year	2	2	2	2	2	2	2	14	10	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00
Technical Expert (Online Data and Mapping Web Services)	person-year	1	1	1	1	1	1	1	7	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	70.00
Technical Expert (Technical Writer)	person-year	1	1	1	1	1	1	1	7	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	70.00
Specialised Consultants (e.g. for Studies)	person-year	2	2	2	2	2	2	2	14	10	20.00	20.00	20.00	20.00	20.00	20.00	20.00	140.00

Additional Contract support	person-year	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	20	2.00	3.00	3.00	3.00	3.00	3.00	3.00	20.00
Upgradation of existing hardware	lump sum	0.5	0.5	-	-	-	-	-	1	0.5	0.25	0.25	-	-	-	-	-	0.50
Interactive Online Decision Support System Development Consultancy	lump sum	-	0.1	0.4	0.5	-	-	-	1	400	-	40.00	160.00	200.00	-	-	-	400.00
New IT Hardware/Software/Data & Office/lab equipment	lump sum	-	0.7	-	-	-	0.3	-	1	400	-	280.00	-	-	-	120.00	-	400.00
Product development (publications, e-books, web hosting, etc.)	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	20	2.00	3.00	3.00	3.00	3.00	3.00	3.00	20.00
Internship Program	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	20	2.00	3.00	3.00	3.00	3.00	3.00	3.00	20.00
Training/Workshops	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	100	10.00	15.00	15.00	15.00	15.00	15.00	15.00	100.00
Minor Civil Works	person-year	-	0.5	0.5	-	-	-	-	1	100	-	50.00	50.00	-	-	-	-	100.00
Incremental Operating Costs (e.g. vehicle hire/travel, internet, consumables, etc.)	lump sum	0.1	0.15	0.15	0.15	0.15	0.15	0.15	1	35	3.50	5.25	5.25	5.25	5.25	5.25	5.25	35.00
Subtotal											124.15	503.90	343.65	333.65	133.65	253.65	133.65	1,826.30
C. C. Real-time Monitoring Service Pilot /c																		
Monitoring Services	lump sum	-	0.25	0.15	0.15	0.15	0.15	0.15	1	400	-	100.00	60.00	60.00	60.00	60.00	60.00	400.00
Technical Assistance (e.g. to set up technical audits)	lump sum	-	0.5	0.5	-	-	-	-	1	40	-	20.00	20.00	-	-	-	-	40.00
Subtotal											-	120.00	80.00	60.00	60.00	60.00	60.00	440.00
Total											244.15	1,578.90	1,053.65	698.65	373.65	643.65	373.65	4,966.30
\a For WRD - including Central Design Organization, Central Quality Control Laboratories, IMTI, IHH, O&M Wing, etc.																		
\b And contract personnel and operating expenses																		
\c Outsourced real-time monitoring data services for key locations (e.g. canal flows)																		

Sub-Component A2 - IRRIGATION SYSTEM MODERNIZATION

Components	Unit	Physical								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Infrastructure Rehabilitation /a																		
1. Infrastructure cost	No.	150	200	750	900	1,000	1,000	778	4,778		-	-	-	-	-	-	-	-
2. Tanks and Anicuts Rehabilitation	Ha	17,047	22,729	85,234	102,281	113,646	113,646	88,417	543,000	0.348	5,932.36	7,909.69	29,661.43	35,593.79	39,548.81	39,548.81	30,769.12	188,964.00
3. On-Farm Development	Ha	17,047	22,729	85,234	102,281	113,646	113,646	88,417	543,000	0.022	375.03	500.04	1,875.15	2,250.18	2,500.21	2,500.21	1,945.17	11,946.00
4. Groundwater recharge structures	Ha	17,047	22,729	85,234	102,281	113,646	113,646	88,417	543,000	0.008	136.38	181.83	681.87	818.25	909.17	909.17	707.34	4,344.00
5. Environmental Activities	Ha	17,047	22,729	85,234	102,281	113,646	113,646	88,417	543,000	0.001	15.68	20.91	78.42	94.10	104.55	104.55	81.34	499.56
6. Third party consultancy	Lumpsum										100.00	100.00	200.00	200.00	200.00	100.00	100.00	1,000.00
7. Unallocated (contingencies)	Lumpsum										55.00	100.00	125.00	125.00	125.00	102.50	100.00	732.50
Total											6,614.45	8,812.47	32,621.87	39,081.32	43,387.74	43,265.24	33,702.97	207,486.06

\a Number of tanks which will be completed are 4,778. (Fy1 -150; Fy2 -200; Fy3- 750; Fy4-900; Fy5 -1,000, Fy6 - 1,000 & Fy7-778; Ayacut area in Ha (tanks and anicuts): 1,7047 (fy 1), 22,729 (fy 2), 85,234 (fy 3), 102,281

Sub-Component A3- PARTICIPATORY IRRIGATION MANAGEMENT

Detailed Costs	Unit	Physical								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Establishing Engineer in Chief, WRD & Regional PIM Wings																		
1. SDS&DEO Salaries																		
Engaging Social Dev. Specialist /a	No.	1	1	1	1	1	1	1	7	5.4	5.40	5.40	5.40	5.40	5.40	5.40	5.40	37.80
Engaging social dev. specialist social safeguards and gender /b	No.	1	1	1	1	1	1	1	7	5.4	5.40	5.40	5.40	5.40	5.40	5.40	5.40	37.80
Engaging Social Dev. Spec. in 4 Regions for PIM activities	No.	4	4	4	4	4	4	4	28	4.2	16.80	16.80	16.80	16.80	16.80	16.80	16.80	117.60
Data Entry Operators for EINC, WRD and 4 Regions	No.	6	6	6	6	6	6	6	42	1.8	10.80	10.80	10.80	10.80	10.80	10.80	10.80	75.60
Subtotal											38.40	38.40	38.40	38.40	38.40	38.40	38.40	268.80
2. Operation Cost as per Project Protocol	lumpsum										200.00	25.00	25.00	25.00	25.00	25.00	25.00	350.00
3. Social Safeguard Activities																		
Social development and safe guard activities	lumpusm	1	1	1	1	1	1	1	7	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	28.00
4. Training for Competent Authorities and Higher Officials																		
Training for competent autho. and higher officials	no.of batches	10	5	-	-	-	-	-	15	10	100.00	50.00	-	-	-	-	-	150.00
Subtotal											342.40	117.40	67.40	67.40	67.40	67.40	67.40	796.80
B. Election for Existing WUAs and Orientation Programme /c																		
1. Conduction Election for Existing 2800 WUAs	WUA	1,000	1,400	400	-	-	-	-	2,800	0.22	220.00	308.00	88.00	-	-	-	-	616.00
2. 3 Day Orientation Training for Mgmt. Committee /d	No. of trainings	100	140	40	-	-	-	-	280	0.9	90.00	126.00	36.00	-	-	-	-	252.00
3. Intensive training on water mgmt. and O&M	No.	12	-	-	-	-	-	-	12	5	60.00	-	-	-	-	-	-	60.00
Subtotal											370.00	434.00	124.00	-	-	-	-	928.00
C. Capacity Building Training to (To Be Formed) WUAs																		
1. Conducting Election (to be formed) 3200 WUAs /e	Nos.	-	800	800	800	800	-	-	3,200	0.22	-	176.00	176.00	176.00	176.00	-	-	704.00
2. Hiring 160 mobilization training Spec. for 6 years	Nos.	-	20	30	40	40	20	10	160	3.6	-	72.00	108.00	144.00	144.00	72.00	36.00	576.00
3. Hiring 640 Field Organizers for 6 years	Nos.	-	80	120	160	160	80	40	640	1.2	-	96.00	144.00	192.00	192.00	96.00	48.00	768.00
4. Capacity Building Trng. to 160 MTS by CEC /f	No. of Training Batches	-	1	1	1	1	-	-	4	10	-	10.00	10.00	10.00	10.00	-	-	40.00
5. Capacity Building Trng. to 640 Fos by CEC /g	No. of Training Batches	-	2	4	5	5	-	-	16	6	-	12.00	24.00	30.00	30.00	-	-	96.00
6. Capacity Building Training (to be formed) /h																		
Base training to Farmers by Peer Trainers /i	No. of Training	-	800	800	800	800	-	-	3,200	0.527	-	421.20	421.20	421.20	421.20	-	-	1,684.80
(TOT) training to master for 3 days on PIM	No. of Training	-	20	20	20	20	-	-	80	0.75	-	15.00	15.00	15.00	15.00	-	-	60.00

(TOT) training to master for 3 days on O&M	No. of Training	-	20	20	20	20	-	-	80	0.75	-	15.00	15.00	15.00	15.00	-	-	60.00
2 days intensive training on Water Management & O&M /j	No. of Training Batches	-	160	160	160	160	-	-	640	0.6	-	96.00	96.00	96.00	96.00	-	-	384.00
1 day intensive follow-up training in Water Mgmt. and O&M /k	No. of Training Batches	-	160	160	160	160	-	-	640	0.3	-	48.00	48.00	48.00	48.00	-	-	192.00
Subtotal											-	595.20	595.20	595.20	595.20	-	-	2,380.80
Subtotal											-	961.20	1,057.20	1,147.20	1,147.20	168.00	84.00	4,564.80
D. Amendments to TNFMIS Act 2000 consultancy	Lumpsum	1	-	-	-	-	-	-	1	25	25.00	-	-	-	-	-	-	25.00
E. Provision for Peer Learning, Digital Message, Design /l	Lumpsum										100.00	100.00	200.00	100.00	200.00	50.00	50.00	800.00
F. Provision for encouragement/award /m	Lumpsum										-	-	20.00	20.00	20.00	20.00	20.00	100.00
G. Provision for Printing ICT, Feedback etc. /n	Lumpsum										5.00	5.00	10.00	10.00	10.00	10.00	10.00	60.00
H. Provision for Taking Up CCWM etc. /o	Lumpsum										10.00	20.00	20.00	20.00	20.00	20.00	10.00	120.00
I. Preparation of O & M Manual and dedicated Apps /p	Lumpsum										20.00	20.00	-	-	-	-	-	40.00
J. Social Safeguards and Social Development /q	Lumpsum	18	18	20	10	-	-	-	66	6	108.00	108.00	120.00	60.00	-	-	-	396.00
Total											980.40	1,765.60	1,618.60	1,424.60	1,464.60	335.40	241.40	7,830.60

\a In E-inC, WRD office for PIM Activities

\b In E-inC, WRD office for Social Safeguards Activities

\c New Managing Committee Members

\d Members (5 members in each WUA)

\e 800 WUAs/election

\f Through IMTI (4 days plus 2 days) (4 batches)

\g Through IMTI (3 days plus 1 day) (4 batches)

\h 3200 WUAs-3200 trainings (25 farmers per training)

\i 48 trainers/WUA in 3 yrs

\j For 10 members/WUA

\k For 10 members/WUA

\l Peer learning, digital message designation, documentation, visits etc.

\m For better performance of Farmers, WUAs and other PIM Staff

\n Documentation of success stories, case studies, best practice of PIM and in Tamilnadu Publication of quarterly PIM News Letters etc.

\o Provision for taking up research studies on micro level management, climate resilience crops and other consultancies etc.

\p Provision for taking up research studies on micro level management, climate resilience crops and other consultancies etc.

\q Used for social mobilization/creation of awareness and organization of community based organizations of women and vulnerable sections, training programs for capacit building/skills improvement, preparation of baseline data for monitoring related to
partici

Component A4- CONVERGENCE FOR IMPROVED SERVICE DELIVERY

Components	Physical									Unit Cost (LocalLakh)	Financial Outlay ('000 Lakh)							
	Unit	2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Formation of model villages (No. 1,000) /a	Lumpsum										150.00	150.00	150.00	150.00	200.00	100.00	100.00	1,000.00
B. Operating cost, capacity building in SWIKC, IEC	Lumpsum										150.00	150.00	150.00	150.00	200.00	100.00	100.00	1,000.00
C. Capacity Building of Departments	Lumpsum										100.00	100.00	200.00	200.00	150.00	150.00	100.00	1,000.00
Total											400.00	400.00	500.00	500.00	550.00	350.00	300.00	3,000.00
\a Entry point facilities and creationof SWIKC																		

COMPONENT B: AGRICULTURAL PRODUCTIVITY ENHANCEMENT, DIVERSIFICATION, IMPROVED LIVELIHOODS, MARKETING AND VALUE ADDITION
Sub Component B1 – AGRICULTURE INTENSIFICATION AND DIVERSIFICATION (AGRICULTURE DEPARTMENT)

Components	Physical									Unit Cost (Local Lakh)	Financial Outlay('000 Lakh)							
	Unit	2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Increasing Crop Productivity by Best Management Practices and Innovations (IPT Demos) /a																		
1. Green Manure (GM - SRI -rice fallow (RF Pulses)	Ha	5,000	7,000	9,000	9,000	6,000	4,500	-	40,500	0.1	500.00	700.00	900.00	900.00	600.00	450.00	-	4,050.00
2. Maize	Ha	1,000	1,500	2,000	1,500	1,000	500	-	7,500	0.05	50.00	75.00	100.00	75.00	50.00	25.00	-	375.00
3. Ragi	Ha	100	200	250	200	150	100	-	1,000	0.05	5.00	10.00	12.50	10.00	7.50	5.00	-	50.00
4. Minor Millets	Ha	1,000	2,000	2,500	2,000	1,500	1,000	-	10,000	0.04	40.00	80.00	100.00	80.00	60.00	40.00	-	400.00
5. Pulses	Ha	1,500	2,500	3,000	2,500	2,000	1,000	-	12,500	0.05	75.00	125.00	150.00	125.00	100.00	50.00	-	625.00
6. Oilseeds (Groundnut, Gingelly, Sunflower etc.)	Ha	750	1,250	1,500	1,250	1,000	750	-	6,500	0.05	37.50	62.50	75.00	62.50	50.00	37.50	-	325.00
Subtotal											707.50	1,052.50	1,337.50	1,252.50	867.50	607.50	-	5,825.00
B. Other Crop Based Components /b																		
1. Establish Farmers Field Schools (FFS) /c	FFS	500	750	1,000	1,000	750	500	-	4,500	0.2	100.00	150.00	200.00	200.00	150.00	100.00	-	900.00
2. Promote IPM																		
Integrated Pest Management (IPM) Villages	Village	25	50	75	75	50	25	-	300	1	25.00	50.00	75.00	75.00	50.00	25.00	-	300.00
INM- Vermi compost (Silpaulin) Units	No.	125	250	375	375	250	125	-	1,500	0.06	7.50	15.00	22.50	22.50	15.00	7.50	-	90.00
Subtotal											32.50	65.00	97.50	97.50	65.00	32.50	-	390.00
3. Seed Village Groups Training																		
Pulses	Group	20	30	60	40	30	20	-	200	0.044	0.88	1.32	2.64	1.76	1.32	0.88	-	8.80
Groundnut	Group	20	25	50	25	20	10	-	150	0.044	0.88	1.10	2.20	1.10	0.88	0.44	-	6.60
Green manure	Group	20	25	50	25	20	10	-	150	0.044	0.88	1.10	2.20	1.10	0.88	0.44	-	6.60
Seed Village Groups Revolving Fund	Group	60	80	160	90	70	40	-	500	0.5	30.00	40.00	80.00	45.00	35.00	20.00	-	250.00
Subtotal											32.64	43.52	87.04	48.96	38.08	21.76	-	272.00
4. Shield Awards for Best Farmers /d	No.	8	8	8	8	8	8	-	48	0.025	0.20	0.20	0.20	0.20	0.20	0.20	-	1.20
5. Shield Awards for Best Field /e	No.	3	3	3	3	3	3	-	18	0.033	0.10	0.10	0.10	0.10	0.10	0.10	-	0.59
Subtotal											165.44	258.82	384.84	346.76	253.38	154.56	-	1,563.79

C. Agricultural Implements /f																		
1. SRI power operated Cono weeder (50%) , hand & power operated sprayer	No.	100	150	250	250	150	100	-	1,000	0.15	15.00	22.50	37.50	37.50	22.50	15.00	-	150.00
2. Hand Operated Sprayer	No.	350	400	600	600	400	300	-	2,650	0.013	4.38	5.00	7.50	7.50	5.00	3.75	-	33.13
3. Power Operated Sprayer	No.	350	400	600	600	400	300	-	2,650	0.03	10.50	12.00	18.00	18.00	12.00	9.00	-	79.50
Subtotal											29.88	39.50	63.00	63.00	39.50	27.75	-	262.63
D. Inst. Streng. - IEC and Capacity Bldg. /g																		
1. Trainings for SRI Skills	No.	18	16	16	16	-	-	-	66	0.185	3.33	2.96	2.96	2.96	-	-	-	12.21
2. Farmers training	No.	36	32	32	32	-	-	-	132	0.21	7.56	6.72	6.72	6.72	-	-	-	27.72
3. Extensional Personnel Training	Ha	18	16	16	16	-	-	-	66	0.275	4.95	4.40	4.40	4.40	-	-	-	18.15
4. IEC/CB activities	No.	9,350	14,450	18,250	16,450	11,650	7,850	-	78,000	0.007	60.78	93.93	118.63	106.93	75.73	51.03	-	507.00
Subtotal											76.62	108.01	132.71	121.01	75.73	51.03	-	565.08
E. Admin. Studies, Consultancy & M&E (Ag. IAMWARM Cell)																		
1. State HQ IAWARM Cell /h																		
Improvements of Project HQ cell infrastructures	No	1	-	-	-	-	-	-	1	5	5.00	-	-	-	-	-	-	5.00
Computers and Other Accessories	sets	5	-	-	-	-	-	-	5	1	5.00	-	-	-	-	-	-	5.00
Agricultural Specialist/Technical Input Provider	pers.month	12	12	12	12	12	12	-	72	0.5	6.00	6.00	6.00	6.00	6.00	6.00	-	36.00
Accounts officer	pers.month	12	12	12	12	12	12	-	72	0.25	3.00	3.00	3.00	3.00	3.00	3.00	-	18.00
Computer/Data Entry Operator	pers.month	12	12	12	12	12	12	-	72	0.15	1.80	1.80	1.80	1.80	1.80	1.80	-	10.80
Documentation operational Charges for 66 sub-basins	NO.	18	14	14	10	10	66	-	132	0.3	5.40	4.20	4.20	3.00	3.00	19.80	-	39.60
Office Expenditure, Other Contingencies	Lumpsum	1	1	1	1	1	1	-	6	7.5	7.50	7.50	7.50	7.50	7.50	7.50	-	45.00
Subtotal											33.70	22.50	22.50	21.30	21.30	38.10	-	159.40
2. Agriculture District/Sub Basin Nodal Units																		
Contract Charges for Data Entry Operator /i	No.	18	14	14	10	10	66	-	132	0.3	5.40	4.20	4.20	3.00	3.00	19.80	-	39.60
Subtotal											39.10	26.70	26.70	24.30	24.30	57.90	-	199.00
Total											1,018.53	1,485.52	1,944.74	1,807.56	1,260.4	898.73	-	8,415.50
\a Involving Women Farmers and Addressing Climate Resilient Issues																		
\b Involving More Women Farmers and Addressing Climate Resilient Issues																		

\c IPM village; INM -vermi compost (Silpaulin) units (@5 no./village) dove tailing with IMP villages; Seed village for Pulses, groundnut and green manure crops; shield awards for best farmers with in the sub-basin/among the sub-basins for crops and also for
\d Within the Sub-basin
\e Among the sub-basins
\f More women farmers to be involved
\g Encouraging More Women Farmers and Addressing Climate resilient Issues)
\h Sourcing of expert personnel- honorarium, documentation operational charges for 66 sub basins and office expenditure, other contingencies
\i For Documentation with Honorarium for all the Sub-baseline

Sub Component B1 – AGRICULTURE INTENSIFICATION AND DIVERSIFICATION (HORTICULTURE DEPARTMENT)

Components	Unit	Physical								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Horticulture Crop Demonstration /a																		
1. Fruits																		
Mango	Ha	60	110	170	110	110	90	-	650	0.077	4.59	8.42	13.01	8.42	8.42	6.89	-	49.73
Guava /b	Ha	60	85	110	85	85	75	-	500	0.176	10.56	14.96	19.36	14.96	14.96	13.20	-	88.00
Pomegranate	Ha	25	40	45	25	30	35	-	200	0.172	4.30	6.88	7.74	4.30	5.16	6.02	-	34.38
T.C. Banana	Ha	75	85	85	90	95	70	-	500	0.375	28.13	31.88	31.88	33.75	35.63	26.25	-	187.50
Subtotal											47.57	62.13	71.98	61.42	64.16	52.35	-	359.61
2. Spices																		
Chillies (dry)	Ha	20	20	25	20	20	20	-	125	0.12	2.40	2.40	3.00	2.40	2.40	2.40	-	15.00
3. Flowers																		
Tuberose	Ha	8	10	8	8	8	8	-	50	0.6	4.80	6.00	4.80	4.80	4.80	4.80	-	30.00
4. Vegetables - Brinjal, Bhendi, Tomato, Green Chillies, Onion etc. /c	Ha	5,500	7,200	7,414	8,600	8,100	6,186	-	43,000	0.2	1,100.00	1,440.00	1,482.80	1,720.00	1,620.00	1,237.20	-	8,600.00
Subtotal											1,154.77	1,510.53	1,562.58	1,788.62	1,691.36	1,296.75	-	9,004.61
B. Promotion of reduced pesticide village /d																		
1. Using only bio-pesticides and fungicides /e	Ha	800	1,200	962	1,000	1,000	1,000	-	5,962	0.012	9.60	14.40	11.54	12.00	12.00	12.00	-	71.54
C. Promotion of hi-tech irrigation technologies /f																		
1. Installation of micro irrigation with drip and fertigation (vegetables)	Ha	480	2,020	2,120	2,070	2,054	2,220	-	10,964	1	480.00	2,020.00	2,120.00	2,070.00	2,054.00	2,220.00	-	10,964.00
2. Installation of micro irrigation with drip and fertigation (banana)	Ha	23	-	-	-	-	-	-	23	0.856	19.69	-	-	-	-	-	-	19.69
3. Installation of micro irrigation with sprinkler (vegetable/dry chilies)	Ha	-	17	34	31	-	-	-	82	0.19	-	3.23	6.46	5.89	-	-	-	15.58
Subtotal									11069		499.69	2,023.23	2,126.46	2,075.89	2,054.00	2,220.00	-	10,999.27
D. Promotion of climate risk resilience technologies /g																		
1. Poly green houses-max (limit 1,000 sq.Mt)	Sq.mt	1,000	1,000	1,000	1,000	1,000	1,000	-	6,000	0.005	4.68	4.68	4.68	4.68	4.68	4.68	-	28.05
2. Mulching technology	Ha	125	135	135	140	155	154	-	844	0.16	20.00	21.60	21.60	22.40	24.80	24.64	-	135.04

Subtotal											24.68	26.28	26.28	27.08	29.48	29.32	-	163.09
E. IEC/CB (involving women farmers)																		
1. Village Level Training to Farmers	No.	2,000	2,800	2,000	2,000	2,000	2,400	-	13,200	0.002	4.00	5.60	4.00	4.00	4.00	4.80	-	26.40
2. Exposure visit to farmers and officers /h	batch	10	14	10	10	10	12	-	66	1	10.00	14.00	10.00	10.00	10.00	12.00	-	66.00
3. Other IEC/CB activities (publicity or propaganda0 /i	Ha	5,748	7,550	7,857	8,938	8,448	6,484	-	45,025	0.008	45.98	60.40	62.86	71.50	67.58	51.87	-	360.20
Subtotal											59.98	80.00	76.86	85.50	81.58	68.67	-	452.60
F. Management Support																		
1. Strengthening the HQ Cell																		
Senior Level Account Officer /j	No.	1	1	1	1	1	1	-	6	3	3.00	3.00	3.00	3.00	3.00	3.00	-	18.00
Technical Assistant (Horticulture) /k	No.	1	1	1	1	1	1	-	6	6	6.00	6.00	6.00	6.00	6.00	6.00	-	36.00
District Level Technical Input Provider /l	No.	10	20	20	15	10	10	-	85	2.4	24.00	48.00	48.00	36.00	24.00	24.00	-	204.00
Data Entry Operator /m	No.	1	1	1	1	1	1	-	6	1.8	1.80	1.80	1.80	1.80	1.80	1.80	-	10.80
Subtotal											34.80	58.80	58.80	46.80	34.80	34.80	-	268.80
2. Other Expenses																		
Laptop	No.	1	-	-	-	-	-	-	1	0.4	0.40	-	-	-	-	-	-	0.40
Xerox	No.	1	-	-	-	-	-	-	1	0.72	0.72	-	-	-	-	-	-	0.72
Telephone charges	lumpsum										0.24	0.24	0.24	0.24	0.24	0.24	-	1.44
Computer Stationeries and Services	No.										1.15	1.15	1.15	1.15	1.10	1.10	-	6.80
Office operating costs	lumpsum										5.00	5.00	5.00	5.00	5.00	5.00	-	30.00
Subtotal											7.51	6.39	6.39	6.39	6.34	6.34	-	39.36
Subtotal											42.31	65.19	65.19	53.19	41.14	41.14	-	308.16
Total											1,791.46	3,719.71	3,869.23	4,042.61	3,909.88	3,668.20	-	21,001.22

\a By addressing the Climate Resilient Issues

\b Includes Brinjal, Bhendi, Tomato, Green Chillies, Onion, Tapioca, Gourds, Watermelon

\c Tapioca, Gourds, Watermelon

\d To promote vegetables in clusters

\e In 300 IMP village of DOA in clusters

\f By encouraging women farmers

\g Women farmers also will be involved

\h On need based in state or outstate 50/batch

\i On need based in state or outstate 50/batch

\j per year

\k PG/PhD graduate

\l B.Sc in (horticulture)/ B.Sc in (Agriculture)

\m per year

Sub Component B1 – AGRICULTURE INTENSIFICATION AND DIVERSIFICATION (ADAPTIVE RESEARCH - TNAU)

Components	Unit	Physical								Unit cost (Local Lakh)	Financial Outlay('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Productivity enhancement of rice in sub basin and increasing pulse production /a	Ha	2,000	3,250	3,250	3,250	3,250	-	-	15,000	0.1	200.00	325.00	325.00	325.00	325.00	-	-	1,500.00
B. Pulse Seed Production Program /b	Rs./Ha	350	500	700	500	450	-	-	2,500	0.06	21.00	30.00	42.00	30.00	27.00	-	-	150.00
C. Area expansion and productivity enhancement of pulses /c	Rs./Ha	750	1,000	1,100	1,150	1,000	-	-	5,000	0.05	37.50	50.00	55.00	57.50	50.00	-	-	250.00
D. Formation of pulse commodity groups & federated /d	Rs. /Ha	-	75	125	150	150	-	-	500	0.02	-	1.50	2.50	3.00	3.00	-	-	10.00
E. Value addition in pulses through processing and branding in collaboration with marketing dept.	lumpsum										-	12.50	12.50	12.50	12.50	-	-	50.00
F. Demonstration of improved production techniques with various oil seeds /e	ha	100	150	150	100	100	-	-	600	0.05	5.00	7.50	7.50	5.00	5.00	-	-	30.00
G. Promotion of sustainable sugarcane initiative (SSI) in sub-basin under precision farming approach /f	ha	100	150	200	150	150	-	-	750	1	100.00	150.00	200.00	150.00	150.00	-	-	750.00
H. Promotion of pesticide free village vegetables in sub-basin through climate resilient activity in model Bio Village /g	ha	750	1,100	1,100	1,100	950	-	-	5,000	0.025	18.75	27.50	27.50	27.50	23.75	-	-	125.00
I. Production of vegetable under precision farming mode by adopting of IPM concept /h	ha	100	350	400	350	300	-	-	1,500	1.2	120.00	420.00	480.00	420.00	360.00	-	-	1,800.00
J. Promotion of red gram (Toor Dhal) under cropping sequence	ha	150	250	250	200	150	-	-	1,000	0.1	15.00	25.00	25.00	20.00	15.00	-	-	100.00
K. Improving productivity of Toor Dhal under precision farming technique /i	ha	100	225	225	250	200	-	-	1,000	1	100.00	225.00	225.00	250.00	200.00	-	-	1,000.00
L. Monitoring GHG Emission (portable GC, field glass chambers and DNDC module)	Lumpsum										-	5.00	5.00	10.00	5.00	-	-	25.00
M. Introduction of new technologies in fruit crops by demon. TNAU high density planting /j	ha	50	100	100	75	75	-	-	400	0.75	37.50	75.00	75.00	56.25	56.25	-	-	300.00
N. Crop diversification in Cauvery command through innovative experiments of introducing new cropping patterns	ha	800	1,100	1,050	1,050	1,000	-	-	5,000	0.04	32.00	44.00	42.00	42.00	40.00	-	-	200.00
O. IT Based Activities																		
1. Price forecasting and market intelligence, execution of crop optimization /k	lumpsum										25.00	65.00	75.00	75.00	65.00	-	-	305.00

2. Implements: purchase of cono weeder and other labour saving implements (need based)	lumpsum										36.89	30.00	30.00	30.00	30.00	-	-	156.89
Subtotal											61.89	95.00	105.00	105.00	95.00	-	-	461.89
P. Capacity Building, IEC and Admin Cost																		
1. Training to farmers, scientists, other state holders /l	Lumpsum										97.30	80.00	80.00	80.00	75.00	50.00	-	462.30
2. TNIAMP cell establishment cost for 7 yrs.	Lumpsum										25.00	15.00	15.00	15.00	10.00	10.00	-	90.00
3. Institutional charges @7.5% for field activities	Lumpsum										51.88	104.85	114.30	105.66	95.44	-	-	472.13
4. Outsourcing of technical staffs for implementing the field and IEC activities	Lumpsum										71.63	150.00	200.00	200.00	100.00	35.68	-	757.31
Subtotal											245.81	349.85	409.30	400.66	280.44	95.68	-	1,781.74
Total											994.45	1,842.85	2,038.30	1,914.41	1,647.94	95.68	-	8,533.63

\a By restoring soil fertility in cropping sequence (green manure - rice-rice fallow

\b Production of TFL Seeds under farmers participatory approach to produce quality pulse seeds

\c under crop diversification in gap areas

\d Seed to sales.

\e with prime focus on improving productivity, encouraging crop diversification

\f Scaling up SSI through joint venture with the nearby sugar mills - TNAU acts as knowledge partner for SSI to Sugar Mills

\g Known as pesticide free village (NIPHM model to be implemented. Farmers should produce their own bio pesticides and make accessible to other farmers at reasonable cost at their door step.

\h Cost inclusive of sustainability and replication on the use of water soluble fertilizer in subsequent crops .

\i including IPM approach

\j with drip fertigation in mango/pomegranate etc.

\k M -velanmai based problem solving through ICT, Geo tagging of interventions for the periodical monitoring, assessment of water spread and cropped area on selected sub basins

\l Exposure visits including farmer to farmer digital video learning (digital green)

Sub Component B1 – AGRICULTURE INTENSIFICATION AND DIVERSIFICATION (AGRICULTURE ENGINEERING DEPARTMENT)

Component	Unit	Physical								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Construction of farm ponds /a	No.	495	594	495	396	396	396	-	2,772	0.54	267.30	320.76	267.30	213.84	213.84	213.84	-	1,496.88
B. To be named	Lumpsum	5	6	5	4	4	4	-	28	0.57	2.85	3.42	2.85	2.28	2.28	2.28	-	15.96
Total											270.15	324.18	270.15	216.12	216.12	216.12	-	1,512.84
\a As a supplementary source of additional irrigation at critical stages of crop development																		

Sub Component B2 – IMPROVING ALTERNATIVE LIVELIHOOD SOURCESTHROUGH LIVESTOCK AND INLAND FISHERIES (ANIMAL HUSBANDRY)

Components	Unit	Physical								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Increasing the AI Coverage by Utilizing the Services of Govt. Inst.																		
1. Artificial insemination equipment /a	No.	400	-	200	200	-	-	-	800	0.19	76.00	-	38.00	38.00	-	-	-	152.00
2. Artificial insemination expenses /b	No.	136,000	136,000	204,000	272,000	272,000	-	-	1,020,000	0.001	100.64	100.64	150.96	201.28	201.28	-	-	754.80
3. Introduction of sexed semen	No.	2,000	-	-	-	-	-	-	2,000	0.015	30.00	-	-	-	-	-	-	30.00
Subtotal											206.64	100.64	188.96	239.28	201.28	-	-	936.80
B. Increasing the AI Coverage by Establishing new AI Institutions																		
1. Artificial insemination equipment /c	No.	18	-	24	24	-	-	-	66	0.5	9.00	-	12.00	12.00	-	-	-	33.00
2. AI training for new AI technicians	No.	18	-	24	24	-	-	-	66	0.025	0.45	-	0.60	0.60	-	-	-	1.65
3. Artificial insemination expenses /d	No.	2,160	5,400	9,360	17,688	24,486	-	-	59,094	0.001	2.89	7.24	12.54	23.70	32.81	-	-	79.19
Subtotal											12.34	7.24	25.14	36.30	32.81	-	-	113.84
C. Dairy Interest Groups																		
1. DIG training	No.	36	-	48	48	-	-	-	132	0.265	9.54	-	12.72	12.72	-	-	-	34.98
2. Follow up training	No.	-	36	36	48	96	48	-	264	0.01	-	0.36	0.36	0.48	0.96	0.48	-	2.64
3. Calf management demo	No.	36	36	84	132	132	-	-	420	0.39	14.04	14.04	32.76	51.48	51.48	-	-	163.80
4. Mastitis management demo	No.	36	36	84	132	132	-	-	420	0.234	8.42	8.42	19.66	30.89	30.89	-	-	98.28
Subtotal											32.00	22.82	65.50	95.57	83.33	0.48	-	299.70
D. Fertility Management Program																		
1. Infertility correction campaign /e	No.	432	432	1,008	1,584	1,584	-	-	5,040	0.14	60.48	60.48	141.12	221.76	221.76	-	-	705.60
2. Estrous synchronization program /f	No.	432	432	1,008	1,584	1,584	-	-	5,040	0.145	62.64	62.64	146.16	229.68	229.68	-	-	730.80
Subtotal											123.12	123.12	287.28	451.44	451.44	-	-	1,436.40
E. Distribution of animal identification cards	No.	86,000	86,000	130,000	175,000	173,000	-	-	650,000		4.30	4.30	6.50	8.75	8.65	-	-	32.50
F. Fodder Development																		
1. Fodder production	ha	540	540	1,260	1,980	1,980	-	-	6,300	0.04	21.60	21.60	50.40	79.20	79.20	-	-	252.00
2. Tree fodder promotion	Ha	15	20	20	-	-	-	-	55	0.041	0.62	0.82	0.82	-	-	-	-	2.26
Subtotal											22.22	22.42	51.22	79.20	79.20	-	-	254.26

G. Strengthening of Veterinary Institutions																			
1. Strengthening of existing Animal Investigative Units (ADIU)	No. of units	15	-	-	-	-	-	-	-	15	0.55	8.25	-	-	-	-	-	-	8.25
2. Establishment of new Animal Investigative Units (ADIU)	No. of units	4	-	2	-	-	-	-	-	6	1.25	5.00	-	2.50	-	-	-	-	7.50
3. Operational expenses for (ADIU)	No. of units	15	15	19	19	19	-	-	-	87	0.5	7.50	7.50	9.50	9.50	9.50	-	-	43.50
4. Strengthening of field veterinary services units /g	No. of units	400	-	200	200	-	-	-	-	800	0.45	180.00	-	90.00	90.00	-	-	-	360.00
5. ICT establishment at district and sub-district nodal and implementing offices	No. of units	-	60	20	20	-	-	-	-	100	0.7	-	42.00	14.00	14.00	-	-	-	70.00
Subtotal												200.75	49.50	116.00	113.50	9.50	-	-	489.25
H. Strengthening of Project Cell Infrastructure																			
1. Equipment																			
Computers and accessories	No.	4	-	-	-	-	-	-	-	4	0.6	2.40	-	-	-	-	-	-	2.40
Color printer (A3 duplex)	No.	1	-	-	-	-	-	-	-	1	2	2.00	-	-	-	-	-	-	2.00
Scanner	No.	1	-	-	-	-	-	-	-	1	0.15	0.15	-	-	-	-	-	-	0.15
Data card	No.	3	-	-	-	-	-	-	-	3	0.02	0.06	-	-	-	-	-	-	0.06
DSLR camera	No.	1	-	-	-	-	-	-	-	1	0.3	0.30	-	-	-	-	-	-	0.30
1.5 KV UPS	No.	1	-	-	-	-	-	-	-	1	1	1.00	-	-	-	-	-	-	1.00
Almirah	No.	2	-	-	-	-	-	-	-	2	0.1	0.20	-	-	-	-	-	-	0.20
Laptop	No.	1	-	-	-	-	-	-	-	1	0.75	0.75	-	-	-	-	-	-	0.75
Cell phone	No.	2	-	-	-	-	-	-	-	2	0.1	0.20	-	-	-	-	-	-	0.20
Motor bike	No.	1	-	-	-	-	-	-	-	1	0.75	0.75	-	-	-	-	-	-	0.75
Subtotal												7.81	-	-	-	-	-	-	7.81
2. Operational Expenses																			
Cell phone charges	per.year	1	1	1	1	1	1	-		6	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-	0.72
Data card charge	per.year	3	3	3	3	3	3	-		18	0.09	0.27	0.27	0.27	0.27	0.27	0.27	-	1.62
Stationary	per.year	1	1	1	1	1	1	-		6	0.75	0.75	0.75	0.75	0.75	0.75	0.75	-	4.50
Vehicle hiring	per.year	1	1	1	1	1	1	-		6	1.25	1.25	1.25	1.25	1.25	1.25	1.25	-	7.50
Remuneration data entry person	per.year	2	2	2	2	2	2	-		12	2.4	4.80	4.80	4.80	4.80	4.80	4.80	-	28.80
Miscellaneous	per.year	1	1	1	1	1	1	-		6	0.5	0.50	0.50	0.50	0.50	0.50	0.50	-	3.00
Subtotal												7.69	7.69	7.69	7.69	7.69	7.69	-	46.14
Subtotal												15.50	7.69	7.69	7.69	7.69	7.69	-	53.95
I. Capacity Building of AHD Officers																			

Orientation of AHD officers on IAMWARM concepts	No. or persons	400	-	200	200	-	-	-	800	0.004	1.60	-	0.80	0.80	-	-	-	3.20
Technical training of AHD Officers	No. or persons	-	200	100	100	-	-	-	400	0.15	-	30.00	15.00	15.00	-	-	-	60.00
Training of AHD officers on disease diagnosis	No. or persons	-	40	30	30	-	-	-	100	0.1	-	4.00	3.00	3.00	-	-	-	10.00
International training / exposure visit	No. or persons	-	5	5	-	-	-	-	10	5	-	25.00	25.00	-	-	-	-	50.00
Subtotal											1.60	59.00	43.80	18.80	-	-	-	123.20
J. Project Documentation																		
1. Registers	No.	400	400	600	800	-	-	-	2,200	0.005	2.00	2.00	3.00	4.00	-	-	-	11.00
2. Stationaries	No.	400	400	600	800	800	-	-	3,000	0.007	2.80	2.80	4.20	5.60	5.60	-	-	21.00
3. Impact documentation logistics	No.	-	-	-	800	800	-	-	1,600	0.011	-	-	-	8.40	8.40	-	-	16.80
Subtotal											4.80	4.80	7.20	18.00	14.00	-	-	48.80
K. TANUVAS																		
1. Setting up nutritional supplement production plant /h	No.	1	-	-	-	-	-	-	1	38	38.00	-	-	-	-	-	-	38.00
2. Capacity building for participating Scientists	No.	40	-	-	-	-	-	-	40	0.05	2.00	-	-	-	-	-	-	2.00
3. Production and distribution of supplement to farmers for validation trial	No.	5,000	5,000	5,000	5,000	5,000	-	-	25,000	0.002	9.75	9.75	9.75	9.75	9.75	-	-	48.75
4. Research, data collection, analysis and report preparation expenses	Lumpsum	1	1	1	1	1	1	-	6	11.71	11.71	11.71	11.71	11.71	11.71	11.71	-	70.26
5. Equipment and operational expenses for production of salt miners lick by DIG	Lumpsum	8	8	8	8	8	-	-	40	0.7	5.60	5.60	5.60	5.60	5.60	-	-	28.00
6. Training DIG on Slat lick preparation	Lumpsum	1	1	1	1	1	-	-	5	2	2.00	2.00	2.00	2.00	2.00	-	-	10.00
7. Project cell infrastructure at TANUVAS	Lumpsum	1	-	-	-	-	-	-	1	3	3.00	-	-	-	-	-	-	3.00
Subtotal											72.06	29.06	29.06	29.06	29.06	11.71	-	200.01
Total											695.33	430.59	828.35	1,097.59	916.96	19.88	-	3,988.70

\a Liquid nitrogen container 1.5 lit plus AI gun

\b frozen semen, liq. nitrogen, consumables, incentives

\c Liquid nitrogen container 1.5 lit plus AI gun

\d Frozen semen, liq. nitrogen, consumables, incentives

\e Medicines and campaign logistics

\f Medicines and logistics

\g analyzer, microscope and diagnostic kits

\h And pre supplementation data collection

Sub Component B2 – IMPROVING ALTERNATIVE LIVELIHOOD SOURCESTHROUGH LIVESTOCK AND INLAND FISHERIES (FISHERIES)

Detailed Costs	Unit	Quantities								Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
		2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Department of Fisheries																		
1. Fish culture in long seasonal Irrigation tanks /a	Ha	-	2,000	2,000	2,000	2,000	2,000	-	10,000	0.03	-	60.00	60.00	60.00	60.00	60.00	-	300.00
2. Fish culture in short seasonal tanks /b																		
Carps	Ha	2,000	2,000	2,000	2,000	2,000	-	-	10,000	0.04	80.00	80.00	80.00	80.00	80.00	-	-	400.00
GIFT	Ha	1,000	1,000	1,000	1,000	1,000	-	-	5,000	0.08	80.00	80.00	80.00	80.00	80.00	-	-	400.00
Subtotal											160.00	160.00	160.00	160.00	160.00	-	-	800.00
3. Fishing implements (gill net, coral/dragnet)	No.	-	100	100	100	100	100	-	500	0.2	-	20.00	20.00	20.00	20.00	20.00	-	100.00
4. Cage Farming	No.	-	5	5	5	-	-	-	15	5	-	25.00	25.00	25.00	-	-	-	75.00
5. Promotion of high value native species /c																		
Capital Costs	No.	-	1	-	-	-	-	-	1	50	-	50.00	-	-	-	-	-	50.00
Operating Costs	lumpsum										-	-	5.00	5.00	5.00	5.00	-	20.00
Subtotal											-	50.00	5.00	5.00	5.00	5.00	-	70.00
6. Integrated aqua farming (aquaphoric)																		
Capital Costs	No.	-	1	-	-	-	-	-	1	53	-	53.00	-	-	-	-	-	53.00
Operating Costs	lumpsum										-	-	2.50	2.50	2.50	2.50	-	10.00
Subtotal											-	53.00	2.50	2.50	2.50	2.50	-	63.00
7. Aquaculture in farm ponds (0.1 ha)	No.	-	500	200	200	100	-	-	1,000	0.27	-	135.00	54.00	54.00	27.00	-	-	270.00
8. Fish seed rearing in cages	No.	-	25	25	25	25	-	-	100	0.4	-	10.00	10.00	10.00	10.00	-	-	40.00
9. Gift Tilapia hatchery - investment																		
Gift Tilapia hatchery - investment	No.	-	1	-	-	-	-	-	1	320	-	320.00	-	-	-	-	-	320.00
Operating costs	lumpsum										-	-	20.00	20.00	20.00	20.00	-	80.00
Subtotal											-	320.00	20.00	20.00	20.00	20.00	-	400.00
10. Purline brood stock maint. mult. center /d																		
Capital costs	lumpsum	-	2	-	-	-	-	-	2	225	-	450.00	-	-	-	-	-	450.00
Operating cost	lumpsum										-	-	37.00	36.00	36.00	36.00	-	145.00
Subtotal											-	450.00	37.00	36.00	36.00	36.00	-	595.00

11. Earthen fish seed rearing and culture farm	No.	-	28	15	15	15	15	-	88	5	-	140.00	75.00	75.00	75.00	75.00	-	440.00
12. Modernization of fish seed farm	No.	-	2	-	-	-	-	-	2	125	-	250.00	-	-	-	-	-	250.00
13. Small scale fish seed mill units																		
Capital Costs	No.	-	1	-	-	-	-	-	1	90	-	90.00	-	-	-	-	-	90.00
Operational Costs	lumpsum										-	-	2.50	2.50	2.50	2.50	-	10.00
Subtotal											-	90.00	2.50	2.50	2.50	2.50	-	100.00
14. Fish kiosk	No.	10	10	-	-	-	-	-	20	8	80.00	80.00	-	-	-	-	-	160.00
15. Monitoring support in sub-basin & IAMP	Lumpsum										-	36.00	36.00	36.00	36.00	36.00	-	180.00
16. Overseas training/exposure visit	Lumpsum										-	25.00	50.00	25.00	-	-	-	100.00
17. ICT, documentation & office equipment etc.	Lumpsum										10.00	15.00	15.00	10.00	10.00	10.00	-	70.00
Subtotal											250.00	1,919.00	572.00	541.00	464.00	267.00	-	4,013.00
B. Tamil Nadu Fisheries University																		
1. Development of production models for irrigation tanks /e	Lumpsum										32.15	23.55	20.55	3.75	-	-	-	80.00
2. Management of pure line inland fish brooders /f	Lumpsum										4.00	16.20	16.20	13.20	9.00	5.40	-	64.00
3. Formulation of species based fish feed /g	Lumpsum										17.80	16.80	14.80	14.80	6.90	6.90	-	78.00
4. Capacity building, training of trainers farmers etc. /h	Lumpsum										2.50	11.50	3.50	4.50	3.50	2.50	-	28.00
Subtotal											56.45	68.05	55.05	36.25	19.40	14.80	-	250.00
Total											306.45	1,987.05	627.05	577.25	483.40	281.80	-	4,263.00

\a @1,500 seeds/ha-EWS

\b A, Carps @2,000 seeds/ha-EWS

\c channa straitus/maurlius

\d Mettur, Krisnagiri, Bhavanisagar

\e For farm ponds

\f In the brooder farm and production of good quality seeds

\g Using locally available low cost ingredients

\h And entrepreneurs in the adaption of advanced farming technique

Sub Component B3 – AGRICULTURE MARKETING, VALUE ADDITION AND POST-HARVEST MANAGEMENT

Components	Physical									Unit cost (Local Lakh)	Base Cost (Local Lakh)							
	Unit	2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Improving Farmer Access to Markets																		
1. Support for new farmer producer organizations																		
Consultancy charges for formation of FPO for 1st year and business plan	No.	-	26	24	30	-	-	-	80	13.8	-	358.80	331.20	414.00	-	-	-	1,104.00
MTS (mobilization training specialist)and 2 FOs for first year	No.	-	26	24	30	-	-	-	80	4.68	-	121.68	112.32	140.40	-	-	-	374.40
FPOs formation and registration /a	No.	-	26	24	30	-	-	-	80	3.8	-	98.80	91.20	114.00	-	-	-	304.00
Start up grant for administrative and contingent expenses	No.	-	26	24	30	-	-	-	80	10	-	260.00	240.00	300.00	-	-	-	800.00
Productive investments for FPOs /b	No.	-	-	5	25	40	10	-	80	20	-	-	100.00	500.00	800.00	200.00	-	1,600.00
Business expansion grant	No.	-	-	-	-	10	20	30	60	30	-	-	-	-	300.00	600.00	900.00	1,800.00
Advertising charges	No.										-	5.00	10.00	10.00	-	-	-	25.00
Subtotal											-	844.28	884.72	1,478.40	1,100.00	800.00	900.00	6,007.40
2. Supporting existing farmer producer companies																		
consulting support for business expansion	No.										120.00	240.00	120.00	-	-	-	-	480.00
Business expansion matching grant (75% grant and 25% Ben)	No.	10	20	10	-	-	-	-	40	30	300.00	600.00	300.00	-	-	-	-	1,200.00
Subtotal											420.00	840.00	420.00	-	-	-	-	1,680.00
3. Smart agri-marketing hub /c																		
Gap filling in infrastructure facilities /d	No.										263.25	-	-	-	-	-	-	263.25
Poly pellets (dunnages/crates	No.										18.00	-	-	-	-	-	-	18.00
Modern weighment facilities with electrification /e	No.										72.00	-	-	-	-	-	-	72.00
Cleaning and grading machines	No.										124.35	-	-	-	-	-	-	124.35
Other associated machineries	No.										150.00	-	-	-	-	-	-	150.00
Fork lift machine (moving, staking and loading)	No.										81.00	-	-	-	-	-	-	81.00
Computer, hardware and accessories, price dissemination gadgets	No.										54.00	-	-	-	-	-	-	54.00
App and software development for automated processing	No.										50.00	-	-	-	-	-	-	50.00

ISO certification	No.										6.00	-	-	-	-	-	-	-	6.00
Advertisement charges	No.										30.00	-	-	-	-	-	-	-	30.00
Subtotal											848.60	-	-	-	-	-	-	-	848.60
4. Negotiated warehouse receipt financing																			
Pilot investment in 4 selected godowns	no										170.00	-	-	-	-	-	-	-	170.00
Implementation of successful model for e-Negotiable Warehouse	no										-	300.00	300.00	300.00	-	-	-	-	900.00
Subtotal											170.00	300.00	300.00	300.00	-	-	-	-	1,070.00
Subtotal											1,438.60	1,984.28	1,604.72	1,778.40	1,100.00	800.00	900.00		9,606.00
B. Promoting Enterprises																			
1. Consultancies																			
Agri Business Consultancy Firm	Lumpsum										-	48.00	96.00	96.00	96.00	96.00	-	-	432.00
Hiring of individual consultants/Specialists /f	no										-	20.40	20.40	20.40	25.20	25.20	25.20		136.80
Subtotal											-	68.40	116.40	116.40	121.20	121.20	25.20		568.80
2. Consultancies for Studies																			
Value Chain Analysis	Lumpsum										-	20.00	76.00	-	-	-	-	-	96.00
Virtual marketing research studies and Impact studies /g	Lumpsum										-	-	10.00	10.00	15.00	20.00	20.00		75.00
Study on business model of direct farmers to consumer sales /h	Lumpsum										-	60.00	80.00	-	-	-	-	-	140.00
Advertising charges	Lumpsum										-	50.00	-	-	-	-	-	-	50.00
Subtotal											-	130.00	166.00	10.00	15.00	20.00	20.00		361.00
3. Facilitating PPP Mechanism																			
Interface W'shops/Seminars	no.	1	16	16	16	16	16	-	81	3	3.00	48.00	48.00	48.00	48.00	48.00	-	-	243.00
Preliminary consultative meetings with institutions and private sector	Lumpsum										-	7.00	7.00	7.00	7.00	5.00	-	-	33.00
Dissemination of information and latest technologies	Lumpsum										-	75.00	75.00	50.00	49.20	9.00	-	-	258.20
Subtotal											3.00	130.00	130.00	105.00	104.20	62.00	-	-	534.20
4. Supporting agro entrepreneurs to provide service to farmers																			
Facilitating w'shop (50 person/w'shop)	No.	-	10	10	20	20	-	-	60	0.75	-	7.50	7.50	15.00	15.00	-	-	-	45.00
Training for entrepreneurship (30 person/batch) for 2 days	batch	-	-	5	5	10	10	-	30	1	-	-	5.00	5.00	10.00	10.00	-	-	30.00
Business plan development routed through ABPF	No.	-	-	50	50	100	100	-	300	1	-	-	50.00	50.00	100.00	100.00	-	-	300.00
Credit facilitation and business execution support /i	No.	-	-	50	50	100	100	-	300	1	-	-	50.00	50.00	100.00	100.00	-	-	300.00
Grant for women individual agri-entre. /j	No.	-	5	10	10	15	15	-	55	5	-	25.00	50.00	50.00	75.00	75.00	-	-	275.00
Start up reserve fund for dept. to take u creative model project	lumpsum										-	50.00	75.00	75.00	-	-	-	-	200.00

Subtotal												-	82.50	237.50	245.00	300.00	285.00	-	1,150.00
Subtotal												3.00	410.90	649.90	476.40	540.40	488.20	45.20	2,614.00
C. Institutional Strengthening and Capacity Building																			
1. Capacity Building for Department Offices																			
Training programme for Ag. officers /k	No. of Batches	-	2	2	-	-	-	-	4	6	-		12.00	12.00	-	-	-	-	24.00
Training programme for deputy ag. Officers and Asst. Ag. officers /l	No. of Batches	-	2	2	-	-	-	-	4	6	-		12.00	12.00	-	-	-	-	24.00
Training prog. for joint directors of Ag. and Deputies /m	No. of Batches	-	2	-	-	-	-	-	2	6	-		12.00	-	-	-	-	-	12.00
Exposure visit outside state-successful model for agri. business activities /n	No. of Batches	0.5	-	1	2	2	-	-	5.5	6	3.00		-	6.00	12.00	12.00	-	-	33.00
Exposure visit outside the country to study and learn the agri. business activities /o	No. of Batches	-	1	1	-	-	-	-	2	37.5	-		37.50	37.50	-	-	-	-	75.00
Subtotal												3.00	73.50	67.50	12.00	12.00	-	-	168.00
2. Institutional Strengthening																			
IEC, documentation, studies and Operating costs /p	lumpsum											5.00	20.00	23.00	30.00	10.00	10.00	10.00	108.00
Subtotal												8.00	93.50	90.50	42.00	22.00	10.00	10.00	276.00
Total												1,449.60	2,488.68	2,345.12	2,296.80	1,662.40	1,298.20	955.20	12,496.00

\a Awareness campaign, meetings with CGS

\b Grant basis on the basis of approved business plans. This could include support for investment n processing , grading/sorting, mechanization, storage, packing etc. 80%, 20%farmer contribution

\c next practices for modernization, automating and digitization of regulated markets

\d such as drying yard, pack house, godowns, auction halls

\e including electronic weigh bridge with generator facility)

\f through IAWARM Cell (4 consultants)

\g Beneficiary feedback

\h through mobile interface

\i through service providers routed through ABPF

\j as back ended subsidy through bank on pilot basis (agro. processing , value addition)

\k During 1st and 2nd year on Agri. business, activities, supply chain mgmt and private sector participation in agri business development 12 days with 25 participants/batch

\l during 1st and 2nd year. FPOs and private sector market linkages course. 5 days with 40 participants/batch

\m during 1st year for 5 days, 17 participants/batch

\n In the state 6 days, 20 participants/batch

\o 5 days, 10 participants/batch

\p for IAMWARM Cell, headquarters and district level units

COMPONENT C- PROJECT MANAGEMENT SUPPORT

Components	Physical									Unit Cost (Local Lakh)	Financial Outlay ('000 Lakh)							
	Unit	2017	2018	2019	2020	2021	2022	2023	Total		2017	2018	2019	2020	2021	2022	2023	Total
I. Investment Costs																		
A. Purchase of Equipments, Vehicles	Lumpsum										60.00	20.00	21.00	-	-	-	-	101.00
B. Trainings, Meetings, Advocacy Activities	Lumpsum										25.00	25.00	25.00	25.00	25.00	25.00	25.00	175.00
C. Consultancies (M&E, Internal Audit etc.)	lumpsum										242.00	243.00	243.00	243.00	243.00	243.00	243.00	1,700.00
D. MDPU Salaries/Allowance	Lumpsum										364.00	364.00	364.00	364.00	364.00	364.00	364.00	2,548.00
E. Operating Costs	Lumpsum										25.00	25.00	25.00	25.00	25.00	25.00	25.00	175.00
Total											716.00	677.00	678.00	657.00	657.00	657.00	657.00	4,699.00

Attachment 3.1
Sample WUA Contract for OFD
Water Resources Department

Government of Tamil Nadu
Tamil Nadu Integrated Agriculture Management Project (TNIAMP)

Contract agreement Form for Execution of works by Water Users Associations

Articles of Agreement

This deed of agreement made in the form of agreement on _____ between the Executive Engineer, WRD, (herein after referred to as the "first party") and _____ WUA (name of WUA) (hereinafter referred to as the second party, which expression shall include its successors and representatives) under _____ (name of Competent Authority) under the tank _____ in village _____ of the district _____ in Tamil Nadu to execute the work of "On Farm Development" (hereinafter referred to as work following terms and conditions laid out in this agreement).

Source of Funding: The First Party has received financing from the World Bank which is being used for this contract agreement and the First Party wishes to have the Second Party perform the services hereinafter referred to, and WHEREAS, the Second Party is willing to perform these services

Scope of Work:

Cost of Contract:

The total cost of the works (hereinafter referred to as the "total cost") is Rs. _____ (Rupees)

Disbursement of Funds:

1. The second party shall have a bank account opened in its name to be operated jointly by two WUA Managing Committee members (President and any one of the Territorial Constituency members with a recognized banking institution in Tamil Nadu as stipulated in TNFMIS Act 2000 and shall provide its Bank account details to the first party.

2. The second party shall notify the first party in writing the names and address of those who will operate the Bank account of the Water User Association. Such signatories shall not be changed without the consent of the first party.

3. The works shall be carried out as per the Schedule of Rates _____ (insert specific figures) as agreed by the Water

Resources Department, Government of Tamil Nadu and its Standard Specifications and any other specifications enclosed with this agreement for the items of works agreed rates indicated in the Schedule of Rates and Approximate Quantities (INSERT ANNEX with agreed Schedule of rates)

4. Payment to the second party for the construction work will be released by the first party in the following manner:

    a. Phase 1: Advance (mobilization advance on signing of agreement): 15% of the total cost (to be specified in the legal agreement)
    b. Phase 2: Execution of works (valued at 75% of advance): 50% of the total cost
    c. Phase 3: Completion of total work: 25% balance of the total cost

5. Payment at Phase 2 and Phase 3 will be made by the first party as per actual value of works executed with certification by the concerned Competent Authority WRD.

This verification will be based on measurement and check measurement of the progress and completion of the works as agreed upon in this works contract and as per the departmental procedures.

Completion Time:

The works are to be completed in six months from the date of commencement of this agreement. In exceptional circumstances, the time period stated in this clause may be extended in writing by mutual consent of both the parties.

Maintenance of Accounts:

The second party shall maintain separate accounts for all the expenditures incurred out of the payments made for the execution of the works. Such account shall be available for the inspection from time to time by the first party or its authorized representatives.

In the event of any misuse of funds, the first party shall have the right to freeze the bank account of the second party after such inquiry as may be deemed necessary.

Inspections and Auditing:

The Second Party shall permit, and shall cause its Sub-Consultants to permit, the Bank and/or persons or auditors appointed by the Bank to inspect and/or audit its accounts and records and other documents relating to the submission of the Proposal to provide the Services and execution of the contract agreement. Any failure to comply with this obligation may constitute a prohibited practice subject to termination of this agreement and/or the imposition of sanctions by the Bank (including without limitation a determination of ineligibility) in accordance with prevailing Bank's sanctions procedures.

Confidentiality:

The Second Party shall not, during the term of this contract agreement and within two years after its expiration, disclose any proprietary or confidential information relating to the Services, this agreement or the First Party's business or operations without the prior written consent of the First Party.

Duties and responsibilities of the First Party:

1. The first party shall be responsible for providing regular and frequent supervision and guidance to the second party for carrying out the works as per specifications agreed upon in this contract. This will include written guidelines and regular site visits of the authorized personnel of the first party, for checking quality of material, construction, and technical guidance as per the norms agreed.

2. The first party shall supply drawings, specifications and guidelines to second party for the proposed works.
3. The Competent Authority shall hold a meeting once in a month preferably during the WUA Managing Committee meeting, where in the second party will submit the latest information including progress report due to be counter-signed by the President of the WUA. The WUA President and the Works Sub-Committee can jointly inspect the site along with the first party representatives on a designated day to assess the progress of the works.
4. The first party shall have the right to instruct to stop or suspend the construction at any stage if there is any deviation from the specification or violation of any of the terms of this Agreement.

Duties and Responsibilities of the Second Party:

1. The second party shall:

a. take up the works, advance payments and ensure completion of agreed works within the time period agreed in this contract;
b. employ suitable skilled persons to carry out the works;
c. make payments to the hired laborers as per the schedule of rates and for different items of work;
d. ensure that all materials required and procured for the works are of good quality (with ISI certification mark for the manufactured items where feasible and available);
e. regularly supervise and monitor the work and reporting of progress using the ICT applications ;
f. adhere to the technical specification and abide by the instructions/directions of the first party and its representatives regarding execution of work.
g. be responsible for bringing any discrepancy to the notice of the representative of the first party as it is noticed by the second party;
h. ensure that the work is carried out in accordance with specifications, drawings, and also within the total sanctioned amount without any cost escalation;
i. keep the Works Sub-Committee and general body of the WUA are informed of the progress of the works then and there;
j. ensure that there is no misuse of the money and materials during construction;
k. Ensure full compliance of the conditions of the comprehensive insurance policy against loss of materials/cash/workman compensation. WORK out details of insurance policy and terms of the premium to be paid by second and first party;
l. Pay all duties, taxes, and other fees levied payable by construction agencies as per law under the contract (first party will deduct taxes at source as applicable under law in respect of such taxes).

Dispute Settlement:

If any dispute arises between the two parties, relating to any aspects of this Agreement, the parties shall attempt to settle the dispute through mutual and amicable consultation. If the dispute is not settled by means of mutual consultation, the matter maybe referred to the concerned Superintending Engineer, WRD.

Termination:

(i). The First Party may terminate this contract agreement with at least ten (10) working days prior written notice to the Second Party after the occurrence of any of the events specified in paragraphs (a) through (d) of this Clause:

a. If the Second Party does not remedy a failure in the performance of its obligations under the contract agreement within seven (7) working days after being notified, or within any further period as the First Party may have subsequently approved in writing;

b. If the Second Party finds it necessary to cancel the assignment and/ or shorten or extend its duration or becomes insolvent or bankrupt;
c. If the Second Party, in the judgment of the First Party or the Bank, has engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices (as defined in the prevailing Bank's sanctions procedures) in securing or in executing the contract agreement.
d. If the First Party, in its sole discretion and for any reason whatsoever, decides to terminate this agreement.

(ii). In the event of termination, the Second Party shall refund to the First Party, all payments made for providing remaining part of activities and the Second Party shall provide the First Party any reports or parts thereof, any other information and document gathered under this agreement prior to the date of termination.

Annexures:

Annexure - l: Terms of Reference and Scope of Services
Annexure - ll: Reporting Obligations of the Second Party
Annexure - lll[2]: Cost Estimate of Services, Second Party's Personnel and Schedule of Rates
OR Annexure – III: Second Party's Personnel and corresponding Unit Rates

Signatories to Agreement:

Executive Engineer, WRD	WUA President
1. Witness	1.Witness
2. Witness	2Witness.

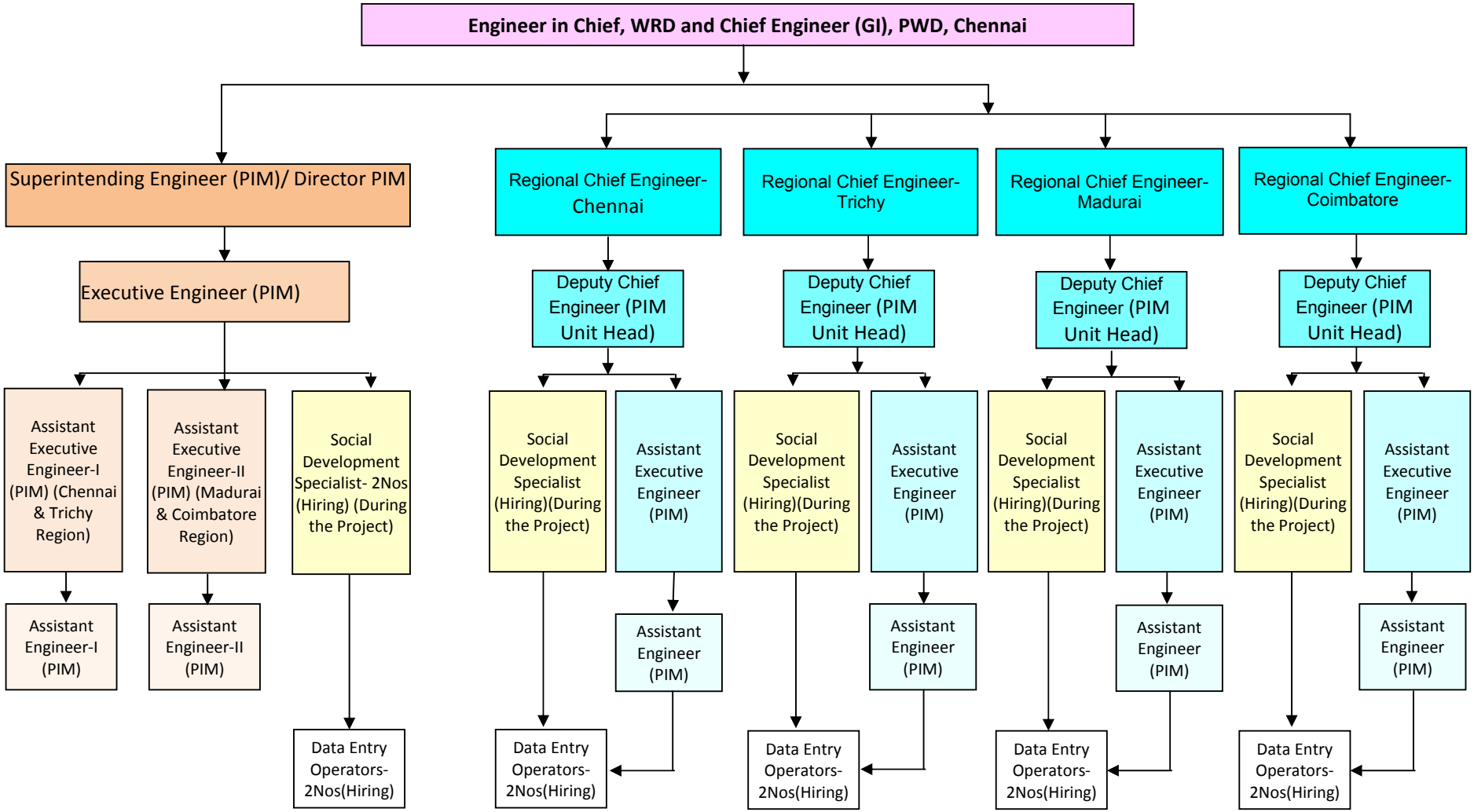
Annex 1: Schedule of quantity for the work "_____" to _____ tank under _____TNIAMP_____ (name of WUA)

Sl.No.	Name of item & Description of Item	Unit	Quantity	Rate in figure	Rate in words	Amount
1	2	3	4	5	6	7

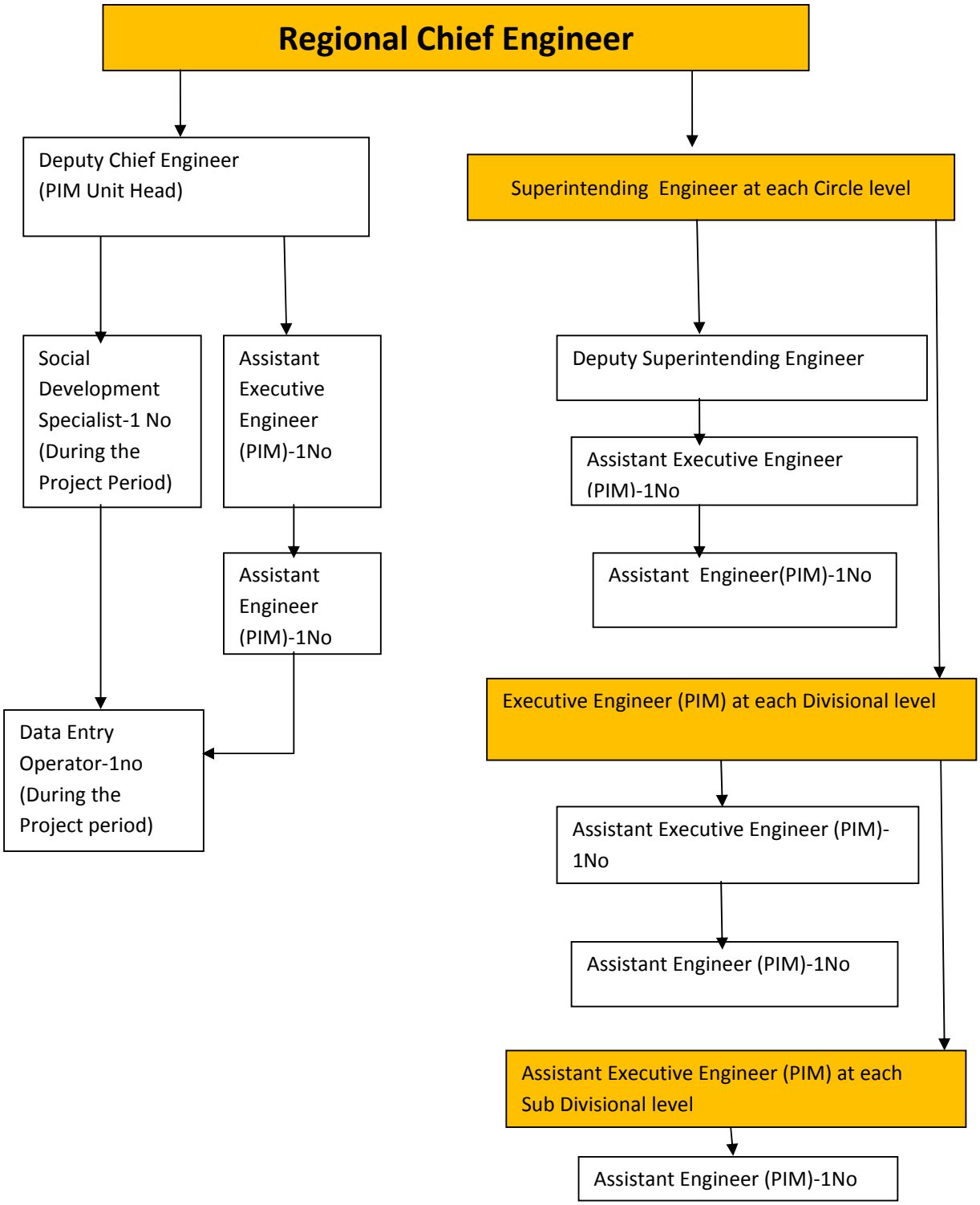
[2] Select one of the two Annexure III and delete the other.
'Annexure – III: Cost Estimate of Services, Second Party's Personnel and Schedule of Rates' is for use in case of assignments where payments to the Second Party are Time based; and
'Annexure – III: Second Party's Personnel and corresponding Unit Rates' is for use in case of assignments where payments to the Second Party are made on Lump sum basis.

Attachment 3.2

Organogram of WRD PIM Wing



Regional PIM Wing



Attachment 3.3.

Roles and Responsibilities of Staff within PIM Wing

Position	Job Description
The Social Development Specialist in EIC,WRD office for Social safe Guard & Gender Activities	• To help line Department to set up and manage multilevel citizen engagement and beneficially feedback mechanism including 'Grievance Redressal Mechanisms'. • Prepare a strategy and action plan for gender equality and social inclusion • To facilitate horizontal integration, vertical change movement including preparation of multilevel structures and process so that the members of community based organizations, interest groups become active members of movement for social change • To plan and organize capacity building training programs for members of community based organizations, interest groups, etc that would include skills aspects of organizations, such as open and transparent process of decision making , record keeping, monitoring and evaluation of activities, out come and impact based specifically designed training Modules • To ensure social safe guards compliance in accordance with ESMF. • To set up and manage database of networking community based organizations and interest groups. • The database among others, would include cross cutting membership, social patterns of membership, access to project, benefits and services and access to other government schemes and services • Document typical case studies of importance as directed by the Director(PIM Wing) • Receive and analyze reports from Regions on Social safeguards and gender issues • To provide Capacity Building training to WUAs, competent Authorities and others as directed by the Director, PIM Wing. • To collect reports from Regional Social Development Specialist regarding Social Development Specialist and other issues collate it and submit the reports to the Director, PIM Wing.
Social Development Specialist (PIM) at the state level in Engineer-in-Chief,WRD & CE(GI) office	• To assist the PIM Wing in coordinating, communicating and monitoring the four Regional PIM units in respect of the discharge of their roles and responsibilities by the respective Nodal Officers and Competent Authorities as envisaged in the TNFMIS ACT 2000. • Conduct monthly visits to each of the four Regional PIM units to oversee their activities and provide supervision and guidance to the PIM units in respect of capacity Building activities to WUAs. • To assist the PIM wing in extending all assistance to WUAs in the implementation of PIM as envisaged in the TNFMIS ACT 2000. • To assist the PIM wing in overseeing the process of conducting elections of WUAs throughout the project area in accordance with the provisions of the TNFMIS ACT 2000. • To assist the PIM Wing in supervising and monitoring the Capacity Building activities to WUAs by the peer trainers • To assist the PIM wing in preparing and finalizing performance indicators for assessment of WUAs • To assist the PIM wing in overseeing an immediate WUA performance assessment exercise, monitoring the implementation of the survey at the Regional levels, gathering of data from all of the Regional units, analysis of results and scoring of WUAs at the state level, this exercise is then to be

	subsequently conducted once a year. • To assist the PIM wing in collecting, collating and analyzing Quarterly reports from PIM units in each of the Regions • Based on the results of the status and performance assessment reports, assist the PIM wing in identifying the key challenges in the performance of WUAs in respect of their functioning and implementing corrective action. • To assist the PIM wing in overseeing the trainings conducted for Competent Authorities, PIM WRD staff, support staff like MTS and FOS and Peer Trainers and reporting on the status and quality of trainings to the state-level PIM cell including assisting the PIM wing in suggesting new training programs and exposure visits. • Provide support to the state PIM wing in overseeing the process of carrying out social audits of WUAs. • Develop a WUA database pertaining to WUAs formed in the project with demographic, organizational, operational details and performance grading of the WUAs. • Documentation of Case Studies to highlight the best practices and issues arising out of WUAs functioning. • Supervise and monitor the development of WUA charters by liaising with the regional PIM units including Competent Authorities • Supervise and monitor and guide the functions and activities of the four Regional social development specialist assigned to each of the Regional PIM units.
Social Development Specialists at the Regional level	• To assist the Regional PIM Wing in extending all assistance to all of the WUAs in the Region in the implementation of PIM as envisaged by TNFMIS ACT 2000. • To assist the Regional PIM Wing in overseeing the process of conducting elections of WUAs in that region. • To assist the PIM Unit in supervising and monitoring the Capacity Building activities conducted by Peer Trainers. • To execute an immediate WUA performance assessment exercise in coordination with the regional Competent Authorities and ensure all data are compiled and scoring completed at the regional level and sent to the state level PIM Wing Social Development Specialist. • To assist the Regional MTS and FOs in the region to conduct two-day and one-day field training exercises for WUAs, to ensure adequate resources persons are available for consisting trainings and to monitor high quality of training provided to WUAs by the MTS & FOs. • To collect data, draft, prepare a Quarterly report of PIM activities within that region and submit to the Social Development Specialist and the PIM wing at the state level • To collect and setup database with all the information about the demographic and other details, etc. about the WUAs in the region and provide the data to the social scientist at the state level PIM wing. • To identify the key challenges in the performance of WUAs with respect to their overall functioning and quality and developing region-specific solutions that can address the challenges • To assist the Regional PIM units in overseeing and monitoring performance of MTS & FOs, and evaluate them through quarterly, monthly and annual reports submitted by them. • Provide support to the Regional PIM units in overseeing the process of carrying out social audits of WUAs in that region and other Participatory Rural Appraisal (PRA) exercises so that the WUAS can function effectively.

	• To supervise and monitor the preparation of WUA charters for WUAs in the region. • To guide and assist the Regional PIM unit to develop methods for effective conflict management, grievance redress at the village level amongst farmers of WUAs in the Region. • To collect details of performance of field staff from the Competent Authorities and report monthly to the State level PIM wing Social Development specialist. • To collect details on social development and gender equality issues pertaining to the project and submit it to the Social Development Specialist(PIM) at EIC office periodically as directed by the Regional PIM Unit head , Deputy Chief Engineer(WRD).
Data specialists	JOB DESCRIPTION
Data Entry Operators for PIM Activities for EIC,WRD Office	• To create a data base of PIM related data pertaining to the Region so as to enable processing, analyzing and retrieving as and when required for office use. • To create a data base about Irrigation systems under the control of the Regional along with the particulars of Ayacut area, location, etc. • Prescribed in Form I of TNFMIS Act 2000 including Hydraulic particulars. • To create a data base about in Water Users Association along with the particulars of name of Water Users Association, Village, Extent of hectares, name of source as prescribed in Form II of TNFMIS Act 2,000. • To create a data base about the Distributary Committee with the particulars of Distributary committee, jurisdiction, extent in the names of Water user Association etc. as prescribed in Form III of TNFMIS Act 2000 if any. • To create a data base about the Project Committee with the particulars of Project committee, its jurisdiction extent in the names of Distributary committees Water user Association etc. as prescribed in Form III of TNFMIS Act 2000 if any. • To create a data base of Land Holders list with the extent of area, survey no. Village name etc., as prescribed in the Form V of TNFMIS Act 2000 • To create a data base of votes list Village name, extent of area etc ., as prescribed in Form VA. • To create a data base of managing committee viz. President and TC members of each Water User's Associations along with their Residence Address, Phone No etc. • To create a data base of Sub committees on (1) Finance and Finance Resources 2) Works (3) Water Management (4) Training and Monitoring and along with the name & Address of convener and other members. • To create a data base on inventory of each WUAs such as No. of tanks No. of open wells, no. of bore wells, No. of sluice, etc., • To create a data base on particulars of hydraulic particular of structures, including details of canals with their hydraulic particulars, • To create a data base of Assets such as Land, • Buildings, Machineries of each WUA, Distributary committee and Project Committee. • To create a data base of WUA hydraulic boundary maps cremating the boundary of each Territorial contributory members of each WUA, . • The entire Data base should be stored in a comprehensive manner and compatible for import and export from MS Office and Vice versa for the purpose of quarrying Data analysis and Data retrieving preferable in Oracle /SQL Server.

	• Regional Data Entry Operators should co-ordinate with the Data Entry Operator in PIM Wing, Chennai in all PIM data activities
Data Entry Operators for Regional CE Office	• All the above data in the Regional PIM Wings to be received from Regional PIM Unit and to the compile and Stored in a comprehensive manner at PIM Wing, Chennai preferable in Oracle / SQL Server . • To assist in Preparation of Estimates to conduct election to WUAs, create awareness capacity Building etc., as directed by the PIMWING/Social Development specialist at PIM Cell. • Co-ordinate with the Data Entry Operator from Regional PIM Units in preparation of detailed State vide data base on PIM activities as and when required. • To create a GIS based data base using ARCGIS • Upload the data at PIM activities in internet and Intranet as and when required. • Compile the data on scores of the set up indicators and scoring matrix for accessing WUAs performance from the Regional PIM Units with the help of Social Development Specialist at PIM Wing, Chennai. • To assist in Preparation of guidelines, score cards, bench marking etc., for training viz., mobilization and training specialist along with the field organizers. • Any other activity as directed by the PIM Cell related to PIM activities • All the above data in the regional PIM Wing as to be received from Regional PIM Unit and to the compile and Stored in a comprehensive manner at PIM Wing, Chennai preferable in Oracle / SQL Server • To create database among others, would include cross cutting membership, social patterns of membership etc.,

Qualification and Experience

Sl. No.	Position	Eligibility Criteria
1	**Social Development Specialist in E-in-C,WRD office for PIM Activities and Social Development Specialist in E-inC, WRD office for Social Safe Guard & Gender Activities**	• Preferably Doctorate degree in Social Science. • Post graduate in social work, Sociology and Rural development and Rural Economics with minimum of 10 years' experience in Rural Development / Rural Community Development work. ♦ Experience in Participatory Irrigation / Development work in World Bank assisted programs is a preferred one.
2	**Social Development Specialist** at the Regional Levels (one person for each region)	♦ Post Graduate in Social work sociology and Rural Development with specialization in Rural Community Development and with minimum of 5 years' experience. ♦ Previous experience in Social / Community oriented activities. ♦ Experience in the similar assignments (especially in Irrigation / Water Resources sector) is preferable.
3	**Data Entry Operators for PIM Activities**	• Candidate should have completed +2 / any Degree with adequate Computer knowledge (MS office, Excel, database etc.).

Attachment 3.4.

Job descriptions for Mobilization and Training Specialists and Field Organizers

Position	Job Description
Mobilization & Training Specialist (MTS)	• To Familiarize with the project. • To Collect all the relevant documents related to the WUAs, maps, TNFMIS ACT 2000 & Rules etc., • To identify key issues (homogeneity of community, gender issues, power relation) and development of vision for each WUA. • Attend Four-day in-depth Orientation training to obtain knowledge about roles and responsibilities together with all field organizers and competent authorities and obtain relevant manuals on PIM training particularly on Water management and O&M practices. • To identify the potential persons to become peer trainers from the WUAs, leading farmers, retired Government servants etc., for giving Capacity Building to WUAs in the peer training Model. • To develop plan and schedule for conducting Peer Trainings to WUAs in coordination with the WUA development team over a period of 36 months (3 years). • To Coordinate and finalize training plan in conjunction with Regional Social Development Specialist, and the Competent Authorities. • To Organize and facilitate the Peer Trainers for conducting 48 Trainings over a period of 3 years in conjunction with WUA development team and the Competent Authorities. • To ensure printing and distribution of essential training materials to the WUAs during the training sessions. • To provide feedback and monitoring results from training sessions to Competent Authority and Regional Social Development Specialist for effective monitoring. • To Conduct WUA assessment and scoring exercise ofthe WUAs in conjunction with WUA development team. • To prepare, analyze and provide results and data from assessment exercise to Regional Social Development Specialist at the PIM unit. • To obtain inputs from Regional Social Development Specialist in developing plan to improve performance of low scoring WUAs. • To ensure performance of WUAs against following five key areas: · General management · Financial management · Water management and maintenance · Asset management and maintenance · Conflict management and dispute resolution · Operation and Maintenance of the Systems • To Build Capacity of the WUAs to organize managing committee meetings, general body meetings, and sub-committee meetings and mobilize the members to maintain records, office up-keep etc., • To build linkages with WRD and other line department Officials so as to benefit the WUAs in getting department specific assistance through SWIK Centers. • To assist all of the field organizers in carrying out on-the-ground capacity building activities on a daily basis • To Monitor and provide supervision for the work of the field organizer in his/her area to ensure good performance of WUAs. • To provide monthly report of all WUA support activities, performance of field organizers, results from training activities to the appointed Competent Authority and Regional Social Development Specialist. • To Identify good practices of the WUAs under the command of the WUA development team and share these practices among the WUAs. • To assist the Regional Social Development Specialists in conducting Social safe guard and gender related activities and collect reports regarding Social, Gender and other issues related to Irrigation Management.
Field Organizers (FOs)	• To assist in carrying out the WUA capacity building activities in their areas and ensure participation of WUA members. • To Familiarise and understand the topography of the area. • To identify the socio-economic and other issues in the area. • To assist in identifying the potential persons in the village to become the Peer trainers from the WUAs, leading farmers, opinion makers, retired Government servants etc., for giving capacity building

Position	Job Description
	to WUAs. • To assist the eligible farmers to become a Water User of the association by updating the Revenue records. • To create awareness amongst the water users to take part in all the activities of WUA. • To assist in updating the details of WUA members now and then. • To assist in developing plan and schedule for conducting training programs. • To Coordinate and finalize training plan in conjunction with MTS and Regional social development specialist. • To assist in organizing and conducting the peer Trainings @ 48 Trainings over a period of 3 years in conjunction with WUA development team. • To distribute essential training materials to all the WUAs during the training sessions. • To assist in getting the feedback and monitoring results from training sessions. • To assist in conducting WUA assessment and scoring exercise for WUAs. • To ensure farmers getting benefits from SWIKC centers. • To motivate the office bearers of WUA to attend the Training programmes and make them to Effectively participate in the deliberations. To Assist the WUAs in Forming Sub-Committees. • To motivate and assist the WUAs in convening the meetings regularly. • To assist the WUAS in opening Joint Account and to maintain various records. • To build the capacity of the WUAs to sustain the activities • To collect reports regarding Social, Gender and other issues related to Social activities. • To assist women participation in election & PIM activities and also collecting such information • To collect the data of networking community based organization & interest group.

B. Eligibility Criteria and Experience

Sl. No.	Position	Area of Specific Expertise required	Eligibility Criteria
1	Field Organizers (FO)	Community Mobilization and rapport building with both farmers and officials Experience in working with the Community. Well acquainted with the WUA areas and have a very good knowledge about the socio-economic and rural development related issues.	• Candidates who have studied up to plus two level • Work Experience in similar assignments (especially in Irrigation/Water Resources sector) is most preferable. • Local person from the respective village& fulfilling the Eligibility criteria is preferable.
2	Mobilization & Training Specialist	Person who has expertise in implementing Capacity Building programs with proven communication and co-ordination, skills, knowledge on participatory approaches. Expertise in designing of training modules and programming preferable.	♦ Post Graduate in Social work/ with Specification in Rural Community Development and with minimum of 1 year Experience. ♦ Experience in similar assignments (especially in Irrigation/Water Resources sector) is preferable. ♦ Proficiency in Tamil is required.

Attachment 4.1
Detailed Guidelines for Organizing and Monitoring On-farm Demonstrations

On-farm demonstrations will be the main vehicle for dissemination of improved technologies in project sub-basins and tanks under TNIAMP and large number of demonstrations will be organized on the identified crops, vegetables and fruits. The focus of demonstrations will be on increasing the production and productivity of those varieties and types of commodities which are demanded by the market and for wider dissemination of high payoff interventions. Although the demonstrations will be organized on the plots of a small number of farmers, the objective of demonstrations is to disseminate improved technologies and practices to large number of farmers in the village/tank command area. As a thumb rule, in addition to the demonstration farmer a group of about 20-30 farmers should be identified and involved in the training sessions (about 3-4) organized at the demonstration site.

Careful attention will be paid to the following aspects while planning, organizing and evaluating the demonstrations:

Focus on high payoff and climate risk resilience enhancing interventions:

The demonstrations will follow the integrated crop management approach from land preparation to harvesting of the crop, giving special attention to high payoff interventions like the following:

- Identification of climate risk resilience agricultural practices appropriate for project sub-basins (e.g. promotion of crops and varieties for minimizing production risks, and climate smart crop husbandry and water management practices for optimizing land and water productivity, improving soil quality and mitigating short term climate change risks), and demonstrating these on farmers' fields.
- Use of good quality seed of improved variety/hybrid which is suitable/recommended for cultivation in the area and is demanded by the market..
- Use of soil test based dose of fertilizer (including need based application micro nutrients like zinc for paddy and maize, and sulfur for mustard) and proper method and stage of fertilizer application, including Integrated Soil Fertility Management using organic manures, bio-fertilizers and chemical fertilizers.
- Recommended seed rate and optimum time of sowing to ensure proper plant population.
- Sowing/planting of crops in lines.
- Pest, disease and weed management including integrated pest management practices.
- Need based irrigation of winter crops like maize, pulses and mustard at critical stage of crop growth.
- Low cost techniques of raising disease free vegetable seedlings.
- Carrying out all crop husbandry practices from land preparation to harvesting of the crop at optimum stage to obtain highest productivity gains.
- Farm level cleaning, drying, grading and storage of agricultural produce. This list is only indicative and should be modified to suit local agro-climatic conditions, production and marketing opportunities. The emphasis should be on 4-5 critical interventions in a demonstration which have high payoffs rather than thinly spreading resources by going for too many interventions in a single demonstration. Selection of farmer on whose land demonstration will be organized:
- A progressive farmer from the community should be selected. It should be ensured that he has the capability and resources to follow the instructions provided by the experts in a timely and complete manner.
- He should also be capable of and must agree to disseminate the demonstrated technologies to fellow farmers in the village(s) and the adjoining areas.
- He must provide labor for carrying out all operations for preparation of land, adoption of complete package practices (sowing, fertilizer application, water management, pest and weed management, etc) up to harvesting and marketing of the crop in a timely manner.

- He must use all the inputs provided by the project (like seed, fertilizer, IPM, etc.) for the demonstration plot only, and should neither sell these nor divert their use on his other land.
- In case of self-pollinated crop demonstrations, he should agree to sell/exchange the seed produced from the demonstration plot to other farmers in the village/adjoining villages on the terms decided by the project staff. This may include the prevalent rate in the village plus small additional amount in view of the good quality of the new variety promoted in the demonstration.
- He must grow a small control plot by following the farmer's practice in the area. This is required for comparison of results with the improved package of practices followed in the demonstration plot.
- He should preferably be a small or marginal farmer.
- Different farmers should be selected for different demonstrations, ensuring that the project benefits do not go only to a few farmers.
- He must own the land for organizing the demonstration which meets the following site selection criteria.

Criteria for selection of demonstration site:

- The plot selected for the demonstration should preferably be on the road side or main path used by villagers and should be easily accessible. This is necessary for organizing trainings and field days at the demonstration site as well as for showing the benefits to the farmers who pass by the demonstration site.
- The soil type of the selected plot should be representative of the area, including head, middle and tail regions of the command area.
- The exact area of the demonstration plot should be known and should have boundary bunds.
- The plot should be leveled and should have access to irrigation water.

The project staff should ensure that the above criteria are followed while selecting the farmer for organizing the demonstration. The wider village community should be informed about the name of the farmer selected for organizing the demonstration, and it should be done at least two months before the sowing time so that there is adequate time to complete the preparatory work, including the completion of soil test report.

Ensure timely supply of inputs for the demonstration:

- All off-farm inputs (like seed, planting material, fertilizer, etc.) to be provided by the project should be procured well in advance and delivered at the demonstration site about two weeks before the sowing time.
- If the demonstration involves development of any farm structures and use of pipes, micro-irrigation structures, etc. these should be procured and installed well in advance so that sowing of the crop is not delayed due to delay in completion of these works.

Organizing the demonstration:

Although the specific details will be determined by the nature of the demonstration and will vary from one demonstration to another, the following aspects should be given adequate attention for organizing good field crop demonstrations:

- Although the demonstration is organized on the land of one farmer, the larger village community should be informed that it is being organized to disseminate improved technologies and practices to a large number of famers in the village so that they are able adopt them in the following years and increase their productivity and income.
- The treatments in the demonstration should be kept simple – one small control plot showing farmers' prevalent practice for growing that particular crop, fodder, vegetable, fruit, etc in the area, and the rest of the plot should have the complete integrated crop

management technology including improved seed, recommended fertilizer dose, irrigation/rainwater management, weed control, pest management, etc. Special attention should be given include critical inputs and management practices which have high payoff but are generally not used by the farmers in the area.

- 3-4 training sessions should be organized at the demonstration site probably around the sowing time and other stages of the crop to educate the farmers about all the critical inputs and practices which are to be followed for obtaining the highest yield. These trainings should be given wide publicity in advance to ensure that large numbers of farmers participate. Simple brochures or handouts (in local language) listing key practices and operations should be distributed to the all the participating famers.
- Special attention should be given to ensure proper plant population and line sowing since one of the main reasons for low productivity is poor plant population.
- Soil of the demonstration plot should be tested well in advance so that soil test based application of fertilizers is done.
- All operations in the demonstration plot should be done at the optimum stage of the crop to obtain optimum yield.
- All other precautions and steps should be taken so as to demonstrate that the crop in the demonstration plot is visibly much better than the farmer's practice control.
- At maturity, the crop should be harvested and the yield of the control plot compared with the demonstration plot for quantifying increase in productivity and additional income obtained as a result of adoption of the improved technology demonstrated.

Organize a field day at the demonstration site:

- It should always be kept in mind that an on-farm demonstration is a powerful tool to demonstrate the benefits of improved technologies to the farmers and not an end in itself. The objective should be to use the on-farm demonstrations for disseminating improved technologies to large number of farmers in the tank villages and not only a physical target for completing certain number of demonstrations.
- As seeing is believing, a field day should be organized at the site of demonstration for showing the benefits of adopting the improved technologies to the farmers. This should be done at a stage when marked differences in crop condition and expected yield between the demonstration plot and the control plot are clearly visible. Normally the appropriate time for organizing the field day is shortly before the harvesting of the crop.
- The date of the field day should be decided well in advance and this should be given wide publicity in the tank village (s) and the adjoining villages.
- Steps should also be taken to ensure participation of staff from the concerned line departments like agriculture, horticulture, animal husbandry, KVK.
- Traders of the area who procure the demonstration commodity from the farmers should also be invited to the field day.
- Steps should be taken to ensure that large number of farmers attend the field day.
- On the field day the famers should be shown the control and demonstration plots and encouraged to discuss the likely benefits from the demonstrated technologies. A training session should be organized by the project staff to educate the farmers about what has been done in the demonstration plot which is different from the practice normally followed by them; when was it done, how and why; what are the likely benefits; etc. Relevant brochures and handouts should also be distributed to the farmers on the field day. Special attention should be given to educate the farmers about the critical inputs, operations and practices which they should follow to obtain highest productivity levels. In addition to short lectures covering specific aspects by the subject matter specialists, famers should given free time to ask questions so that it is more of an interactive and question answer session rather than a lecture by an expert.

- Special attention should be given to ask the farmers if they would like to adopt the demonstrated technologies on their farmers in the next crop season, where from they can obtain various inputs like seed, fertilizer, plant protection and weed control materials, how they should carry out all the operations at the optimum stage of the crop, wherefrom they should obtain technical guidance, what are the difficulties they are likely to face in procuring the required inputs and adopting the improved practices, and how these can be addressed.
- Since seed is a critical input and acts as a catalyst in the adoption of other practices, in case of self pollinated crops some arrangements should be made to distribute the seed of the demonstration plot to other farmers in the village/adjoining villages on payment of agreed price.
- The date of crop cutting, which will take place sometime after the field day, should be announced in the field day. The farmers should be invited to come on that day so that they can actually see the increase in productivity as a result of adoption of improved technologies demonstrated in the plot.

Facilitating adoption of the demonstrated technologies by large number of farmers:

The objective of the demonstrations is achieved only if large numbers of farmers in the villages adopt the critical demonstrated technologies on their fields in the years following the crop season in which the demonstration is organized. In order to accomplish this, the famers should be encouraged to achieve this by organizing meetings in the village before the sowing season of the crop in the following year (s). Technical guidance and support should be provided to enable the farmers to acquire the required inputs by tapping into the ongoing schemes funded by Govt. of India and the GoTN, like Rashtrya Krishi Vikas Yojana, National Food Security Mission, Horticulture Mission, State Extension Reforms scheme, etc. Linkages should also be established with the TN state line departments of Agriculture and Horticulture, for achieving large scale adoption of the demonstrated technologies by the farmers. Based on the response, an enhanced target for the subsequent years may be fixed. In order to promote continuity, demonstrations should be organized in the same village or adjoining villages in the following years on the land of a different farmer.

Evaluating success of demonstrations:

The success of a demonstration should be assessed at two levels – First in terms of how well the demonstration was organized to cover all the above steps and the level of gain in productivity in the demonstration plot vis-à-vis farmer practice in the area; and Second in terms of adoption rates of the demonstrated technologies by the farmers in the project villages during the years following the year in which the demonstration was organized and the gains in productivity achieved by the farmers on their fields.

or measuring the adoption rates in the following years, the following three parameters should be monitored:

- Number of farmers adopting new technologies. It is likely that most of the farmers may not adopt all the practices due to various constraints. Efforts should be made to facilitate adoption of critical practices which will result in substantial gains in productivity.
- Area over which the new technologies have been adopted
- Gains in productivity achieved by the farmers

The focus of the demonstrations should be on maximizing these three parameters. Obviously the gains in productivity levels achieved by the adopter farmers in most cases will be lower than those achieved in the on-farm demonstration plot per se, but these are an excellent indicator of the real success of on-farm demonstration because these benefits will accrue to large number of farmers (and will not be confined only to the direct beneficiary who received input support from the project) in the project area. These benefits will also be sustainable because the farmers will continue to use these improved practices. This will also

substantially increase the number of households benefitting from the project, lower the cost per household, and improve the rate of return to investments under this component.

The O.K. card given on next page should be completed and duly signed by all concerned and kept for record.

O.K. CARD FOR ON-FARM DEMONSTRATIONS:

1. Nature of demonstrations (crop, variety and theme):
2. Implementing agency and names of the responsible extension worker and officer:
3. Name of farmer:
4. Name of extension worker responsible for organizing the demonstration:
5. Name of support organization and its agriculture expert, if applicable:
6. Name of village:
7. Name of tank, sub-basin and district:
8. Details of organizing demonstration and related activities:

Sr. No.	Activity	Completion Date
1.	Selection of farmer	
2.	Organization of related training sessions for farmers in the village: • Land preparation, critical inputs, and how these are to be procured, sowing, water management, fertilizer application, etc. • Practices like weed control, pest disease and nutrient management, etc. during crop growth	
3.	Supply of inputs for the project (must include seed, soil-test based fertilizer dose)	
4.	Sowing of crop	
5.	Fertilizer application	
6.	Field day	
7.	Crop cutting	

9. Assessment of key activities:

Sl. No.	Activity	Yes	No
1.	Was the demonstration on a roadside/easily accessible plot?		
2.	Were the inputs supplied before the recommended sowing time?		
3.	Was foundation/certified seed supplied by the project?		
4.	Were 2-3 training sessions organized in which at least 20 farmers participated?		
5.	Was a field day organized at the demonstration site in which at least 50 farmers from the adjoining villages/WUAs participated?		
6.	Did the demonstration have a control plot showing the practices normally followed by the farmers in the area?		
7.	Was the cropping cutting for recording yield done by following the prescribed procedure?		

10. What were the yields (Q/ha) in the control and demonstration plots?

    Control:
    Demonstration:

11. What is the average yield (Q/ha) of the demonstration crop in the village?
12. What are the main requirements of the farmers for adoption of the technologies demonstrated?

Signature: _____ _____ _____

Name: _____ _____ _____

Date signed: _____ _____ _____

Asst, Agricultural Officer / Agricultural Officer / WUA Representative / Asst. Director of Agriculture

Attachment 4.2 Cost norms to be followed in Demonstrations

1. SRI Crop Demonstration:

a) Green Manure

Sl. No	*Particulars*	Unit Cost (Rs. /Kg)	Amount (Rs.)
1	Seed cost with seed treatment components - 40 Kg / Ha	50	2,000
	Total		**Rs.2,000**

b) SRI [Paddy]

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Cost of Soil testing	20	20
2	Seed cost with seed treatment components - 8 Kg / Ha	150	1,200
3	Cost of nursery raising and Bio-fertilizers		600
4	Cost of fertilizers (150:50:50 Kg NPK / Ha)		
	Urea - 330 Kg	6	1,980
	Single Super Phosphate - 315 Kg	9	2,835
	Muriate of Potash – 80 Kg	16	1,280
	$ZnSO_4$ 25 Kg	50	1,250
5	IPM - Plant protection charges	1,000	1,000
	Total	**Rs. 10,165 (Assistance Restricted to) Rs. 6,000**	

c) Rice Fallow Pulses

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Seed cost with seed treatment components - 20 Kg / Ha	120	2,400
2	DAP 20 Kg / Ha @ Rs.25 / Kg	25	500
	Total	**Rs. 2,900 (Restricted to) Rs.2,000**	
	Total Cost	**Rs. 15,065(Assistance Restricted to) Rs.10,000**	

2 **Maize**

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Cost of Soil testing	20	20
2	Hybrid seed cost with seed treating components - 15 Kg / Ha	320	4,800
3	Cost of fertilizers (150:75:75 Kg / NPK / Ha)		1,980
4	Cost of bio fertilizer- *Azospirillum*&*Phospho bacteria* @ 10 Nos. each	10	200
5	IPM - Plant protection charges	1,000	1,000
	Total Cost	**Rs. 8,000 (Assistance Restricted to) Rs.5,000**	

3. Ragi (Finger Millet)

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Cost of soil testing	20	20
2	Seed cost with seed treating components 5kgs	75	375
3	Fertilizer cost - (60:30:30 kg N P K ha^{-1})		
	a) Urea -130 kg	6	780
	b) Super phosphate-188 kg	9	1,692
	c) Muriate of potash-50 kg	16	800
4	Foliar application of nutrients 2 % DAP-10 kg	25	250
5	Bio-fertilizer-10 packet	20	200
6	IPM - Plant protection charges	1,000	1,000
	Total Cost	**Rs.5,117 (Assistance Restricted to) Rs.5,000**	

4. Minor Millets:

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Cost of Soil testing	20	20
2	Seed cost with seed treating components 12.5 kgs	85	1,063
3	Fertilizer cost - (44:22:0 kg N P K ha^{-1})		
	a) Urea -96 kg	6	576
	b) Super phosphate-138 kg	9	1242
4	Foliar application of nutrients 2 % DAP-10 kg	25	250
5	Cost of Bio fertilizer-10 packet	20	200
6	IPM - Plant protection charges		800
	Total Cost	**Rs. 4,151 (Assistance Restricted to) Rs.4,000**	

5. Pulses (Garden Land):

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Cost of Soil testing	20	20
2	Seed cost with seed treatment components - 20 Kg / Ha	120	2,400
3	i.. DAP 20 Kg / Ha	25	500
	ii. Single Super phosphate 250 Kg	9	2,250
4	IPM - Plant protection charges	1,000	1,000
	Total Cost	**Rs.6,170 (Assistance Restricted to) Rs. 5,000**	

6. Groundnut:

Sl. No	*Particulars*	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Cost of Soil testing	20	20
2	Cost of fertilizers (17:34:54 NPK + Gypsum 400 Kg / Ha)		
	i. Gypsum 400 Kg / Ha	4	1,600
	ii. Urea - 40Kgs	6	240
	iii. SSP - 220 Kg.	9	1,980
	iv. MOP - 90 Kg.	16	1,440
3	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
4	Bio fertilizers-20 Packet	10	200
5	IPM - Plant protection charges	1,000	1,000
	Total Cost	**Rs. 7,230 (Assistance Restricted to) Rs.5,000**	

7. Farmers Field School:

Sl.No.	Operationalizing Farmers Field School	Cost Norms in Rs.
1	Frontline demonstration at Farm School on a maximum area of 2 Ha. at same rates as approved under the Guidelines of National Food Security Mission for the crops.	7,500
2	Grant towards logistics support to Farm School	1,000
3	Contingency	2,000
4	Details of interactions / training at Farm School	
a.	*Honorarium for maximum two external trainer for maximum 6 visit @ maximum of Rs.250 per visit per trainer*	3,000
b.	*Travel expenses for maximum two external trainer for maximum 6 visits @ maximum of Rs.150 per trainer per visit*	1,800
c.	*Food expenses for 28 participants @ Rs.30 per participant per day for 6 events.*	5,040
d.	*Printed literature @ Rs.50 per participant for 28 participants and trainers*	1,400
	Total	**21,740**
	Grand Total:	**Rs.21,740 (Assistance Restricted to) Rs.20,000**

8.a .Integrated Pest Management Villages

Sl.No.	Name of the content	Production Cost/Unit. (Rs.)
1	On farm Production of*Trichodermaviridi*/fruit fly trap / Vermicomposting (heap method)	58,700
2	On farm Production of*Trichogramma*sp.	14,000
3	On farm Production of Reduvid bugs, Adoption of Ecological Engineering based PHM and AESA based IPM	18,550
4	Farmers training (with in district)	5,000
5	Farmers training at NIPHM Hyderabad(other state)	11,250
	Total	**1,07,500(Assistance Restricted to) Rs.1,00,000**

8.b. Vermi Compost Demo. (TNAU – Silpaulin method):

Sl. No	Particulars	Unit Cost (Rs. / Kg)	Amount (Rs.)
1	Capital cost - Vermi bag (12’ x 4’ x 3’) – 1 No.	2,000	2,000
2	Cost of earth worms -10 Kg	150	1,500
3	Cost of Poles (60’ length with 1½” Dia) and Shade net (60 Sq.ft.)	750	750
4	Cost of FYM (1.5 MT)	1,170	1,750
5	Capacity Building activities (Training by FTC / TNAU / Reputed organization)	1,000	1,000
	Total Cost	**Rs. 7,000 (Assistance Restricted to) Rs.6,000**	

Attachment 4.3
Guidelines on Implementing Horticulture Demonstrations

3.1. Horticulture crop demonstrations

This intervention will mainly focus on intensification of the existing cropping system and promotion of market led cropping systems through demonstration of selected Horticulture interventions such as introduction of HB vegetables, quality planting materials, integrated nutrient and pest management, improved agronomic and water management practices depending on emerging market opportunities .In addition to the crop demonstrations other high-technologies such as Micro Irrigation, promotion of bio pesticides usage ,cultivation under protected condition and mulching technologies are also included in the interventions in the selected sub basins.

3.2. Demonstration and adoption

The project considers the best way to build capacities of the command area farmers in terms of orientation on new technologies and adoption of improved technologies is through demonstration and adoption, i.e through the principles of 'learning by doing" and "seeing is believing". The approach has training, capacity building and demonstrations as integral part of the system. The demonstrations will be conducted in the fields of selected farmer's. Some of the demonstrations and trainings are situation specific.

3.3. Process and Implementation:

Each Horticulture crop demonstration will be provided with inputs from the project covering seeds/planting materials, fertilizer and pesticides. The demo plots will be identified by the concerned Horticulture officers and the Assistant Horticulture officers of the block. These officers will be responsible for conducting the demonstrations and training of farmers participating in respective demonstrations and review the adoption in their fields through periodic field visits. . They will conduct trainings on different aspects at the demonstration area at critical stages of cropping

3.4. Selection criteria for demonstration plot

1. Easy accessibility from identified villages.
2. Road side plot.
3. Plot soil type is representative of majority soil-type in the village.
4. The stake holder who is cooperative and willing to adopt the complete package in a timely manner.

3.5. Supervision by technical team members:

The project plans to utilize the existing departmental technical officers' expertise present in the districts. The district/block level members of line departments will supervise the demonstrations and trainings conducted at village level. The existing members like Assistant Directors/ Deputy Directors and Joint Directors of Horticulture department will be associated in supervision of the field activities. The horticulture department at state and district level will play an important role in supervision and facilitation of the overall process. The DLIC will coordinate this at district level. At state level the JDH and ADH in the office of the Director of Horticulture will monitor and guide the District officers in laying the demonstrations.

3.6. Demonstration-Roles and responsibilities of stakeholder and Field officers concerned

Position	Roles and responsibilities
Stakeholder	Conducting the demonstration under the guidance of the field officers concerned. Day to day operations of the demonstration plot. Mobilizing the fellow farmers in the village to the training and exposure visit time to time. Coordination between the trainer and the farmer. Motivating the fellow farmers in the adoption of latest production technologies to be adopted in the demo plot.
Trainer/Resource persons	Helping in identification of suitable farmers and area in the sub basin concerned. Facilitating to conduct the demonstration successfully and effectively in time. Motivating and assisting the farmers towards adoption of the new technologies in full without any omission for desirable out come. Designing and using the relevant training methodology for effective diffusion of technologies to all the farmers nearby. Reviewing the adoption of the crop production Technologies in nearby sub basins also.
Horticulture Extension officers	Preparation of Sub basin development plan in time. Identification of suitable resource persons. Orientation of resource person and allotment of sub basins. Planning the extension activities in the sub basin. Liaison with farmers and other line department officials involved for effective convergence. Coordinate with trainers/ training agencies for effective conduct of training and laying of demonstrations. Coordinating the village level training and exposure visits.
JHQ Cell	Coordination with District and sub basin line department officials for smooth implementation of the project activities.

3.7. The table below presents the likely demonstration theme and indicative list of sessions to be conducted. Based on needs the indicative practices will be added/deleted during laying the demonstrations.

Key Interventions	Key Actions	Selection criteria
1. Increase in crop productivity based on best management practices A) Horticulture crop Demonstrations a) Vegetables b) Fruits c) Spices d) Flowers	• Soil testing • Nursery management • Water management • Integrated Nutrient Management • Integrated Pest Management • Cultural practices including weeding	• The productivity levels are low compared to district average • Sufficient availability of water in the entire crop season to head and middle farmers and insufficient water availability to the tail end farmer • Willingness of the community for adoption of new practice • 90% command area is occupied by paddy
B. Promotion of reduced pesticide villages to produce vegetables in clusters	Encouraging the farmers to use only bio-pesticides and fungicides instead of chemicals.	This programme will be implemented in300IPM villages in clusters selected by the Agriculture Department
II**. Promotion of HI-Tech irrigation Technologies**	Installation of Micro irrigation unit with fertigation.	For vegetable crops in selected areas.
III. **Promotion of Climate resilient technologies** a) Construction of Polygreen house. b). Mulching Technologies	Erection of Poly green house structure including irrigation and climate control devices. Spreading of High density poly ethylene mulching sheet to minimize the water evaporation in the soil and create microclimate around the root zone of the crops.	It will be implemented in selected sub basins preferably nearer to the big cities exclusively for high value vegetables and cut flowers through out the year. This programme will be implemented in selected sub basins exclusively for vegetables, spices and flowers.

2.8.Outlines of the Key Intervention to be Implemented

I. Increase in crop productivity based on best management practices. (Involving more women farmers also)

Under this programme, Horticulture crop demonstrations by diversification, to produce quality / healthy Horticulture crops in clusters will be taken up.

I. A. Horticulture crop demonstrations (By addressing the climate resilient issues)

- The demonstration plots cover vegetables, fruits, spices and flowers.
- All the latest crop production technologies and the agronomic practices will be adopted in all the demonstrations.
- Required HB seeds, planting materials and the other required inputs will be procured and supplied to the stakeholders well before the season.
- The demonstrations will be selected, based on the climate-resilient that promote sustainable use of land and water resources.

- The cost norm per hectare covers HB seeds, seedlings, quality grafts, layers, manures & fertilizers, bio-fertilizers, bio-pesticides etc.

a. Vegetables.

- This Intervention is to improve the productivity of the existing vegetable crops nearby and also to increase the area under vegetables.
- The demonstration on intensification of existing vegetable area will help the farmers to adopt the agronomic practices, nutrient management, and pest control and value addition.
- Proposed to lay demonstrations in brinjal, Bhendi Tomato, Green Chilies, Onion, Tapioca, Gourds, watermelon etc., in the farmer's field in clusters by diversification.
- Vegetable demonstrations will be taken up in almost all the sub basins.

b. Fruits

- Demonstrations in fruit crops will be taken up in selected areas considering the suitability.
- Under fruit crops, T.C.Banana, mango, guava and pomegranate are to be taken up for demonstrations.

c. Spices.

- Dry chilies demonstration is proposed for selected Districts only.
- The cost norms cover the cost of HB seeds and other inputs required.

d. Flowers.

- Tube rose demonstration is proposed for selected Districts.
- The cost norms cover the cost of seed bulbs and other inputs required.

I.B. Promotion of reduced pesticide villages to produce vegetables in clusters.

- This programme encourages the farmers to use only bio-pesticides instead of chemical pesticides.
- This programme will be implemented in 300 IPM villages in clusters selected by the Agriculture Department
- Under this programme demonstrations are proposed only for vegetable crops.
- Village campaigns will be organized in the selected villages to educate the farmers regarding production of pesticide free vegetables, and its market potentials.
- The cost norms cover the cost of bio pesticides and fungicides.

I C. Promotion of HI-Tech irrigation (Micro irrigation-by encouraging women farmers also)

- About one fourth of vegetable demonstrations proposed in the project will be covered under micro irrigation with fertigation.
- This programme will be implemented in cluster villages.(Vegetables)
- The provision includes the cost and installation of drip and fertigation equipments and accessories(head and field units)
- Depends on area, required exclusive agencies will be engaged for providing the end to end solutions and support to the farmers by following the World Bank procurement norms towards installation and maintaining the micro irrigation system in the vegetable fields.

II. Promotion of climate risk resilience technologies

a. Poly Green House (women farmers also will be involved)

- This provision includes the cost of erection of poly green house structure including irrigation and climate control devices.
- The financial assistance will be released to the stakeholders as per back ended subsidy procedure for maximum area of 500 to 1008 sq.mt.
- This programme will be implemented in selected sub basins exclusively for vegetables and Flowers.
- It is the technique of providing favourable environmental condition for plant growth besides creating an ideal micro climate around the plants
- It is rather used to protect the plants from the adverse the climatic conditions such as wind, cold, precipitation, excessive radiation, extreme temperature, Pests and disease incidence etc.
- Cultivation of high value vegetables and flowers will be taken up throughout the year.

b. Mulching

- This provision covers the cost of High density poly ethylene mulching sheets and spreading cost.
- This programme will be implemented in selected sub basins exclusively for vegetables and Flowers.
- This technology helps to adjust the soil temperature during hot summer and winter seasons and retains the soil moisture by slowing down the evaporation process.
- Mulching controls soil borne diseases, soil erosion and weed growth by blocking sunlight to the soil.
- The duration of the crop could be extended to few more months depends on maintenance.

Attachment 4.4

Cost Norms for Horticulture Demonstrations

Under this Project the operational guidelines on cost norms as envisaged in Mission for Integrated Development of Horticulture (MIDH), Dept of Agriculture and cooperation, Ministry of Agriculture, Krishi Bhavan, New Delhi will be adopted.

Sl. No.	Interventions	Unit	Pattern of Assistance	Cost Norms (Rs.)	Assistance (Rs)	Assistance for first year(%)	Assistance for Ist year (Rs.)	Authority	Remarks
I	**Vegetables -** Brinjal, Bhendi, Tomato, Green Chilies, Onion, Tapioca, Water melon and Gourds etc.	Ha	40% cost maximum area of 2ha per beneficiary	50,000	20,000	-	20,000	MIDH Pg-41	Inclusive of Seeds & other inputs
II	**Fruits**								
	i)Mango normal spacing 10x10mts (100 nos.) without integration.	Ha	50% cost maximum area of 4 ha per beneficiary	25,500	12,750	60%	7,650	MIDH Pg-41 & 52	Inclusive of Grafts and INM/IPM
	ii)Guava High density planting 3x3mts. (1,111 nos.) without integration.	Ha	40% cost maximum area of 4 ha per beneficiary	73,330	29,332	60%	17,599	MIDH Pg-41 & 52	Inclusive of Layers and INM/IPM
	iii)Pomegranate High density planting 4x3mts. (1,111 nos.) without integration.	Ha	40% cost maximum area of 4 ha per beneficiary	71,640	28,656	60%	17,193	MIDH Pg-41 & 53	Inclusive of Layers and INM/IPM
	iv)TC Banana without integration.	Ha	40% cost maximum area of 4 ha per beneficiary	1,25,000	50,000	75%	37,500	MIDH Pg-40	Inclusive of planting materials and INM/IPM
III	**Seed Spices**								
	i)Dry Chilies	Ha	40% cost maximum area of 4 ha per beneficiary	30,000	12,000	-	12,000	MIDH Pg-42	Inclusive of planting materials and INM/IPM
Sl.no.	Interventions	Unit	Pattern of Assistance	Cost Norms (Rs.)	Assistance (Rs)	Assistance for first year(%)	Assistance for Ist year (Rs.)	Authority	Remarks
IV	**Flowers**								
	i)Tuberose	Ha	40% cost(SF/MF) maximum area of 2ha per beneficiary	1,50,000	60,000	-	60,000	MIDH Pg-42	Inclusive of Seed bulbs & other inputs
V	**Promotion of IPM**								
	i)Usage of bio fungicides and pesticides	Ha	30% cost maximum area of 4 ha per beneficiary	4,000	1,200	-	1,200	MIDH Pg-44	Cost of IPM inputs
VI	**Protected cultivation**								
	i) Poly Green House (Naturally ventilated system-Tubular structure)	Sq.mt.	50% cost limited to 4000 Sq.mts .per beneficiary.	935	468	-	468	MIDH Pg-43	>500Sq.mts up to 1008 Sq.mts.
	ii)Plastic Mulching	Ha	50% cost limited to 2ha per beneficiary.	32,000	16,000	-	16,000	MIDH Pg-44	Cost of plastic mulch
VII	**Drip irrigation-Vegetable**	Ha	100% cost for SM/MF limited to 1ha per beneficiary for vegetable	1,00,000	1,00,000	-	1,00,000	PMKSY Pg-	<1.2 mt spacing
	Drip irrigation-Banana	Ha	-do-	85,603	85,603	-	85,603	PMKSY Pg-6	1.5×1.5mt.
	Sprinkler for Vegetables	Ha	-do-	19,542	19,542	-	19,542	PMKSYPg-11	63mm

MIDH - Operation Guidelines 0f Mission for Integrated Development of Horticulture Ministry of Agriculture, Krishi Bhavan, New Delhi.

PMKSY-Operational Guidelines for Implementation of Micro Irrigation scheme under Component of Pradhan Mantri Krishi Sinchayee Yojana

As per the enlistment finalized by the Horticulture Department (TANHODA) time to time the farmers will have the choice to choose their agency.

Attachment 4.5

PROJECT IMPLEMENTATION PLAN FOR IAMWARM II -TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY

SENSITIZING FARMERS ON "NUTRITIONAL SUPPLEMENTAL STRATEGY" DEVELOPED AT TANUVAS TO MITIGATE METHANEEMISSION AND INCREASE PRODUCTIVITY IN DAIRY CATTLE

1. Objectives

a. Critical nutrient supplementation to dairy cattle to mitigate methane production and increase milk production
b. Popularizing the technology for adoption.

2. Background

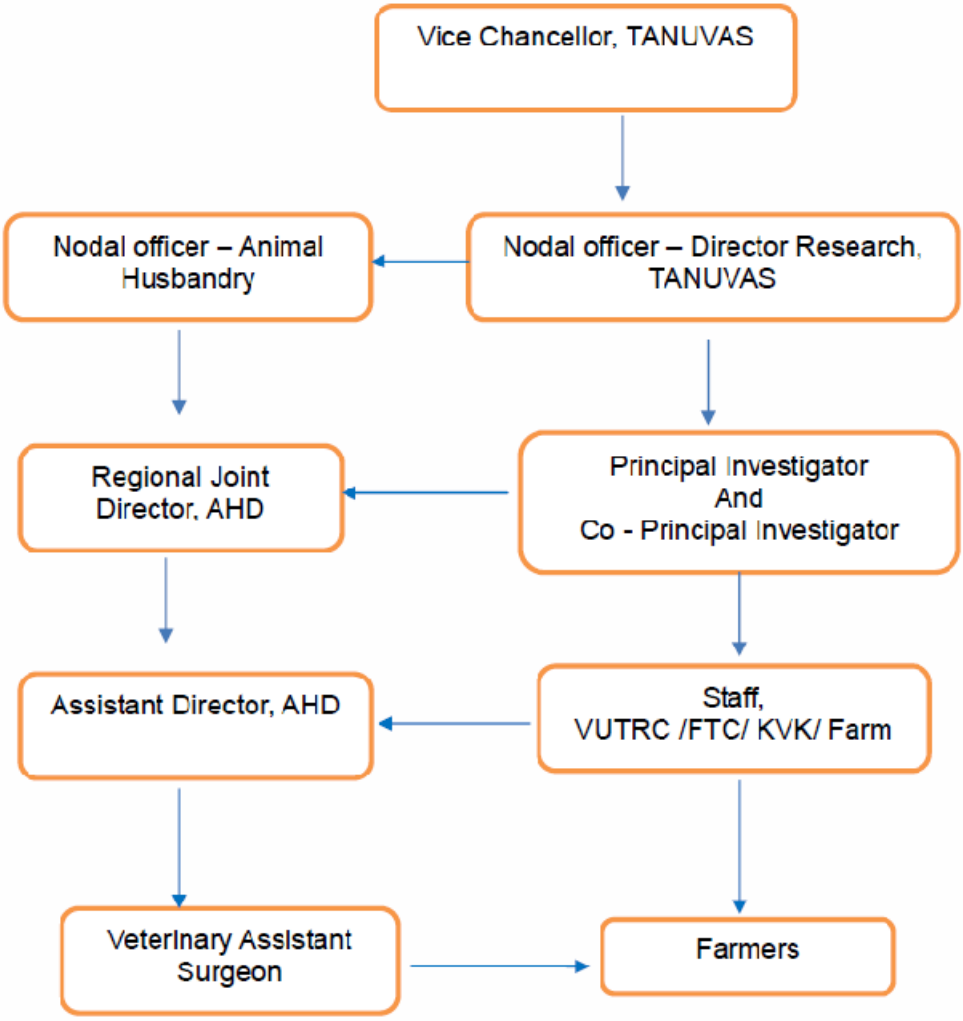
There are 35 Lakh of milch cows in Tamil Nadu and majority of them are in the hands of unorganized dairy farmers. In these unorganized farms, less than four animals are reared with unbalanced feeding regimen and consequently they yield low milk which is less than their genetic potential. Survey on the feeding practice adopted by the owners of these animals indicates that there is a mismatch between energy and protein supply to these animals apart from undernourishment of nutrients. Thus the critical nutrients limit the performance of these animals and supplying them as supplement would augment their productivity.

The main thrust of dairy research today is to improve the efficiency of milk production. This is accomplished by manipulating fundamental biological processes regulating milk yield. The tremendous progress in the field of rumen microbiology has enabled us to better understand the complex microbial interactions governing efficient nutrient utilization by ruminants. Rumen microbes play an important role in digesting feed and forages consumed by ruminants. In this process the rumen microbes also proliferates and provides protein to host when they get digested in the lower gut. The microbial processes of the rumen confer the ability to convert fibrous feeds and low quality protein, and non-protein nitrogen into valuable nutrients for the ruminant animals. Rumen microbial protein represents a major source of amino acids to the ruminant animal. Microbial protein contributes about two thirds of the amino acids absorbed by ruminants. Moreover, increased microbial protein synthesis leads to methane mitigation.

Manipulating rumen fermentation is a means of mitigating methane emission and augmenting milk production in low yielding dairy cattle. Critical nutrient supplement developed by TANUVAS ameliorates nutritional deficiencies, in low yielders, increases microbial proliferation resulting in improved milk production with methane mitigation. This supplement increases milk production by 500 ml to 700 ml /day/cow in majority (75%) of cows.

3. Planning and implementation Structure

- The Vice chancellor (TANUVAS) shall delegate sanction to the officers for the implementation of the Project at TANUVAS.
- Director of Research (TANUVAS) shall be the Nodal officer in coordinating with nodal officer identified by Animal Husbandry department and MDPW for implementation of the project.
- Principal investigator in the cadre of Professor, Animal Nutrition TANUVAS and Co principal investigator in the cadre of Assistant Professor, Animal Nutrition TANUVAS shall be responsible for planning and implementation of the project.
- The staff of the various farms, KVK's, VUTRC's, FTC's will coordinate with Principal investigator, Co-principal investigator, line department staff (VAS) and farmers for implementing the project.



4. Pre Implementation strategies

- On administrative Sanction, Vice Chancellor, TANUVAS will delegate / assign the staff of VUTRC's /KVK's / FTC's / Farms who will coordinate the work with the Principal investigator, Co-principal investigator, staff of line department and farmers.
- On administrative Sanction, the principal investigator will prepare the detailed modalities of implementation and initiate the purchase of the equipment's involved in setting up of the production plant as per the guidelines of TANUVAS.
- In concurrence with the nodal officer Animal Husbandry a plan will be laid out in the selection of beneficiaries.
- The Principal investigator along with Co-principal Investigator will chart out the modalities on data documentation and providing capacity building program for farmers.

5. Implementation

5.1 Production of critical nutrient supplement

The project envisages setting up of a permanent plant with capacity of producing 4000 litres / day of Critical nutrient supplement, developed by TANUVAS. The plant will be made fully operational in the first year itself.

5.2 Creating Awareness Wide publicity will be given at the Sub basin level to create awareness among the farmers about critical nutrient supplements and its benefit. Via Village level meetings, Awareness Campaigns, Local TV network / Radio, Handouts, banners, and Farmer workshops.

Details	Phases in months				
	0 -12	13 – 24	25 – 36	37 – 48	49 – 60
Setting up of Production Plant					
Lactating cattle* and Pre supplementation data collection and interpretation					
Production and distribution of supplement at free of cost					
Post supplementation data collection and interpretation					
Capacity building of farmers					
Report preparation , Preparing plant for sustainable production					

5.3 Farmers Identification and animal selection

- The Principal investigator and Co principal investigator in coordination with Heads of the various farms, KVK's, VUTRC's, FTC's and line department staff (VAS) will identify the beneficiaries (unorganized small dairy farmers). Assistance of nodal officer animal husbandry will be got for identifying the willing farmers.
- Small unorganized dairy farmers owning less than four animals will be the target beneficiaries.
- Lactating cattle belonging to small / marginal farmers, fed on low quality crop residues will be selected. The animals will be grouped as cross bred and indigenous. 35,000 cows in 1st year, 35,000 cows in 2nd year and 30,000 cows in 3rd year will be selected.
- Data on milk yield and methane production will be assessed pre supplementation of critical nutrient.

5.4 Distribution of supplement

- Critical nutrient supplement will be distributed free of cost to one lakh animals owned by the beneficiaries viz small unorganized dairy farmers, in a phased out manner, in concurrence with nodal officer, Animal husbandry department.
- Critical nutrient supplement will be distributed free of cost to 35,000 cows in 2nd year, 35,000 cows in 3rd year and 30,000 cows in 4th year.

5.5 Post supplementation data collection

Post supplementation productivity level and methane emission from the 1 % of animals will be documented.

5.6 Database creation

- Pre and post supplementation data will be documented.
- List of farmers who have success stories will be prepared and maintained.

5.7 Capacity building – For changing mindset

Farmer – to – farmer Interaction will be arranged with the successful farmers for convincing the other farmers who were not covered under the project, so as to have quick spread of the advantages of the interventions.

6. Reporting Mechanism

- The field level implementing officers in VUTRC / KVK / FTC / Farms will report to the principal investigator, monthly on the physical progress and the bottlenecks experienced during implementation. Principal Investigator will sort out bottle neck problems and facilitate smooth functioning of project and inturn will report to nodal officer for suitable remedial measures, if any.
- The principal investigator will report to the Nodal Officer, TANUVAS on the Physical and Financial progress periodically (monthly).
- The Nodal officer shall in turn report to Vice Chancellor, TANUVAS and IAMWARM on the Physical and Financial progress periodically as prescribed.

7. Post implementation

7.1 Documentation and Evaluation

The project report will be prepared utilizing the data generated and will be submitted MDPU.

7.2 Economic / Social and Environmental benefits of project

Components of Project	Economic Benefits	Social Benefits	Environmental Benefits
Setting up of Production Plant	Production of TANUVAS GRAND	-	-
Production and distribution of supplement	Increased economic returns on supplementation Approximately Rs 12 / day / animal	Improved economic status of farmer	Methane mitigation – 30g less methane per animal per day
Pre and post supplementation data	Quantification of improved economic returns	Proof provided to farmers	Quantification of methane mitigation
Capacity building of farmers on supplementation	Awareness on increased economic returns on supplementation	Awareness on increasing milk production	Awareness on methane mitigation

7.3. Outcome Indicators

- Production of critical nutrient supplement 4000 litres / day
- Increase in 500 ml of milk per animal in at least 50% of cows covered.
- 20% reduction in methane per animal in at least 50% of cows covered.
- Willingness of more farmers to participate.

7.4 Sustainability of Intervention

The production plant will continue to produce the supplement in a self-financing mode and sell it to dairy farmers of Tamil Nadu in a subsidized mode. TANUVAS GRAND production = 6800 bottles/day TANUVAS GRAND requirement for one lactation = 10 bottles/cow
period TANUVAS GRAND requirement in Tamil Nadu for = 12 Lakh
every year (one third of 35 Lakh of dairy cows in unorganized sector will be in Lactation) Ability of farmer to purchase at 50% in Tamil Nadu = 6Lakh
for every year
TANUVAS GRAND requirement for every day = 12000 litres (20ml/day for 6 Lakh) No of TANUVAS GRAND bottle requirement for = 20000
every day Production plant can supply TANUVAS GRAND = 6800 bottles /day Production plant can satisfy the 35% of requirement of TANUVAS GRAND in Tamil Nadu every day.

Attachment 6.1
Format / Checklist for preparation of DPR/Sub-basin Development Plans:

Component A:

Irrigation and Water Management:

- Get the Correct sub-basin map from IWS/ SWaRMA with District and Block boundaries duly marked
- Number the tanks proposed to be rehabilitated carefully avoiding the Panchayat Union Tanks though they may fall under the chain of tanks
- Get the cultivation data from the records or VAO's for each tank as fully irrigated, partially irrigated and gap areas for the last 5 years
- EE,WRD as Nodal Officer to Convene a meeting with all Line Departments' officers by addressing the Joint Director Of Agriculture / AHD, Fisheries Department , EE Ground Water and also TNAU
- Share the sub-basin map with all the officers and get their views
- Propose a date for Joint Walk through surveys for each tank jointly identifying the lead farmers / ex Members of WUAs
- Under take the Joint walk through survey, establish the ground conditions and ascertain the demands of the stakeholders including new schemes if any suggested by them and also the agri-practices etc
- Work out the current water balance position in the sub-basin with current cropping pattern and Ground Water extraction status
- CE Ground Water shall come out with possible recharge structures in the Water Spread area of a few tanks by geological survey already available or to be done fresh
- EE WRD shall identify the infrastructure improvements needed in water-bodies including the feeder channels from one tank to other.
- WRD shall consult the Central Design Office and incorporate their design standards and specifications as per need.
- Cluster approach to be explored in each sub-basin. There will be convergence table for each cluster.
- The proposals for regarding of streams/ supply channels shall be validated by CE PF for their necessity
- CE GW shall prepare the Hydrographs of the sub-basin covering from 2000 to 2015, SPI and the Rainfall Charts.
- With the revised draft DPR, EE GW shall also work out the projected charts showing the expected outcome
- A GIS plan incorporating the year wise proposed interventions may also be prepared and copies exhibited in the prominent places in the sub-basins
- WRD and others may explain to the stakeholders the action proposed for planning major works which are capital-investment intensive in nature for which separate planning will be required through planning departments
- Any new bed dam, Check dam or cross masonry proposed shall bear the concurrence of the District Collector
- Hydrology of each sub-basin may also be furnished with current water balance with reference to the prevailing cropping system
- EEs shall involve in all these, mutually associating with IWS, SWaRMA and GW and come up with a technically superior and reliable data basis without any ambiguity to act as a good decision support system
- In the case of sub-basins spreading over more than one district the concerned jurisdiction EEs shall discuss and furnish the details to the Nodal EE and associate with him in all preparations.

Environmental and Social Impact Assessment

- A detailed Environmental and Social Impact Assessment (ESIA) has been completed to assess potential social and environmental impacts of the project.

- For Phase I irrigation infrastructure rehabilitation related investments, the EMPs will be prepared for top 10% by cost of all packages (estimated at Rs 6.0 crore or higher). For the remaining 90% of sub-projects with investment costs lower than the threshold of INR 60 million, an ESMF with its own set of mitigation measures and best practice guidelines will be applicable to address and mitigate any potential adverse environmental impacts.
- Based on the implementation experience of Phase 1, the ceiling of top 10% and minimal investment threshold of Rs. 6.0 crore for environmental screening and preparation of EMPs will be revisited for subsequent phase packages/investments.

Component B:

Agriculture Productivity Enhancement, Diversification, improving alternate livelihood sources through livestock and inland fisheries, Marketing and Value addition, etc.,

- Line Departments' officers also prepare a note on possible new techniques to be introduced in the sub-basin with diversification of crops for reducing the water utilization, possible extent of Micro Irrigation and farm ponds construction bearing in mind to address the adverse climate change conditions.
- All Departments, especially the TNAU to explore possible research components/topic that can be included in the Development plans or tie up arrangements for research activities
- The AHD and Fisheries Departments also shall come with possible interventions in the sub-basin
- The draft proposals shall be shared with the Stakeholders for their views
- The draft proposals shall contain the package distribution for WRD and the Demo extents with crops , MI , fodder , Marketing value additions etc
- With the revised draft proposals work out the Water Balance in the sub-basin ensuring that the water consumption for crops is reduced considerably and also the Ground Water extraction is minimized

Project Management Support:

- The agreed Draft Plan to be discussed in the DLCC meeting and the refinements if any suggested by the District Collector to be addressed and sent to MDPU through HODs for an iterative session for further improvements comprising the following (Model)Chapters

Proposed Chapters:

WRD	Line Departments
Introduction	Introduction
About the sub-basin –Infrastructure data	About the sub-basin
Hydrology of the sub-basin- Current Gap area details	Current Agri Practices in the sub-basin
..Water Balance W.O.P	Cropping pattern in general in the sub-basin
Cluster formations	Proposed cropping pattern in Clusters
Joint Walk Through details	Demands of stakeholders in Joint Walk through
Matrix of demands , constraints, proposed developments	Matrix of current and proposed cropping pattern
Innovations introduced	Innovations introduced
Revised Water Balance W.P	Number of Demos/ Interventions proposed
Details of WUAs prevailing and proposed	Anticipated yield increase
Model Villages	Modalities of working in Model Villages
Impact anticipated	Impact anticipated

- The final improved version of DPRs of WRD and Line Departments with cost estimate prepared in converged mode shall be consolidated as a Sub-basin Development Plan (SBDP) and the Water Balance in the sub-basin will be assessed with reference to the interventions proposed in the project to enable monitoring of the project activities and ensuring sustainable improvements due to project interventions.
- During implementation GIS map showing the interventions of all departments will be developed and added in the SBDP to synergize the convergence of all line departments. This consolidated sub-basin development plan will be housed in the MDPU Library for reference and further monitoring.
- Implementation plans will be also prepared.

Attachment 6.1 A

Contingency Emergency Response

Following an adverse natural event that causes a major natural disaster, the Government/ Project Implementing Entity may request the Bank to re-allocate project funds to support response and reconstruction. This component would draw resources from the Unallocated expenditure category and/or allow the Government/Project Implementing Entity to request the Bank through MDPU to re-categorize and reallocate financing from other project components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available as a result of the emergency.

Disbursement condition.

Contingency funding components are designed to disburse only after a calamity has occurred, or is about to occur. The trigger for disbursement will be declaration of calamity by State/Union Government in part of the state. As the disbursement Condition, Project Implementing Entity/Government will inform the Bank in writing of declaration of calamity. Eligible calamities will cover all disasters including epidemic outbreaks

Disbursement sub-categories.

The component will include the following disbursement sub-categories:

- Goods, works and consultant services (including audit costs) for emergency response and recovery; and
- A quick-disbursing component (a positive list of imported and locally-manufactured goods)

Procurement arrangement. Procurement under this component will follow the procurement methods suggested for the overall project with improved turnaround of procurement documents.

Possible list of goods. The possible list of goods has been identified for which expenditures can be documented. The possible list may also include purchase of second-hand Goods including leasing charges, where required. The list includes:

i. Fuel and petroleum products;
ii. Construction material;
iii. Prefabricated and temporary structures for providing: shelter and medical services;
iv. Earth-moving machinery and spare parts;
v. Communication equipment;
vi. Emergency rescue equipment;
vii. Critical Agricultural / Livestock / Fisheries Inputs and;
viii. Any other items which may be acceptable to the Bank and agreed to by the Borrower and the Bank.

Proof of payment and documenting expenditures:

The Implementing Agencies will be responsible for obtaining and maintaining (i) adequate documentation for expenditures in the form of purchase orders/contract, invoices, adequate evidence of receipt of goods & services delivered to the project and/or beneficiaries, where applicable, and proof of payment to suppliers or project bank statements, evidencing the payments made to suppliers, as well as accounting, reporting and audit of such expenditures to World Bank through MDPU

Monitoring and reporting. The Implementing Agencies will be responsible for providing weekly updates to MDPU on the use of contingency funding following an emergency to facilitate reporting to World Bank. Further guidelines are as below:

(a) Implementing Agencies shall prepare and furnish to the Bank through MDPU for its review and approval, which shall set forth detailed implementation arrangements for the CER Component, including: (i) criteria for activating the CER Component; (ii) designation of terms of reference for, and resources to be allocated to, the entity to be responsible for the coordination and implementation of the CER Component (the "Coordinating Authority") (iii) activities which may be included in the CER Component, Eligible Expenditures required there for ("Emergency Expenditures"), and any procedures for such inclusion; (iv) financial management arrangements for the CER Component; (v) procurement methods and procedures for Emergency Expenditures to be financed under the CER Component; (vi) documentation required for withdrawals of Emergency Expenditures; (vii) environmental and social safeguards instruments, including management frameworks, assessments and/or plans for the CER Component consistent with the Bank's policies on the matter; and (viii) any other arrangements necessary to ensure proper implementation of the CER Component;

(b) afford the Bank a reasonable opportunity to review the said proposed CERC ;

(c) promptly adopt the CERC Annex for the CER Component as shall have been approved by the Bank; and

(d) not amend, suspend, abrogate, repeal or waive, whether in whole or in part, any provision of the CERC Annex without the prior approval by the Bank.

1. After the Borrower and the Project Implementing Entity have both determined that an Eligible Crisis or Emergency has occurred, the Project Implementing Entity shall prepare and furnish to the Bank for its review and approval, in accordance with the provisions set forth in the CERC Annex, a Contingent Emergency Response Implementation Plan (the "CERIP") which shall set forth detailed arrangements for the activation of CER Component, including: (i) specific activities to be financed out of the Emergency Expenditures; (ii) itemized costs for each expenditure item; (iii) implementation arrangements for the CER Component, as defined in the CERC Annex or with proposed amendments; (iv) procurement plan for the CER Component; (v) details regarding compliance with environmental and social safeguards instruments; and (vi) any other arrangements necessary to ensure proper implementation of the CER Component.

2. The Project Implementing Entity shall ensure that the CER Component is carried out in accordance with the CERC Annex and the CERIP, provided however that in the event of any inconsistency between any of the provisions of the CERC Annex and/or the CERIP on one hand, and those of this Agreement and/or the Loan Agreement on the other hand, the provisions of the latter shall prevail.

3. The Project Implementing Entity shall undertake no activities under the CER Component (and no activities shall be included in the CER Component) unless and until the following conditions have been met in respect of said activities:

(a) (i) the Borrower and the Project Implementing Entity have determined that an Eligible Crisis or Emergency has occurred; (ii) the Project Implementing Entity has furnished to the Bank a request through the Borrower to include said activities in the CER Component in order to respond to said Eligible Crisis or Emergency, and (iii) the Bank has agreed with such determination,

accepted said request and notified the Borrower and the Project Implementing Entity thereof; and

(b) the Project Implementing Entity has prepared and disclosed all safeguards instruments required for said activities, in accordance with the CERC Annex, the Bank has approved all such instruments, and the Project Implementing Entity has implemented all actions which are required to be taken under said instruments prior to the commencement of such activities.

(c) Implementing Agencies shall not amend, suspend, abrogate, repeal or waive, whether in whole or in part, any provision of the CERC Annex without the prior approval by the Bank.

Procurement Arrangement under the Contingent Emergency Response Component

Selection Methods	Procurement Regulations Clause Reference
Consulting services	
CQS	In accordance with Section VII, paragraphs 7.11 and 7.12 of the Regulations
FAs	In accordance with Section VII, paragraph 7.33 and Annex XV of the Regulations
Direct Selection	In accordance with Section VII, paragraphs 7.13–7.15 and 7.39 of the Regulations
Using a 'pool of experts' or a list of 'preselected' consulting firms may also be considered as an appropriate method for supporting counterpart agencies at various steps of project execution, including the procurement process and the preparation of TOR, shortlists, RFPs, and bidding documents. Remuneration and fees may be resolved at the time of pre-selection and prescribed in an FA.	
Procurement of goods, works, and non-consulting services	
RFQ	In accordance with Section VI, paragraph 6.7 and Annex XII paragraphs 5.1–5.3 of the Regulations
FAs	In accordance with Section VI, paragraphs 6.57–6.59 and Annex XV of the Regulations
Direct Selection	In accordance with Section VI, paragraph 6.8–6.10 of the Regulations
Simplification of pre- and post-qualification criteria. The pre- and post-qualification criteria requirements should be set so that to optimize the participation of available local or regional contractors and suppliers. In particular, the qualification requirements should match the qualifications of available and competent local and regional contractors and suppliers.	
Prequalified suppliers and contractors. Using lists of prequalified suppliers and contractors to whom periodic invitations are issued can also help accelerate the procurement process. Such approach would be consistent with Section VI, paragraphs 6.19–6.24 of the Regulations; but instead of being used for large and complex works or goods, it could be used for a large number of similar simple contracts of any size, as well as for procurement of commodities, per Section VI, paragraph 6.51 and Annex XII paragraphs 6.7 and 6.8 of the Regulations. Prequalification documents may use a simplified format that is acceptable to the World Bank. Suppliers and contractors would be asked to provide quotations for simple unit prices, as for commodities. Contracts should be awarded on a competitive basis and may be for a duration of up to two years, with a price escalation clause and the possibility of extension upon mutual agreement between the client and the supplier/contractor.	

Attachment 6.2
Mapping of Sub basin Activities by Water Resources Department

Stage	Activity Type	Key Activities	Timing
Pre-Planning	Official Communication	• EIC to identify the Executive Engineers for 66 Sub-basins who will be the Nodal Officer of the Sub-basin to facilitate and monitor the project related activities of all the line departments in the Sub-Basin. • The EE will fix a date for Meeting of the Sub-basin Committee formed across line Departments.	1st week of April
	Information Collection	• EE will coordinate the collection of data regarding the current state of the irrigation and drainage systems in the Sub-Basin and furnish the same (in electronic form where possible) to MDPU for collation into an initial Sub-basin Atlas. • The EE will work with MDPU to prepare a power point presentation on the Sub-basin (including initial identification of key issues and options)	Completed by April end
	Preliminary Stakeholder Consultation	• EE will convene a Sub-basin Committee meeting with these officers, and agencies like "ATMA" • EE will, in consultation with other departments, convene an "TNIAMP (IAMWARM II)Day" in appropriate locations in the Sub-Basin to initiate discussions with Sub-Basin stakeholder on what are the major Sub-Basin constraints and opportunities and how the TNIAMP (IAMWARM II)project could help in this regard • Fix date(s) and location(s) for Joint Walkthrough(s) of the Sub-Basin based on discussions held ( ) Develop a Sub-Basin Joint Walkthrough Report in consultation with other line agencies to give the preliminary impressions of the Sub-Basin and its needs.	Sub-basin Committee meeting in 2nd week Of June Joint Walkthrough Report by 1st week of July
Planning	Training	• The EE will identify immediate capacity-building needs (technical, administrative, other) in the Sub-Basin and organize such training.	
	Stakeholder Discussions & Analysis	• Based on sound technical analysis as well as effective stakeholder communication, identify key hardware (construction) and software (capacity-building/training) options (all key options should be considered including a no-activity option). • CE, IWS shall also arrange to furnish to the regional Executive Engineer thematic maps pertaining to the Sub-basin /basin • The Regional Executive Engineer will also discuss with the Chief Engineer SGSWRDC on the possible recharge structures to be constructed in the Sub basin on scientific basis. • EEs GW shall also plan for preparation of estimates for these for implementing by the GW Wing with consultations with CE PF on design aspects. • The Superintending Engineer WRD of the basin shall also associate in these activities	2nd week of July
	Sub-basin Plan	• Develop Draft Sub-basin Plan and discuss plan with stakeholders, line agencies and MDPU: The Draft Sub-basin Plan will then be placed before the Sub-basin subcommittee for the professional judgment and their formal clearance considering all multi-sectoral aspects. The minutes of the said meeting will have to be sent to the Collector, Superintending Engineer WRD, the HODs of Line Departments and the Project Director, MDPU. • The draft Sub-Basin plan will be discussed at a Sub-basin Stakeholder workshop. • With the vetting by MDPU exhaustive reports and estimates will be prepared jointly by MDPU and the Nodal officers of WRD and Line Departments. • HODs forward to MDPU which after finishing touches will place before the steering committee for clearance and to forward to World Bank for their clearance • The Final Sub-basin Plan shall be agreed with the stakeholders, line department HODs, MDPU and forwarded for clearance by the	1st week of August

Stage	Activity Type	Key Activities	Timing
		Project Steering Committee (through MDPU). • After clearance by PSC and the World Bank, the concerned regional Chief Engineer WRD shall arrange for any required modifications (if any) as part of clearance.	
	Memorandum of Understanding	• EE will develop draft MOU (based on model to be supplied by MDPU) • Discuss and agree with stakeholders • The EE will organize a Signing Ceremony to initiate project implementation in the Sub-basin.	1st week of Oct.
Implementation	Procurement and Financial Management	• The Regional CE will initiate procurement activities with appropriate packaging and cost estimation following Bank procurement processes followed as outlined in project documents **TNIAMP Project and Procurement cell** • This cell shall scrutinize the Sub-basin development plans and the hydrology aspects, design of structures, cost estimates with due clarifications obtained from the Chief Engineers Concerned, Procurement plans prepared by the Regional Chief Engineer, and annual work plan before forwarding the Sub basin development plan to the MDPU • The cell shall arrange to get the performance data on the indicators as in the PAD from the regional Chief Engineers and forward to MDPU **Participatory Irrigation Management cell (PIM, Information Technology & Training Cell)** • This cell through the Regional Chief Engineers shall arrange for the elections to WUAs in the project area • The cell shall arrange setting up of suitable buildings for WUA or a cluster of WUAs, IT kiosks to educate the farmers on the market intelligence to enable them for growing diversified crops • To design the capacity building for the WUAs and all officers of the departments engaged in the implementation of the project • This cell will advise on any IT related activities to be undertaken to support project implementation in the Sub-Basin (e.g. IT networking, information flow, etc.) **Environment/Social Cells (Functioning and Chief Engineer, WRD, Plan Formulation)** • This cell will facilitate the examination of environmental and social development opportunities in the Sub-Basin that can be enhanced by project activities and ensure adequate mitigation and management of environmental and social risks associated with project activities • The WRD (and all the cells) will assist with monitoring project activities and feeding information into and utilizing results from the Project Monitoring Information System being developed.	April to October
	Training/ Capacity-Building	**Participatory Irrigation Management cell (PIM, Information Technology & Training Cell)** • It shall develop suitable modules for training (CAPACITY BUILDING) of officers of WRD and line departments and arrange for these through various training centers in and outside states • International training will also be identified and suitable nominations for the year program will be finalized at least 3 months in advance,	

Stage	Activity Type	Key Activities	Timing
	Implementation Management	• Continuous and close monitoring of project implementation (Project Monitoring Information System continuously updated) • Quality Management procedures applied (through stakeholder/WUA social audits, Sub-Basin committee, WRD supervision, MDPU agency (line dept.)	
Post-Implementation	Documentation & Evaluation	• The Regional EE (WRD) as nodal officer of the Sub-Basin committee, will, with the support of the other line departments and the Monitoring and Evaluation Consultant, help develop a Sub-basin ICR (integrated across all line dept. activities) and contribute to project Monitoring & Evaluation.	
	Sustainability & Scaling-Up	• The EE shall Develop an O&M plan for sustainability of project activities in the Sub-Basin • The EE shall determine approaches for up-scaling activities (including any follow-up project activities)	

Attachment 6.3

Mapping of Sub basin Activities by Tamil Nadu Agricultural University

Stage	Activity Type	Key Activities	Timing
Pre-Planning	Official Communication	▪ The Vice Chancellor, Tamil Nadu Agricultural University has to identify the Nodal Officer at Head Quarters and the sub basin nodal officers to facilitate and monitor the project related activities in the Sub-Basin. ▪ The nodal officer will fix date for meeting with the sub basin nodal officer to highlight the priorities ▪ Sub basin nodal officers will attend the meeting of the sub basin committee formed across the line departments and take stock of priorities for the sub basin development	1st week
	Information Collection	o The Scientists at sub basin level will coordinate with EE WRD regarding collection of data on the current state of irrigation to MDPU for collation into an initial Sub-basin Atlas. ▪ The Nodal Officer, TNAU will work with MDPU to prepare a power point presentation on the Sub-basin (including initial identification of key issues and options) issues along with the sub basin nodal officer to have right feedback	Completed by 1st month
	Preliminary Stakeholder Consultation	▪ Scientists at sub basin level will attend the meeting convened by the EE, WRD (Sub-basin Committee meeting) with the officers of line departments and agencies like "ATMA" in the Sub-basin ▪ The Scientists will attend the "TNIAMP (IAMWARM II)Day" convened by the Executive Engineer, WRD in appropriate locations in the Sub-Basin to initiate discussions with Sub-Basin stakeholder (including farmers, traders and reputed and responsible civil society /community in the Sub-basin. o Fix the date and location for Joint Walkthrough(s) of the Sub-Basin based on discussions held ▪ The Scientist at the sub basin will attend the Joint Walkthrough surveys organized by the Executive Engineer, WRD along with other line departments and the local stakeholders to identify key issues and options by making suitable notations on the Sub-Basin atlas and other maps o Develop a Sub-Basin Joint Walkthrough Report in	Sub-basin Committee meeting in 3rd week Joint Walkthrough Report by 5th week

Stage	Activity Type	Key Activities	Timing
		consultation with other line agencies to give the preliminary impressions of the Sub-Basin and its needs.	
Planning	Training	▪ The Nodal Officer (the Specialist for training) of TNAU in liaison with the Scientists of sub basin will identify immediate capacity-building needs (technical, administrative, other) among the Sub-Basin officials and organize such training. o This training will include the identification of appropriate location for awareness creation / exposure visits The Scientists concerned will document this in a brief Training / Capacity Building Plan. For the line department personnel it is the single agency for capacity building on various agricultural technologies and its allied sciences and the Training specialist is to pool up the data in this regard. TNAU is the single and appropriate agency for imparting training to the line department personnel on agriculture and allied sectors and hence its services can be best utilized	
	Stakeholder Discussions & Analysis	▪ Based on sound technical analysis as well as effective stakeholder communication, identify key hardware (Adoption of new technology like Drip, Sprinkler, Farm machineries, Precision farming) innovative technologies emanated from the recent research findings and software (capacity-building/training) options (all key options should be considered including a no-activity option). ▪ Preliminary identification of location specific recent research technologies for large scale demonstrations in consultation with stakeholders and the same proven findings mainstreamed to the DOA based on the outcome of the large scale demonstrations ▪ The Nodal Officer TNAU shall also associate in these activities of consultations and guide the Nodal officers / Scientists of the sub basin in preparing the Sub-Basin development plans and liaising with other departments' officials especially in selection of crops, input. and introduction technologies etc	
	Sub-basin Plan	▪ Develop Draft Sub-basin Plan and discuss with stakeholders, line agencies (Tamil Nadu Agriculture University, horticulture, agricultural engineering etc.) and MDPU	

Stage	Activity Type	Key Activities	Timing
		▪ The Draft Sub-basin Plan will then be placed before the Sub-basin committee constituted for the professional judgment and their formal clearance considering all multi-sectoral aspects. The minutes of the said meeting will have to be sent to the Collector, the HODs of Line Departments and the Project Director, MDPU. ▪ The draft Sub-Basin plan will be discussed at a Sub-basin Stakeholder workshop ▪ Submit the Sub-basin Plan to MDPU for appraisal from technical, environmental, social, and economic perspectives and modify as requested) ▪ The Sub-basin plan will be presented at MDPU through a well-designed power point presentation (with assistance of maps, Google Earth, etc.) and comments solicited. ▪ The Final Sub-basin Plan shall be agreed with the stakeholders, line department HODs, MDPU and forwarded for clearance by the Project Steering Committee (through MDPU). ▪ After clearance by PSC and the World Bank, the Nodal Officer at head quarters shall arrange for any required modifications (if any) as part of clearance.	
Mechanism of Implementation	Establishment of Cells	▪ Project implementation could be achieved through the following cells established with Tamil Nadu Agricultural University. They are ▪ Project Cell at Head Quarter of Tamil Nadu Agricultural University, Coimbatore with Director, Water Technology Centre as the Nodal Officer ▪ Project Cell at sub basin level headed by Professor and Head of Research Stations / KVKs ▪ Procurement Cell at Nodal Office of TNAU ▪ IT cell will be created to implement the activities of Geo Tagging, Remote sensing, e- Agriculture, Price forecasting and farm advisory.	
Implementation	Procurement and Financial Management	▪ The Nodal Officer, TNAU will initiate procurement activities with appropriate packaging and cost estimation following Bank procurement processes followed as outlined in project documents o Works: bid documents prepared o Goods: specifications developed o Consultancy : if any required in respect of Agri- Business Development activity	

Stage	Activity Type	Key Activities	Timing
		▪ The Nodal Officer, TNAU will submit the procurement documents and cost estimates of each sub basin to the Empowered Committee for clearance. Once the empowered committee clears, The Nodal Officer, TNAU with the support of the staff of project cells in their offices shall take appropriate action for getting the GO. ▪ In the case of post review contracts according to the powers delegated to the officers bid documents will be prepared and bids will be called for following the procurement guidelines of the bank and contracts concluded in line with the procurement plans approved ▪ At this stage the District Collectors will be informed to monitor the implementation through the District Level Co-ordination Committee, Regional Coordination Committee established in TNAU regional centers for that purpose ▪ MDPU will examine the work plans received from the TNAU and line agencies on the modifications required in the ongoing packages and for the next years budget requirements and forward the budget demands to the finance department for inclusion in the state annual budget In addition, each of the cells mentioned below will facilitate smooth project implementation as indicated below: **TNIAMP Cell** ▪ The Director, Water Technology Centre, TNAU will be the Nodal Officer for implementing TN-IAMP of TNAU components by forming a separate Cell at Nodal office WTC TNAU to monitor the physical and financial progress besides documenting the activities. ▪ The HODS of KVK/Research stations will be sub basin Nodal officer with one scientist in the cadre of not less than Assistant Professor will be the in charge of TNAU activities at sub basin. The unemployed agricultural graduates/Diploma Holders will be employed by out sourcing to work closely with the farmers at sub basin. A coordination committee will be formed under the chairmanship of Vice Chancellor TNAU with technical directors as members to review the progress periodically.	

Stage	Activity Type	Key Activities	Timing
		Domestic and export market intelligence: ▪ This cell through the Vice Chancellor, and Director, CARDS, TNAU shall predict the prices and demanding markets for the farm produce and communicate with the user groups for getting fair price ▪ All along, the production risks that would surface the basin crops suggested are addressed and proper TNAU interventions to counter these challenges are briefed. Next being the market risk, this would significantly influence the farm profitability and viability. Basin farmers are given with narrow choice of crops and facing both monsoon risks and market risks at tandem. So, they should be addressed with proper market signals so that when the signals are positive, the farmers should reap better profits and at the time of negative signals, they should minimize price risks. Hence, delivering and disseminating market intelligence at appropriate time especially prior to sowing and prior to harvest will help the basin farmers to have appropriate farm decisions to choose their crop choices in sowing, selling and stocking the farm produce. With this intention, price forecasts would be generated and disseminated at proper time using print and electronic media to enable the farmers' information symmetric about market signals. In addition to price intelligence, product and place intelligence such as consumer preferences, quality standards for domestic and export markets, potential markets etc., will also be provided and validated. ▪ The cell shall have possible convergence with Department of Agricultural Marketing ▪ The cell shall arrange for the publication of market information through dailies and television network **Monitoring GHG Emission in 66 sub basins** ▪ TNAU will estimate GHG emissions from different land use systems in all sub basins. The impact of demonstration technologies on GHG emissions will be assessed using satellite data combined with EX-ACT model spatially. MODIS data will be acquired and analyzed for GHG emissions. At ground level portable GC will be used to analyzed GHGs collected through field glass chambers.	

Stage	Activity Type	Key Activities	Timing
		Remote sensing and GIS application for Impact Assessment ▪ The impact on water resources and crop area and diversification will be studied using Remote Sensing and GIS as a tool in TN-IAMP. For effective assessment Synthetic Aperture Radar (SAR) data from Sentinel 1A and RISAT will be utilized along with optical data during the cropping season. Besides, developmental activities in the PWD tanks and interventions from line department viz., Agriculture, Horticulture etc., under IAMP will be Geo- tagged. ▪ A mobile based Application will be developed for monitoring progress of technology demonstrations and impact in TN-IAMWARM project area. During the implementation phase, the following activities will be carried out by Department of Remote Sensing and GIS, TNAU.	
	Training/ Capacity-Building	▪ It shall develop suitable modules for training (CAPACITY BUILDING) of officers of line departments and arrange for these through various Research Stations / KVKs / Agricultural /Horticultural Colleges which are spread over in 35 locations across the state ▪ International training will also be identified and suitable nominations for the year program will be finalized at least 3 months in advance, in consultation with the Project Director, IAMP and the heads of Line departments	
	Implementation Management	▪ Continuous and close monitoring of project implementation (Project Monitoring Information System continuously updated) ▪ Quality Management procedures applied (through stakeholder/WUA social audits, Sub-Basin committee, , MDPU and quality management and monitoring consultants) ▪ Documentation of implementation status and issues for resolution – for example, any contract variation, performance of demonstrated technologies, etc. should be well supervised and documented and appropriate approvals sought. ▪ The Nodal Officer shall be responsible for: o Updating Project Monitoring Information System o Monthly Sub-basin Project Status Summary by Line Agency o Quality Management and Monitoring Reports o Monthly & Quarterly Progress Report (collated by MDPU)	

Stage	Activity Type	Key Activities	Timing
		o Final Completion Report by implementing agency (line dept.)	
Post-Implementation	Documentation & Evaluation	▪ The Nodal Officer at Head Quarters as nodal officer of the Sub-Basin committee, will, with the support of the other line departments and the Monitoring and Evaluation Consultant, help develop a Sub-basin ICR (integrated across all line dept. activities) and contribute to project Monitoring & Evaluation.	
	Sustainability & Scaling-Up	The Nodal Officer, TNAU will forward suggestions to MDPU to: ▪ Develop an O&M plan for sustainability of project activities in the Sub-Basin ▪ Develop any further Sub-basin Partnerships o Continue post-implementation monitoring • Determine approaches to address any identified gaps in ensuring sustainability of project investments • Determine approaches for up-scaling activities (including any follow-up project activities)	

Attachment 6.4

Summary Mapping of Sub basin Level Activity by Agriculture Department

Stage	Activity Type	Key Activities	Timing
Pre-Planning	Official Communication	• The Director of Agriculture to identify District JDAs for 66 Sub-basins who will be the District level Nodal Officer for the Project / Procurement Officer for the Sub-basin concerned.	1st week
	Information Cultivation	• The JDA / District Nodal Officer will co ordinate the collection of data on current agriculture scenario by the Sub-basin Nodal Officers / implementing Officers and furnish the same (in electronic form also).	Complete by 1st month
Preliminary stakeholder consultation		• The Sub-basin Nodal Officer / implementing officer should participate in the multiple stakeholder meeting at Sub-basin, village and tank levels convened by the EE WRD • In the meeting a date for joint walk survey will be decided • The Sub-basin Nodal Officer / implementing officer should participate in the joint walk through and get the feedback on their needs / expectation of the WUAs,	Sub-basin committee meeting in 3rd week Join walk through by 5th week
Planning	Training	• The Sub-basin Nodal Officer should identify immediate capacity - building needs (technical, administrative and others) in the	Completed by 2nd month

		Sub-basin and should organize such trainings / demonstrations. The Sub-basin Nodal Officer should document this in a brief training / capacity building plan.	
Implementation	Stakeholder discussion & Analysis	• The Sub-basin Nodal Officer should identify key countermeasures / solutions to address the issues / constraints taken into account. • The Sub-basin Nodal Officer and implementing staff to do preliminary identification of fields & farmers tank wise and development components of activities wise in consultation with stakeholders & line department officers concerned if necessary.	2nd month
	Sub-basin plan	• Based on the field visit and the needs expressed by the stakeholders and on the basis of water potential in the Sub-basin as assessed by WRD, designs on the introduction of new technologies for increasing crop area, productivity and the possible diversification of crops to less water intensive can be prepared. • The above draft plan should be iterated based on consultation with the Agricultural Marketing Department, AED, Tamil Nadu Agricultural University, WRD, Horticulture Department officials of the Sub-basin and also with Multi Disciplinary Project Unit.	Completed by 3rd month
		• The location of demonstration plots to be identified and consultations with the EE, WRD and the concerned WUAs on the prospects of assured delivery of water to the proposed area are to be ascertained. The Sub-Basin development plan and the cost estimate will then be forwarded to the World Bank and clearance obtained by MDPU. • Agriculture Department has to prepare detailed technical designs and cost estimates. • The Sub-basin plan will be presented at MDPU through a well designed power point presentation (with assistance of maps, Google Earth, etc) and comments solicited. • The final Sub-basin plan shall be agreed with the stakeholders, line department HODs, MDPU and forwarded for clearance by the project steering committee (through MDPU). After clearance by PSC and the World Bank, the concerned District JDA shall arrange for any required modifications (if any) as part of clearance.	

	Memorandum of Understanding	• In connection with laying of Demonstrations, the JDA shall discuss in details with WUAs and fix the fields and type of Demonstrations.	4th month
	Procurement and financial management	• The District JDA will initiate procurement activities with appropriate packaging and cost estimates following Bank Procurement Processes followed as outlined in project documents. • The District JDA will submit the procurement documents and cost estimates to the Empowered Committee through DOA for clearance. Once the empowered committee clears, the DOA with the support of the project cell in his office shall take appropriate action for preparation of bid documents as per procurement guidelines of the bank and contracts concluded in line with the procurement plans approved. • After signing of the Agreement by the contractor, the District Collector will be informed to monitor the implementation through the District Level Coordination Committee. • MDPU will examine the work / supply plans received of line agencies on the ongoing packages and for the next year's budget requirements and forward the budget demands to the finance department for inclusion in the state annual budget. • The JDA will report to the HODs, District level Coordination Committee and to MDPU on the physical and financial progress periodically. • The District Collector shall review implementation convening meeting often and resolve the issues. • The JDA should ensure that the works are completed as per time schedule agreed in the contract with the suppliers as well as in the approved procurement plan. • Simultaneously the JDA shall take up macro level impact caused by these demonstrations with frequent WUAs meetings and document them for perusal by the monitoring and evaluation consultant to be employed by the Multi Disciplinary Project Unit. • The accounts section of the DOA office should get the accounts reconciled periodically with AG and arrange to file reimbursement of claims promptly and follow it up till reimbursement communication from the World Bank as well as from the Government of India is received.	2nd month

	Implementation Management	• Quality Management procedures applied (of implementation by department and stakeholders) o Final completion report.	1st to 12th month
Post Implementation	Documentation & Evaluation	• The District JDA as Nodal Officer of the Sub-Basin committee, with the support of Monitoring and Evaluation Consultant, helps develop a Sub-Basin ICR (integrated across all line department activities) and contribute to project monitoring and evaluation. • The District JDA should note that the Sub-Basin atlas and Sub-Basin plans are to be revised every year.	1st to 12th month
	Sustainability & Scaling-UP	• The JDA shall submit to the Director of Agriculture (who will forward to MDPU) suggestions to develop suitable plan for sustainability of project activities in the Sub-Basin.	1st to 12th month

Attachment 6.5
Summary Mapping of Sub basin Level Activity by Horticulture Department

Stage	Activity Type	Key Activities	Timing
Pre-Planning	**Official Communication**	• Director of Horticulture & Plantation Crops to identify the Deputy Directors of Horticulture for 66 Sub-basins as Nodal Officer to facilitate, monitor the project with line departments	1st week
	Information Collection	• DDH will collect data on cropping pattern and cultivation packages in the Sub-Basin in electronic form where possible to MDPU for collation into an initial Sub-basin Atlas.	
	Preliminary Stakeholder Consultation	• DDH to participate in the Sub-basin Committee meetings by EE WRD with line depts., "ATMA" in the Sub- basin, PIM, Training and environment/Social Cells of Water Resources Organization • DDH along with the concerned ADH will join an "TNIAMP (IAMWARM II)Day" in the Sub-Basin to initiate discussions with Sub-Basin stakeholder	
Planning	**Training**	• The DDH to identify capacity-building needs (technical, administrative, other) in the Sub-Basin and organize such training.	
	Stakeholder Discussions & Analysis	• Based on technical analysis & effective stakeholder communication, identify key hardware (construction) and software (capacity-building/training) options (all key options should be considered including a no-activity option).	
	Sub-basin Plan	• Develop Draft Sub-basin Plan, discuss with stakeholders, line agencies and MDPU on cultivation packages, suitable crop diversification and possibility of the mechanization of farming in the Sub-Basin areas and demonstration on new crop technologies	
	Memorandum of Understanding	• DDH will develop draft MOU (based on model to be supplied by MDPU)	
Implementation	**Procurement and Financial Management**	• The District JDH/DDH will initiate procurement activities with appropriate packaging and cost estimate as per Bank procurement processes followed as outlined in project documents **TNIAMP (IAMWARM II)Cell and Procurement cell** • To scrutinize contract documents and evaluation reports from JDH/ DDHs before sending to Tender Award Committee • After approval of bid document/evaluation - reports with minutes of tender award committee to be sent to MDPU for onward transmission to World Bank for their clearance • Once the NOC is received from the bank through MDPU, JDH/	

Stage	Activity Type	Key Activities	Timing
		DDHs will finalize agreements and commence the works according to the procurement plans which will be monitored by this cell • Budget unit of cell shall arrange necessary funds to be issued to concerned DDHs through DHPC. • Annual budget plans on budget allocation needed as RE for current year and BE for the next year will be compiled and sent to the Project Director. PD will send them to finance department by November middle of every year	
	Training/ Capacity-Building **Implementation Management**	**TRAINING CELL :** • To develop suitable modules for training inside & outside of state (CAPACITY BUILDING) for officers of DOHPC, stake-holders. Also, frequent field-days involving stake-holders & line depts. will be devised & conducted.	
Post-Implementation	**Documentation & Evaluation**	• District JDH/DDH is the nodal officer of the Sub-Basin committee He will develop a Sub-Basin (Implementation Completion Report) ICR with the help of Monitoring and Evaluation Consultant & line depts. and contribute to project M & Evaluation.	
	Sustainability & Scaling-Up	• The DDH shall submit suggestions to develop an O&M Plan through DOHPC to MDPU for sustainability in the Sub-Basin Development activities.	

Attachment 6.6

Summary Mapping of Sub basin Level Activity by Agriculture Marketing Department

Stage	Activity type	Key Activities	Timing
Pre planning	1. Official Communication	DAM & AB to identify the Marketing Nodal officers for all the 66 Sub basins	1st week
	2. Information collection	The Nodal officer will collect the data on current scenario of the marketing activities to prepare a sub basin atlas / details and furnish the same to MDPU.	Completed by 1st month
	3. Preliminary stakeholder consultation	At sub basin level, a Sub basin Committee will be constituted by Executive Engineer with all Nodal officers as members and agencies like ATMA will be coordinated.	Sub basin committee meeting in 3rd week
	4. Project Day	The Sub basin committee will convene an "TNIAMP (IAMWARM II) Day" in the sub basin to initiate discussion with sub basin stakeholders, traders, agro processors, agro- entrepreneurs and other civil society associations.	
	5. Interactions	The interactions at Sub Basin level would include the following. • Presentation of TNIAMP (IAMWARM II) Project objective and marketing information. Discussions with stakeholders on what are the major sub basin constraints and opportunities • A date for joint walk through survey will be decided. • Document the list of stakeholders met and minutes of these meetings. • Zone of influence: • The location of marketing infrastructure sites are to be identified. • To develop a sub basin Joint walk through report in consultation with other line agencies. (iv) From the marketing perspective the walk through report should include the existing scenario (Vide 4:2:2:2 of Part B)	Joint walk through Report by 5th week
II. Planning	6. Training	(v) The Nodal officer will identify immediate capacity-building needs in the sub basin and organize such training.	6th week
	7. Stakeholder Discussions & Analysis	(vi) Based on sound technical analysis as well as effective stakeholder communication, identify key hardware (construction) and software (capacity-building / training) options including a no activity option.	8th week

	8. Sub basin development plan (Vide 4:2:2:4 of Part B)	(vii) Marketing Nodal officer to develop a draft Sub basin development plan and discuss the plan with stakeholders, other line agencies and MDPU (viii) The final Sub basin development plan shall be agreed with the stakeholders, Line Department HODs, MDPU and forwarded, for clearance by the Project Steering Committee.	
	9. Memorandum of understanding	(ix) The Executive Engineer, WRD will develop a draft MOU inclusive of all Departments concerned	
III. Implementation	10. Procurement and financial management Vide Annexure II of Part B.	The Directorate of Marketing and Agribusiness will initiate procurement activities with appropriate packaging and cost estimation following Bank procurement processes as outlined in project documents.	9th week
	11. Implementation management	(x) Continuous and close monitoring of project implementation (Project Monitoring Information System continuously updated) (xi) Quality management procedures applied. - Conduct of Farmers Meets at different stages of crop cultivation and harvest, involving farmers, traders, agro processors and other marketing personnel.	
	12. Documentation and Evaluation	(xii) Nodal officer to help the sub basin Executive Engineer to develop a sub basin ICR and contribute to project monitoring and evaluation. (xiii) Sub basin Atlas and Sub basin development plans are to be revised every year.	
	13. Sustainability and scaling up	(xiv) The Nodal officer shall submit proposals to - Develop an O&M plan for. - Further sub basin partnerships - Continue post implementation monitoring. - Approaches for up scaling activities.	

Attachment 6.6.a

Template for release of project grant to FPOs for creation of CSCs

(To be prepared and signed on a Stamp Paper)

Group photograph of the members

1) This Grant Agreement is made on the day …….. of ……. 20……, ……..……District (Name of the project district) of Tamil Nadu.

a. BETWEEN

2) …… (Name of the Farmer Producer Organization under ……. Cluster/Block), at ……..…….. District (Name of the project district) of Tamil Nadu, herein referred to as "First Party".

a. AND

3) Commissioner of Agricultural Marketing and Agri Business herein referred to as "Second Party".
4) This agreement is drawn up for the purpose of releasing the grant for setting up of *Common Service Centre*, which will help the members of the Farmer Producer Organizations and the farmers as a whole from the project districts in post harvest management and market linkage for the project commodities.
5) Out of the total cost of setting up the Common Service Centres, initially……(percentage of the grant) will be borne by the First Party and……(percentage of the grant) will be the grant from the project to the First Party as per World Bank agreement.
6) Terms and Conditions:
   - The First Party shall have to invest an amount of Rs.……..(write in numbers) (Rupees…….. .....write the amount in words) as their initial share portion in the form of cash/kind on the activity.
   - The First Party shall have to follow the Departmental Procedure as set out in World Bank Procurement Regulations for IPF borrowers July 2016 for procurement activity in satisfaction with the Party of Second.
   - The First Party shall have to produce documentary evidence of their investment and contribution from the members made on the activity to the Second Party.
   - Maintenance of the Common Service Centres established from the grant will lie with the First Party and will record the status of utilization of the centres in a log book on daily basis.
   - Department of Agricultural Marketing and Agri Business will have every right to monitor the utilization of the grant at any time and take action for illegal utilization.
   - Proper utilization registers will be maintained by the First Party and the Second Party will have every right to monitor and audit them.
   - Status of utilization of the assets created shall be provided to the second party by the first party on a monthly basis and whenever demanded.
   - Charging of user fees against utilization of the Common Service Centres lies at the discretion of the First Party in consultation with the Second Party.
   - The First Party shall be liable for timely submission of Utilization Certificates and Statement of Expenditures along with the vouchers to the Second Party.
   - The expenditure of the First Party in relation to grants shall be audited through Internal Audit appointed by the MDPU
   - The Second Party shall have the right to suspend or terminate the right of a beneficiary FPO to withdraw and use the proceeds of the Grant in the following circumstances: i) upon any failure of the FPO to perform its obligations in accordance with respect to the Grant; or ii) upon the Bank declaring the FPO ineligible.

- The First Party shall consent to the Tamil Nadu and/or the Borrower's right to restitution of any amounts of the Grant disbursed with respect to which fraud and corruption has occurred, or with which an ineligible expenditure has been paid.
- Any dispute between First Party and Second Party will be resolved amicably by the Arbitration appointed by the Second Party.

Name and Signature of the First Party
(President/Secretary of the FPO)

Name and Signature of the Second Party
(Commissioner of Agricultural Marketing and Agri Business)

Witnesses:

- Nodal Officer of the sub-basin.
- Signature of the Deputy Director of Agriculture (Agri Business).
- Two members from the General Body (one preferably to be women)

Photograph of the Women Entrepreneur

Attachment 6.6.b

Template for release of project grant to Women Entrepreneur

(To be prepared and signed on a Stamp Paper)

1. This Grant Agreement is made on the day …….. of …….. 20……, ……..…….District (Name of the project district) of Tamil Nadu.

BETWEEN

2. …… (Name of the Women Entrepreneur)…….. (Address) at …….. District (Name of the project district) of Tamil Nadu, herein referred to as "First Party".

AND

3. Commissioner of Agricultural Marketing and Agri Business herein referred to as "Second Party".
4. This agreement is drawn up for the purpose of releasing the grant to women entrepreneur for small scale business for the project commodities.
5. Out of the total cost, initially……(percentage of the grant) will be borne by the First Party and……(percentage of the grant) will be the grant from the project to the First Party as per World Bank agreement.
6. Terms and Conditions:
   - The First Party shall have to invest an amount of Rs……..(write in numbers) (Rupees…….. .write the amount in words) as their initial share portion in the form of cash/kind on the activity.
   - The First Party shall have to follow the Departmental Procedure as set out in World Bank Procurement Regulations for IPF borrowers July 2016 for procurement activity in satisfaction with the Party of Second.
   - The First Party shall have to produce documentary evidence of their investment and contribution from the members made on the activity to the Second Party.
   - Department of Agricultural Marketing and Agri Business will have every right to monitor the utilization of the grant at any time and take action for illegal utilization.
   - Proper utilization registers will be maintained by the First Party and the Second Party will have every right to monitor and audit them.
   - Status of utilization of the assets created shall be provided to the second party by the first party on a monthly basis and whenever demanded.
   - Charging of user fees against utilization of the machineries/post harvest equipments lies at the discretion of the First Party in consultation with the Second Party
   - The First Party shall be liable for timely submission of Utilization Certificates and Statement of Expenditures along with the vouchers to the Second Party.
   - The expenditure of the First Party in relation to grants shall be audited through Internal Audit appointed by the MDPU
   - The Second Party shall have the right to suspend or terminate the right of a Women Entrepreneur to withdraw and use the proceeds of the Grant in the following circumstances: i) upon any failure of the Women Entrepreneur to perform its obligations in accordance with respect to the Grant; or ii) upon the Bank declaring the Women Entrepreneur ineligible.
   - The First Party shall consent to the Tamil Nadu and/or the Borrower's right to restitution of any amounts of the Grant disbursed with respect to which fraud and corruption has occurred, or with which an ineligible expenditure has been paid.
   - Any dispute between First Party and Second Party will be resolved amicably by the Arbitration appointed by the Second Party.

Name and Signature of the First Party
(Women Entrepreneur)

Name and Signature of the Second Party
(Commissioner of Agricultural Marketing and Agri Business)

Witnesses:

- Nodal Officer of the sub-basin.
- Signature of the Deputy Director of Agriculture (Agri Business).

Attachment 11.1
Results Framework and Monitoring

PDO Level Results Indicators	Core	unit	Baseline	Cumulative Target Values							Frequency	Data Source/ Methodology	Responsibility for Data Collection
				PY1	PY2	PY3	PY4	PY5	PY6	[3]PY7			
1.Area provided with improved irrigation and drainage services (ha)[4]	☒	Hectare	-	1,600	16,000	56000	88,000	112,000	136,000	160,000	Annually	Revenue Department	Line Dept, and MDPU
2.A. Yields of agriculture crops i). Rice ii). Maize iii). Pulses	☒	Kgs/Ha	Average of Previous 5 years – 3390 4943 520	 3750 5400 540	 3850 5560 550	 3950 5720 560	 4050 5880 570	 4150 6040 580	 4200 6150 590	 4250 6200 600	Annually	Departmental Reports	Line depts.
2.B. Yields of horticulture crops i). Vegetables (Brinjal, Bhendi & Tomato) ii). T.C Banana	☒	MT/Ha	Average of Previous 5 years 9.216 42.000	 10.500 50.000	 10.950 52.600	 11.400 55.200	 11.860 57.800	 12.310 60.400	 12.650 62.000	 12.759 63.000	Annually	Departmental Reports	Line depts.
3.Area under climate resilient technologies (SRI, RCT, etc.)		Hectare	-	15000	30000	45000	50000	60000	70000	75000	Annually	Departmental Reports	Line depts.
4.Area under non-paddy crops		Hectare	-	10000	15000	25000	35000	50000	60000	75000	Annually	Departmental Reports	Line depts.
5. Share of selected commodities sold through new marketing channels		Percent	-	0	1	5	10	15	20	20	Annually	Departmental Reports	Line depts.
6.A.Project Beneficiaries (including female) 6.B. Female Project Beneficiaries		Number	-	5,000 2,250	50,000 22,500	100,000 45,000	200,000 90,000	300,000 135,000	400,000 180,000	500,000 225,000	Annually	Departmental Reports	Line depts.

[3] Year 7 values are the cumulative total of achievements of all previous years

[4] Reduction in partially irrigated and gap areas.

PDO Level Results Indicators	Core	unit	Baseline	Cumulative Target Values							Frequency	Data Source/ Methodology	Responsibility for Data Collection
				PY1	PY2	PY3	PY4	PY5	PY6	[5]PY7			
7.Staff trained in water resources planning and management, improved service delivery both within WRD &allied departments and agencies		Numbers	-	50	200	400	550	700	850	1,000	Annually	Annual Reporting	Line dept
8.Sub-basin development plans jointly prepared, agreed and under implementation by multiple agencies		Numbers	-	18	36	56	66	Updating of sub-basins and implemented	Updating of sub-basins and implemented	Updating of sub-basins and implemented	Annually	Annual Reporting	Line Dept and MDPU
9.Tank Irrigation system modernized		Numbers	59	150	350	1100	2000	3000	4000	4800	Half Yearly	Annual Reporting	WRD
10.Staffing and operationalizing PIM wing in EIC office and Regional offices		Numbers	13	24	24	24	24	24	24	24	Annually	Annual Reporting	WRD
11.Operational water users associations created and/or strengthened	☒												
11 A Operational water users associations created		Number	-	-	800	800	1600	2400	3200	-	Annually	Annual Reporting	WRD
11B i)WUAs undertaking OFD works		Percentage				25	25	25	25	25	Annually	Annual Reporting	WRD PIM Wing
ii) WUAs conducting rotational water supply or utilizing other water management practice		Number				100	200	300	400	500	Annually	Annual Reporting	WRD PIM Wing
12.Multi Sectoral Convergence and Vision building trainings, with officers etc. and community involvement on a single platform		Number	-	18	36	56	66	132			Annual	Annual Reporting	WRD & Line Depts

[5] Year 7 values are the cumulative total of achievements of all previous years

Intermediate Results Indicators	Core	unit	Base-line	Cumulative Target Values							Frequency	Data Source/ Methodology	Responsibility for Data Collection
				PY1	PY2	PY3	PY4	PY5	PY6	PY7			
13.Area under micro irrigation		Hectare	-	1,500	4,000	6,000	8,000	10,000	12,000	12,000	Annually	Departmental report	Line Dept
14.Area under improved agronomic practices		Hectare	-	5,000	30,000	60,000	70,000	90,000	100,000	100,000	Annually	Departmental report	Line Dept
15.Area covered by IPM/INM/Organic farming		Ha	-	1000	2500	3500	5000	7000	8000	8000	Annually	Departmental report	Line Dept
16.Increase in milk productivity by dairy cow		Lts / cow / Day	5 Lts / cow / day[6]	-	-	5.25	5.5	5.75	6	6.25	Annually	Sample milk recording	AHD
17. Production of Heifer calves		No			20,000	41,000	73,000	116,000	160,000		Annually	AHD records	AHD
18.Area under improved fish production		Hectare	-	-	-	10,800	14,400	18,000	21,600	25,100	Annually	Fisheries Dept Records	Fisheries Dept
19.Number of FPOs formed and strengthened		Number	-	-	20	40	70	90	120	120	Annually	Departmental report	Dept of Agri. Marketing
20. MDPU adequately staffed and functioning effectively		Number	27	55	55	55	55	55	55	55	Annual	Annual report	MDPU

[6] Based on IAMWARMP baseline plus 10%

Attachment 11.2
Results Chain