Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project (APIIATP)

Environment and Social Management Framework – Volume 1

March 2018

State Project Director
APIIATP
Water Resources Department
Vijayawada 520003
Andhra Pradesh

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Sutra Consulting

ACKNOWLEDGEMENTS

Sutra Consulting is thankful to the Water Resource Department, Government of Andhra Pradesh for providing us the opportunity to undertake this important assignment.

I convey my sincere gratitude to Dr. P.S. Raghavaiah, IFS, Special Commissioner, CADA for his guidance and support to the project team. I wish to thank Smt. Y.V. Rajarajeswari, Superintending Engineer for her immense support and cooperation. The Joint Director, Agriculture, Executive Engineer, Dy. Executive Engineer, Asst. Executive Engineers, Asst. Director of Agriculture, Chief Engineer, Minor Irrigation and Dy. Executive Engineer, MI, CADA have provided unfailing support and I thank them for the same. I would also convey my sincere thanks to all the PMU Experts for supporting the project team at various stages of the assignment.

I wish to thank the World Bank Mission members comprising of Messrs./Mmes. Ranjan Samantaray (Task Team Leader), Kazuhiro Yoshida (Co-TTL), Balagopal Senapati (Procurement), Dilip Prusty (Finance), S Satish (Social & Institutional Development), Anupam Joshi (Environment), Paul Sidhu (Agriculture), R K Malhotra (Construction Engineering), Martin Kumar (Fisheries), Sudhirendar Sharma (Climate Resilient Agriculture, M&E), Sekhar Muddu (Hydrology, Water Use Efficiency), Fokke Fenemma (Agribusiness), Rohan G Selvaratnam (Cost Table), Saumya Srivastava (Agribusiness), and Yukitsugu Yanoma (Economic Analysis) for providing valuable guidance at various meetings especially on the Social, Institutional and Environmental aspects during the preparation of this report.

I wish to thank the Superintending Engineers, Executive Engineers, Deputy Executive Engineers, Assistant Executive Engineers, Work Inspectors and Revenue Officials like VROs and Village Assistants in the districts where the assignment was conducted for their untiring support and cooperation.

This acknowledgement would remain incomplete without thanking the farmers and community members in all sample tanks visited for their co-operation during the study.

I am hopeful that this report would serve as a useful document and would prove to be relevant for the various stakeholders associated with the project.

DIRECTOR
SUTRA CONSULTING

ESMF STUDY TEAM

KEY EXPERTS		
1.	Smt T. Katyayani	Team Leader
2.	Sri J. Prasad	Social Specialist
3.	Smt R. Rama Devi	Gender Specialist
4.	Sri Manoj Kumar	Engineering Expert
5.	Sri D. Senthil	Environmental Specialist
6.	Smt G. Padma	Environmental Specialist
INVESTIGATORS		
1.	Sri Pratik Katare	Field Survey Supervisor
2.	Sri Narendra	Field Investigator
3.	Sri Raju	Field Investigator
4.	Smt Sujatha	Field Investigator
5.	Smt Ch. Lakshmi	Field Investigator
6.	Smt Neelima	Field Investigator
7.	Sri Akhil	Field Investigator

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LIST OF ABBREVIATIONS

ACZ	Agro-Climatic Zone
AE	Assistant Engineer
AP	Andhra Pradesh
APCBTMP	Andhra Pradesh Community Based Tank Management Project
APIIATP	Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project
APLMA	Andhra Pradesh Land Management Authority
APFDC	Andhra Pradesh Forest Development Corporation
APSAC	Andhra Pradesh Space Application Centre
APWALTA	Andhra Pradesh Water, Land and Trees Act
APWSIP	Andhra Pradesh Water Sector Improvement Project
BC	Backward Class
BOD	Biological/ Biochemical Oxygen Demand
BP	Bank policies
CADA	Command Area Development Authority
CB	Capacity Building
CCMC	Cascade Coordination and Management Committee
CDP	Cascade Development Plan
COD	Chemical Oxygen Demand
CPP	Cultural Property Plan
CSO	Civil Society Organisation
DI	Diversity Index
DLIC	District Level Implementation Committee
DO	Dissolved Oxygen
DoWR	Department of Water Resource
DPD	District Project Director
DPU	District Project Unit
DRDA	District Rural Development Agencies
DSP	Dam Safety Plan
EA	Environmental Assessment
EC	Electrical Conductivity
EM	Environment Management
EMF	Environment Management Framework
EMP	Environment Management Plan
ESMF	Environment and Social Management Framework
FCS	Fishermen Cooperative Society
FTL	Full Tank Level
GAP	Gender Action Plan
GHG	Green House Gas
GO	Government Order
GoAP	Government of Andhra Pradesh
GoI	Government of India
GP	Gram Panchayat
GRC	Grievance Redressal Committee
GRM	Government Redressal Mechanism
GSDP	Gross State Domestic Product
GVA	Gross Value Added
GW	Ground Water
HH	Household
HYV	High Yield Variety
ICM	Integrated Crop Management

ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IEC	Information, Education and Communication
ILO	International Labour Organisation
IMD	India Meteorological Department
INM	Integrated Crop Management
INMP	Integrated Crop Management Plan
INR	Indian Rupee
IPCC	Inter-Governmental Panel on Climate Change
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
ISEC	Institute for Social and Economic Change
ISFR	India State of Forest Report
ISMP	Integrated Social Management Plan
JE	Junior Engineer
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MT	Metric Tonne
NGO	Non-Government Organisation
NHP	Natural Habitat Plan
NPK	Nitrogen Phosphorous Potassium
NSDP	Net State Domestic Product
NSSO	National Sample Survey Organisation
OC	Organochlorine
OP	Operational Policies
PAD	Project Appraisal Document
PESA	Panchayat Extension to Scheduled Areas Act
PH	Potential of Hydrogen
PIP	Project Implementation Plan
PMU	Project Management Unit
PPE	Personal Protective Equipment
PR & RD	Panchayati Raj and Rural Development
PRECIS	Providing Regional Climates for Impacts Studies
PRI	Panchayati Raj Institution
PSC	Project Steering Committee
RFCTLARRA	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
RFCTLARRR	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules
RPF	Resettlement Policy Framework
RTBV	Rice Tungro Bacilliform Virus
RTD	Rice Tungro Disease
RTSV	Rice Tungro Spherical Virus
SAC Barrage	Sir Arthur Cotton Barrage
SAR	Sodium Absorption Ratio
SC	Scheduled Caste
SDSO	State Dam Safety Organisation
SEMF	Social and Environmental Management Framework
SIA	Social Impact Assessment
SMF	Social Management Framework
SO	Support Organisation
SRI	System of Rice Intensification
SSP	Sector Specific Plan
ST	Scheduled Tribe
TDP	Tank Development Plan

TDS	Total Dissolved Solid
THI	Temperature Humidity Index
TLIA	Tank Cluster Level Implementation Arrangement
TOR	Terms of Reference
TPPF	Tribal People Policy Framework
UK	United Kingdom
UNCED	United Nations Conference on Environment and Development
USA	United States of America
VOC	Volatile Organic Compound
WUA	Water User Association

EXECUTIVE SUMMARY

Background

Andhra Pradesh (AP) has a long tradition of tank based irrigation and farmers for years have been dependent on the elaborate systems of tanks for irrigating agricultural lands. The state has about 40,000 minor irrigation sources spread across thirteen districts. The geographical area of the state is about 402.7 lakh acres of which the total cultivable area is around 199 lakh acres. Irrigation potential has been created for 103 lakh acres through major, medium and minor irrigation projects. The performance of the tanks system in AP however witnessed a decline in the past two decades due to a variety of factors including heavy siltation in tank bed and inflow channels, growing forests, damages in sluices, field channels and bunds weirs.

The Government of AP (GoAP) with support from the World Bank implemented the Andhra Pradesh Community Based Tank Management Project (APCBTMP) with an objective of improving agricultural productivity and building capacities of Water User's Associations (WUAs) to manage tanks effectively. During the course of implementation of the APCBTMP there was a realization of the need for development of more holistic interventions which aimed not only to improve productivity of crops but also maximize returns by reducing gaps in supply and demand chain. A specific need to focus on interventions that disseminated and facilitated adoption of technology by farmers, created awareness on quality standards, organized farmers and promoted collective sale and purchase of inputs and produce was identified during the course of this project.

It is in this context that the World Bank and the Government of Andhra Pradesh conceptualized the ***Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project (APIIATP)***. The project adopts a holistic and synergized approach that seeks integration across relevant stakeholders of selected minor irrigation tanks across the state under different agro climatic zones.

The Project Development Objective of APIIATP is to ***enhance agricultural productivity, profitability and resilience to climate variability in selected tank systems of Andhra Pradesh***. In line with the "*Transformation*" objective, the project aims to promote inclusive rural growth, develop and disseminate new agricultural and water management technologies, climate resilient agriculture, enhance market linkages for small and marginal farmers and improve water and natural resource management. The proposed project will have positive impacts in terms of environmental protection and reduced greenhouse gas emissions by disseminating high efficiency irrigation systems and promoting diversification to pulses and high value crops which would significantly reduce water and carbon footprints.

As a part of the project preparation, a number of advisory and analytical studies have been undertaken. One of them relates to identifying and addressing environment and social issues. Towards this end the project has prepared an environmental and social management framework and associated Management Plans. The Environmental and Social Management Framework (ESMF) approach is adopted as the selection of tanks and the nature and extent of interventions will become explicit over time, as and when they are selected.

Objectives of the Study

An Environmental Management Framework (EMF) and Social Management Framework (SMF) have been developed with a view to guide interventions and ensure that project activities do not cause any harm and are in compliance with the applicable national and local regulations, as well as World Bank safeguards policies. Comprehensive social and environmental assessments have been conducted so as to enable the preparation of environmental and social management frameworks for the specific identified investments. These will ensure that potential adverse impacts are adequately mitigated and potential benefits are enhanced to improve effectiveness and sustainability of the project. The relevant portions of the frameworks will be suitably integrated with the contract documents to facilitate smooth implementation during the rehabilitation and operation phases.

Approach and Methodology

The requisite information has been generated from both primary and secondary sources through participatory rural appraisals comprising consultations with relevant stakeholders at different levels- state, district and village. A baseline assessment was undertaken in a sample of 121 tanks, comprising of 102 project tanks and 19 control tanks. Of this sample, a set of 18 tanks across eleven districts were selected for conducting an in-depth environmental and social assessment. Three of these tanks are in tribal/scheduled areas. The tanks were selected keeping in mind factors such as ACZ and district where they were located, presence of tribal population, registered ayacut area and height of tanks (including a sample of tanks with height above 10 meter for which Dam Safety Plans were to be developed).

The data collected from secondary sources was complemented by information gathered from field level consultations with officials of Irrigation, Revenue and other relevant Departments and interviews with members of WUAs. In addition, interviews and focus group discussions were conducted with men and women farmers, members of women self-help groups etc. in sample tanks.

Environmental and Social Policy Framework

The environmental and social legislations of GoI and GoAP applicable to the project components have been reviewed. The relevant environmental policies include: *National Water Policy, 2012; Water Prevention and Control of Pollution Act, 1974; Andhra Pradesh State Water Policy, 2008; Andhra Pradesh Farmers Management of Irrigation Systems Act, 1997; Andhra Pradesh Water Resources Development Corporation Act, 1997; Insecticides Act, 1968 ; The Air (Prevention and Control of Pollution) Act, 1981; National Conservation Strategy and Policy of Environment and Development, 1992; Environment Impact Assessment Notification, 2006; Andhra Pradesh Water, Land and Trees Act and Rules, 2002; Solid Waste Management Rules, 2016; Hazardous And Other Wastes (Management and Trans-boundary Movement) Rules, 2015; Construction and Demolition Waste Management Rules, 2016 and Noise Pollution and Control Rules, 2000.*

The relevant social policies include:*73rd Amendment of the Constitution, 1992; 5th Schedule of the Constitution (Article 244 (1)); Panchayat Extension to Scheduled Areas Act (PESA), 1996; The Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Rules, 1995; The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; Agency Tracts Interest and Land Transfer Act, 1917; Andhra Pradesh Scheduled Castes Sub Plan and Tribal Sub Plan (Planning, Allocation and Utilization of Financial Resources) Act No. 1, 2013; Andhra Pradesh Scheduled Areas Land Transfer Regulation, 1959; Andhra Pradesh (Andhra Scheduled Areas) Estate*

(Abolition and conversion into Ryotwari) Act; Andhra Pradesh Mutta (Abolition and Conversion into Ryotwari) Regulation,1948 and 1969; Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013; Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Bill, 2015; Andhra Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules (RFCTLARRR), 2014; Andhra Pradesh Government Land Allotment Policy, 2012; Minimum Wages Act, 1948; Mahatma Gandhi National Rural Employment Guarantee Act, 2005 and National Policy for Farmers, 2007.

The World Bank safeguard policies that are triggered are *OP 4.01: Environmental Assessment; OP 4.04: Natural Habitat; OP 4.09: Pest Management, OP/BP 4.10: Indigenous People, OP/BP 4.11: Physical Cultural Resources, OP/BP 4.12: Involuntary Resettlement, OP 4.37: Safety of Dams and OP 7.60: Projects in Disputed Areas.*

Tank Description and Characteristics

Tanks in Andhra Pradesh are characteristically quite diverse on many fronts; age, size of ayacut, sources of water, type (independent or cascade) as well as socio-economic and cultural aspects. On the social front, diversity is distinguishable based on caste, resource endowment and tribal/cultural parameters.

The newest constructed tank is more than 75 years old while the oldest tanks in scarce rainfall and southern zones have been in existence for more than 500 years. All the sample tanks are multipurpose in terms of usage; however, their usage has declined due to reduced water availability. Some of the tanks have been dry since the past couple of years as they are dependent on rain. Continuous dry spells have led to a situation wherein villagers are not entirely dependent on tanks either for drinking or domestic use.

Siltation of tanks is a commonly observed phenomenon and is taking place largely because of degradation of catchment forests and vegetation. Tanks are dependent on the catchment area; however this was found to be completely degraded in some tanks and in several others the vegetative cover ranged from moderate to low. Silt deposited on the bed reduces the storage capacity and hence the silt accumulation on the bed reflects upon the irrigated area under a given tank. The tank-bed is also used for purposes such as cultivation of seasonal crops, collection of silt for application on farm fields and commercial activities like brick kilns and pottery. In the process the tank-beds are prone to weed growth which affects storage capacity and ultimately the efficiency of the tank system.

Weed growth was observed in the sample tanks; primarily *Ipomea cornea*, *Prosopis juliflora* and *Water hyacinth* were found to be occasionally mixed with some local bushes. Over years the farms close to the boundary of the command area are also using water from the tanks. Distribution system of a tank depends on the strength of the bund and functional status of the sluices, field channels and drops. Several tanks had bunds and sluices that require repairs. Similarly repairs were also required in surplus weirs and feeder channels.

Environment Assessment

Andhra Pradesh has a tropical climate with moderate to subtropical weather. Humid to semi-humid conditions prevail in the coastal areas while arid to semi-arid situations are prevalent in the interior parts of the state, particularly Rayalaseema. The coast between Ongole and Machilipatnam is recognized as being vulnerable to high surges and the severity of cyclones and storm surges is expected to increase as a consequence of climate change. The state can be divided into five Agro

Climatic Zones (ACZs) namely, scarce rainfall, south coastal, north coastal, Krishna Godavari and high altitude and tribal areas. The state is dominated by red soils (less fertile) covering about 65% of area, followed by black soils (medium fertile 25%) and alluvial soils (most fertile 10%).

The agriculture sector is one of the most critical sectors in the economy of the state. Rice is the most important cereal crop grown and the percentage of gross cropped area under rice cultivation is highest in SPS Nellore and lowest in Anantapur. The cropping intensity in the state ranges from a high of 1.69 in East Godavari to a low of 1.07 in Anantapur[1]. Fishery is another important sector and there are a total of 104 reservoirs with 2.40 lakh hectares water spread area. There are about 25,400 tanks with an area of about 3.38 lakh ha, aquaculture ponds 42,100 with an extent of 1.25 lakh ha, one fresh water Kolleru lake with an extent of 0.90 lakh ha and rivers and canals covering a length of 11,514 Kms.

The key parameters that were studied as part of the environment assessment included surface water quality, tank bed sediment quality, forests and bio-diversity and avian, floristic and fish diversity. Total Dissolve Solids (TDS) values are found to be well below drinking water permissible limits in all tanks except for one. Dissolved oxygen levels are satisfactory with the value ranging between 5 mg/l to 7.3 mg/l. Tank bed sediments a generally clay, which improves moisture retention, water holding capacity and provides essential macro and micro nutrients required for the plant growth. The cyclic nature of the tanks has also helped in the diversity of species. The vegetative growth in and around the tank and its environs has attracts various forms of life- avian, amphibians and reptiles. Of the 18 sample tanks in which an in-depth environmental and social assessment was undertaken, seven have a height of more than 10 meters and fall under the purview of dam safety.

The major environmental issues identified include dam safety, siltation and sedimentation and application of fertilizers and pest management. The key issues with regard to dam safety include cracks on crest, seepage and status of toe drains and leakage through head regulator gates. With respect to siltation the issues include improper land use pattern in catchments, siltation of feeder channels, foreshore, tank proper and canal/drainage line. The issues affecting pest and fertilizer management include non-availability of Integrated Pest Management mechanism, quantum of application, safety methods adopted during application and ground water pollution due to heavy leaching of nitrogenous fertilizer.

Environment Management Framework (EMF)

The proposed project will induce both positive and negative impacts. For instance on the negative side, owing to increased use of irrigated agriculture, the project will lead to increased use of agro-chemicals. This triggers the World Bank Operational Policy OP 4.09 on pest management. According to the Millennium Development Goals, although irrigated agriculture has negative impacts, as far as groundwater recharge is concerned it has positive connotations. However, it is necessary that the proposed project provides plans and strategies to safeguard the wider interests of the community.

The EMF produces a mechanism to identify the key environmental concerns and to screen projects on the basis of the impacts and risks. It includes Action Plans containing measures to address key issues like Dam Safety, Nutrient Management, Pest Management, Cultural Property Management and Natural Habitat that arise as part of the project. The EMF will serve as a road map to be followed by implementing agencies during various stages of the project. The application and implementation of the EMF will also support achievement of compliance with applicable laws and regulations as well as with requirements of relevant Bank policies.

[1](Source: http://www.ap.gov.in/wp-content/uploads/2016/01/5-AP-Agri.pdf)

The overall outcome of the EMF is to ensure that environmental opportunities are enhanced and adverse impacts are minimized and fully mitigated. In particular, the EMF for this project seeks to ensure the achievement of outcomes such as: dam safety concerns are addressed effectively (e.g. dam safety panel formed and operational, dam safety measures/instrumentation completed), sustainable agriculture practices effectively promoted in tank command (e.g. awareness building, IPM, INM, organic farming, water conservation, conjunctive use, etc.) and silt and weeds in tanks effectively managed.

Social Assessment

Social assessment has revealed extensive diversity in tank communities across intra- and inter-tank, village, district and regional levels. This is reflected amply in terms of aspects such as categories of farmers, occupations, housing status and assets, landholdings, cropping pattern, agriculture production and productivity levels, livestock ownership, fisheries activity, household income and expenditure, sources of agricultural information and adoption of agricultural practices.

The state/country distinguishes the social strata/households into Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Community (OBC) and others. The sample data shows that the SCs constitute 6.4%, STs 15.8% and OBCs 44%. Thus nearly 66% of the households would require to be "included" within the framework of the project.

Half the number of Ayacutdars (households owning land in the Tank command) are Marginal, owning less than 1 Hectare of land. Small farmers (1-2 Ha) constitute 29%. The remaining 21% are medium and large farmers. It is important to note that while 50% of the farmers are marginal they own only 18% of the land in the ayacut. Small farmers forming 29% of the sample own around 28% of the land. The 21% medium and large farmers account for the majority 54% of the land. Further the baseline data shows that 83% are owner cultivators. Given this land ownership, majority of the households adopt subsistence agriculture.

Land use pattern has been largely dominated by paddy in the study region. However, in addition groundnut, maize, sunflower, oil palm, green gram, coconut, black gram, mango, vegetables, other cash crops are also grown in small areas in tank command areas. Sale of all produce except chilli is undertaken at the village level to the local or sub-division level traders. Livestock rearing is a significant activity in the sample villages. Nearly 99% of households have at least one animal in their possession. Apart from agriculture and grazing, fisher folk also are dependent on tank areas and fishing activity was observed in 35 of the project tanks.

Water Users Association (WUAs)

Andhra Pradesh deploys Water User Associations (WUAs) as vehicles of community participation, viz, local level institutions, primarily to ensure effective and decentralized local level operation and maintenance of Minor Irrigation tanks. This has legitimacy through the Andhra Pradesh Farmers Management of Irrigation Systems Act, 1997 (APFMIS Act). According to the APFMIS (Amendment) Act, 2017 every water users area shall be divided into Territorial Constituencies which shall be minimum of six and maximum of twelve depending on the extent of command area and administrative feasibility. The selection of a managing committee consisting of one member from each of the territorial constituencies of a water users area by a simplified procedure of selecting the representative by consensus and where there is no consensus, it shall be by simplified procedure like show of hands or distribution slips in the manner prescribed.

The Government of Andhra Pradesh had amended section 34 of APFMIS Act, 1997 (Act 11 of 1997) on the 16th June, 2015 through an Ordinance for constituting the WUAs with President/Chairman, Vice President/Vice Chairman and 4 members as appointed by the General Body of the Farmers' Organizations by consensus to exercise powers and perform the functions of a farmers organization and the Managing Committee thereof till such time such farmers organization is duly constituted or re-constituted and such Managing Committee assumes office under the provisions of this Act. The current set of WUAs started functioning from the year 2015 and all of them are working under transitional arrangements. In respect of inclusion and equity, certainly there is further scope for participation by SCs, STs and women. The provision of co-opting women GP members also needs to be fully made use of.

Stakeholder Consultations

A number of consultations have been held with relevant stakeholders across all levels. A district level disclosure workshop was held at Araku Valley (a tribal/scheduled area) on the 28th November 2017 to share and evince feedback on the draft ESMF. A state level workshop was held at Vijayawada on21st December 2017 to share the final draft ESMF report with the public at large, and stakeholders in particular.

Key issues identified during consultations and addressed thus far include dominance by economically and socially better-off groups, high levels of vulnerability of scheduled tribes, inadequate representation of and participation by women, skewed composition and inadequate functioning and limited financial capacity and inadequate capacity building of WUAs and their committees.

Social Management Framework (SMF)

The SMF has been developed to enable address the key social issues including safeguards. The overall framework helps in identification of social concerns at the sub-project level and anticipated social impacts of the proposed interventions and provides recommendation to address identified social issues at various stages of sub-project cycle. The key issues that the framework addresses relate to: inclusion and equity; land; tribals; gender and WUAs. Towards this, the following find a place: WUA strengthening/capacity building, Gender Action Plan (GAP), Tribal People Planning Framework (TPPF) and Resettlement Policy Framework (RPF). These will be fed into an overall Cascade Development Plan (CDP) which will guide the entire project management activities.

Plans and Frameworks

Based on the World Bank safeguard policies that have been triggered by the proposed project, specific plans have been developed. These are:

1. **Integrated Nutrient Management Plan (INMP):** The aim of Integrated Nutrient Management (INM) is to integrate the use of natural and man-made soil nutrients to increase crop productivity and preserve soil productivity for future generations[2]. INM aims at optimal use of nutrient sources on a cropping-system or crop-rotation basis. This encourages farmers to focus on long-term planning and make greater consideration for environmental impacts.
2. **Integrated Pest Management Plan (IPMP):** IPM is a holistic approach to sustainable agriculture that focuses on managing insects, weeds and diseases through a combination of cultural, physical, biological and chemical methods that are cost effective, environmentally sound and socially acceptable. This includes the responsible use of crop protection and plant

[2] FAO, 1995a

biotech products. The goal of Integrated Pest Management (IPM) is to identify, prevent, and eliminate conditions that could promote or sustain a pest population with a food manufacturing, storage, or transportation operation.

3. **Cultural Property Plan (CPP):** CPP aims to preserve and protect cultural heritage by avoiding, minimizing or mitigating the adverse impacts that projects might cause to cultural heritage. In addition, the project can play a role in promoting awareness of and appreciation for cultural heritage.
4. **Dam Safety Plan (DSP):** Dams are complex structures and usually require a systematic review and evaluation of all aspects of the design, construction, maintenance, operation, processes, and systems affecting a dam's safety, including the dam safety management system. The DSP aims at developing systems and structures that would strengthen the institutional frame work for dam safety assurance and upgrade physical features in and around selected dams to enhance safety status as required through basic safety facilities and remedial works.
5. **Natural Habitat Plan (NHP):** The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The World Bank therefore supports the protection, maintenance and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The NHP lays down precautionary approaches to natural resource management that help ensure opportunities for environmentally sustainable development.
6. **Resettlement Policy Framework (RPF):** While the proposed project does not anticipate any land acquisition activities, the RPF has been developed keeping in mind any cases which may result in displacement. The main objective of RPF is to appropriately identify, address and mitigate adverse socio-economic impacts that may occur due to securing of lands in general, and particularly involuntary acquisition of land. The RPF aims to avoid involuntary acquisition of land (and subsequent resettlement) wherever possible and in cases where it is unavoidable, the RPF requires the Appropriate Government to develop a robust rehabilitation and resettlement plan to effectively manage the social impacts created by the project. The plan identifies the full range of people affected by the project and justifies their displacement after consideration of alternatives that would avoid or minimize displacement.
7. **Tribal People Planning Framework (TPPF):** Social assessment indicated that some of the sub-project areas are inhabited by tribal people. However, the exact sub-projects, their exact location and hence, the exact nature of impacts are not known as yet. Hence a TPPF is prepared. The objectives of the TPPF are to ensure that tribals are adequately and fully consulted prior and during the course of the project; receive benefits and compensation equal to that of the mainstream population: are provided with special assistance as per laws and policies because of their vulnerabilities vis-à-vis the mainstream population; and receive adequate protection against project adverse impacts on their cultural identities.
8. **Gender Action Plan (GAP):** Women comprise nearly half of the rural and urban population of the country. They play an important role in the economic and social life of households and communities. Their roles and responsibilities in agricultural communities are especially significant. Despite this, they do not have a definite say in resource management and decision making. It is in this context that a GAP has been developed. The GAP would help address concerns related to gender based inclusion and equity. The ultimate objective of the GAP is to ensure that the project is able to serve women's strategic and practical needs. The plan aims to ensure that women are given an opportunity to participate in the project and are represented in key planning and management structures. It also strives to minimize social vulnerability of women arising due to project activities like construction.

Institutional Arrangement and Capacity Building Measures

The project proposes to adopt a community-based approach in tank improvement and management. Hence it is essential that community participation in addressing social and environment concerns is planned right from the beginning and is integrated in the overall project framework and plan. Social and environmental issues and concerns identified definitely affect the performance and utility of tank system. Hence, due importance needs to be given to address these in the planning and implementation process. Essentially, appropriate institutional arrangements, including adequate staffing with specialization in social and environmental management need to be ensured at different levels of project institutional structure. Accordingly, the following institutional arrangement is proposed for environmental and social management.

Table 1: Institutional Arrangements for Environmental and Social Management

Body	Role
Tank Level	
WUA	WUAs will assume responsibility for tank system improvement and management, within the defined tank / cascade in a holistic manner, including implementation of sector specific activities that will help to bring in more climate resilience in agriculture and allied sectors
Support Organization (SO)	SOs will act as an intermediary between WUA and the implementing agencies and departments. They will be engaged at the cascade level and will be involved in facilitating and implementing activities in more than one tank systems. SOs will be associated in all project implementation activities including awareness generation, community mobilization and submission of project completion report specific to the assigned cascade.
Cascade Level	
Cascade Coordination and Management Committee (CCMC)	CCMCs will be formed to coordinate among water user associations of identified tanks in cascades and would be responsible for developing other institutional mechanisms for water management and cascade/tank system maintenance.
District Level	
District Project Unit	DPU will have primary responsibility of planning and implementation of cascade / tank based agricultural / horticultural interventions. This includes design / development of district level strategy, identification of opportunities and areas of capacity building, identification of resource persons, facilitating demonstrations, monitoring and reviewing progress of interventions.
State Level: Project Management Unit (PMU)	
Monitoring & Evaluation Expert	Monitoring & Evaluation Expert will supervise the Mid-term and End of Project ESMF Audit to be undertaken by the External M&E Agency. In consultation with the subject experts in PMU, the M&E Expert will also develop thematic studies as identified for impact assessment of ESM interventions implemented in the Project.
Environment Safeguard Expert	The Environment Safeguard Expert will ensure implementation of Environmental Management Framework, coordination with Dam Safety Panel for Dam Safety Plan, guide DPUs in formulation of environment component to be integrated in the Detailed Project Report (DPR),

Body	Role
	monitor implementation of environment management framework
Social and Institutional Development Expert	Social and Institutional Development Expert will ensure implementation of Social Management Framework and guide DPUs in formulation of social components and monitor implementation of social management framework
Capacity Building and Communication Expert	Capacity Building and Communication Expert will identify stakeholders and ensure their participation, identify training needs of key stakeholders and ensure timely implementation of capacity building measures of social and environmental management components
Agronomist	Agronomist will provide capacity building inputs that would lead to increased crop productivity
Agri-Business Expert	Agri Business Expert will develop sector plans and oversee implementation
Fisheries Expert	Fisheries Expert will ensure implementation of components related to fisheries in the EMF and SMF

The overall responsibility for project implementation and coordination rests with the Command Area Development Authority (CADA) in the Water Resources Department of GoAP. Implementation support is provided by the Departments of Agriculture, Horticulture, Animal Husbandry, Fisheries, Forestry, Rural Development, Ground Water, Andhra Pradesh Space Application Centre (APSAC) and various Support Organizations and other private service providers.

The Commissioner CADA and Secretary Water Resources Department is the overall Project Coordinator. Project implementation is coordinated through a Project Management Unit (PMU) established in CADA. The PMU headed by the State Project Director of the rank of Special Commissioner comprises of a compact multi-disciplinary team dedicated to the project. Corresponding District Project Management Units (DPUs) have been established at the district level with smaller multi-disciplinary dedicated teams.

The PMU reports to a Project Steering Committee (PSC) chaired by the Chief Secretary and comprises the Secretaries of Water Resources, Finance, Agriculture, Horticulture, Animal Husbandry, Fisheries and Rural Development etc. with Commissioner CADA as Convener. The PSC reviews progress of the project every six months and provides strategic directions, guidance on policy matters and resolve conflicts, if any, amongst the implementing agencies. Appropriate capacity building requirements to manage ESMF has been developed by PMU.

Monitoring and Evaluation

Monitoring and evaluation (M&E) system arrangements have been developed for measuring and assessing project activities, developing corrective measures and evaluating impact. The project stakeholders involved in implementation would have a key role to play in operationalizing and adopting the M&E system. Inter-institutional reporting, coordination and programmatic relationships have a strong bearing on information and data flow for M&E and the system needs to be embedded in the institutional setup. An external agency will be brought on board to undertake project M&E. Aspects of monitoring will include processes, outputs, outcomes and impacts as well as environmental and social management audits.

Grievance Redressal Mechanism (GRM)

A GRM will be in place for addressing social, environmental and project related grievances. The GRM will have multi-level structures and processes. At the village level the first level of grievance redressal institution would be the WUA. Subsequent levels would include:

- A District level Grievance Redressal Committee headed by the District Project Directors would supervise addressal of grievances and would meet once every month. The Committee would submit quarterly reports to the District Collector.
- A Project level Grievance Redressal Committee (GRC) would be up at the state level and will be housed within the PMU. It would be headed by a PMU consultant who would be responsible for overseeing grievance redressal activities and would convene monthly meetings. This Committee would prepare six monthly reports and submit to the Executive Committee.
- An Executive Committee for Grievance Redressal would be set up at the state level and would be chaired by the Project Coordinator. This Committee would meet once in every six months and be in charge of overall appeals and supervision of grievance redress

The GRM is also backed up legislatively by Right to Information (RTI) Act as well as other provisions such as recently launched women's helpline and Visakha guidelines.

Consultations and Disclosure

Disclosure workshops are aimed at sensitising the village people about the major findings of the ESMF study along with the possible planned intervention. These workshops provide a healthy platform where the primary and secondary beneficiaries of the project interact and discuss regarding their expectations, queries and suggestions.

For this, two disclosure workshops were conducted, i.e., one at the district level and the other at the state level. The district level disclosure workshop was organised on 28th November 2017 in Similiguda Tank of Visakhapatnam district. The people from Project Management Unit, ESMF Agency, representatives from various departments (Agriculture, Horticulture, Fisheries etc.), and the villagers were the major participants in this workshop. The workshop resulted in listing various feedbacks, suggestions and recommendations from all different primary and secondary stakeholders of the project. The State level workshop was conducted on 21 December 2017 at the PMU. Summary reports of both the workshops are included in this report.

Chapter One: Introduction

Background

1.1. Andhra Pradesh (AP) has a long tradition of tank based irrigation and farmers for years have been dependent on the elaborate systems of tanks for irrigating agricultural lands. The performance of the tanks system however witnessed a decline in the past two decades due to a variety of factors including heavy siltation in tank bed and inflow channels, growing forests, damages in sluices, field channels and bunds weirs etc. Other factors that affected the condition of tank systems included policy changes, shortage of funds, lack of adequate community driven collective action, relative apathy of Government machinery and poor coordination among concerned departments.

1.2. Historically minor irrigation structures have occupied an important place in Indian agriculture and rural life. Among the minor irrigation structures tanks have had a predominant position. These tanks have been the lifelines of villages in the dry regions of the country in general and in AP in particular. The rainfall and terrain conditions determined the number and size of tanks in various regions. In scanty rainfall regions with undulating terrain, tanks were seen as a strategy to harvest and store water to meet conditions of scarcity. The tanks with their traditional technology, eco-friendly structures and sizes were mostly community managed and to a large extent able to address the needs of non-complex traditional societies. In addition, these tanks have been directly or indirectly contributing to livelihoods of households by way of facilitating fisheries, animal husbandry, sheep rearing and other traditional industries like pottery and brick making.

1.3. The state has about 42,000 minor irrigation sources spread over the thirteen districts. The geographical area of the state is about 402.7 lakh acres out of which the total cultivable area is around 199 lakh acres and out of which the irrigation potential is created for 103 lakh acres through the existing major, medium and minor irrigation projects. The role of tanks in recharging groundwater sources has also been acknowledged in areas predominantly dependent on groundwater based irrigation.

Overview of Andhra Pradesh Community Based Tank Management Project (APCBTMP)

1.4. The Andhra Pradesh Community Based Tank Management Project (APCBTMP) was implemented by the Government of AP (GoAP) with support from the World Bank with an objective of improving agricultural productivity and building capacities of Water User's Associations (WUAs) to manage tanks effectively. During the course of implementation of the APCBTMP there was a realization of the need for development of more holistic interventions which aimed not only to improve productivity of crops but also maximize returns by reducing gaps in the supply and demand chain. A specific need to focus on interventions that disseminated and facilitated adoption of technology by farmers, created awareness on quality standards, organized farmers and promoted collective sale and purchase of inputs and produce was identified.

1.5. It is in this context that the Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project (APIIATP) has been conceptualized by the World Bank and the GoAP. The project adopts a holistic and synergized approach that seeks integration across relevant stakeholders of selected minor irrigation tanks across the state under different agro climatic zones.

Overview of AP Integrated Irrigation and Agriculture Transformation Project

PDO: Enhance agricultural productivity, profitability and resilience to climate variability in selected tank systems of Andhra Pradesh

1.6. The Project Development Objective of APIIATP is to enhance agricultural productivity, profitability and resilience to climate variability in selected tank systems of Andhra Pradesh. In line with "Transformation", the project aims to promote inclusive rural growth, develop and disseminate new agricultural and water management technologies, climate resilient agriculture, enhance market linkages for small and marginal farmers and improve water and natural resource management.

1.7. The proposed project will have positive impacts in terms of environmental protection and reduced greenhouse gas emissions by disseminating high efficiency irrigation systems and promoting diversification to pulses and high value crops which would significantly reduce water and carbon footprints. A total of 1000 tanks located in 12 of the 13 districts in the state are proposed to be initially covered as part of the project.

1.8. The proposed project activities have been categorized into four main components as illustrated in the adjoining exhibit and summarized in subsequent paragraphs (Department of Water Resources, GoAP 2016).

Component A: Improving Irrigated Agriculture Efficiency at Farm Level

1.9. This component would improve tank-based minor irrigation to strengthen the integrated farming system (in which growing crops, agro-forestry and rearing livestock co-exist) with reduced water footprints. It will consist of three inter-related sub-components: (i) Institutional Strengthening and Capacity Building of WUAs (ii) Improving Tanks System Performance & Resilience (iii) Inflow Hydrology Management for Improving Water Productivity and Efficiency.

Component B: Promoting Adaptive Sustainable Agriculture Practices

1.10. This component would improve production and productivity of the tank systems and increase returns to farmers and other water users through better market linkages and promotion of agribusiness. This component will have two sub-components: (i) climate smart diversified agriculture production systems; and (ii) Innovation & Technology Transfer for Fishery Production.

1.11.

Component C: Climate-friendly Market and Agribusiness Promotion

1.12. This sub-component will aim at reducing the 'road miles' of goods and services by bringing producers and consumers closer for locally produced goods and services by reviving/enhancing local farmers markets and developing alternate marketing channels to improve farm level post-harvest management and value addition. The project will support development of farmer producer organizations/companies anchored in WUAs and facilitate public-private partnerships to enable direct buying arrangements at the local level.

Component D: Project Management and Capacity Building

1.13. The objective of this component is to ensure smooth implementation of project activities, as well as monitoring of and learning from project processes and outputs.

Objectives of the Study

1.14. As a part of the project preparation, a number of advisory and analytical studies have been undertaken. One of them relates to identifying and addressing environment and social issues. Towards this end the project has prepared an environmental and social management framework and associated Management Plans. The Environmental and Social Management Framework (ESMF) approach is adopted as the selection of tanks and the nature and extent of interventions will become explicit over time, as and when they are selected.

1.15. The overall objective of the study is to identify, assess, and implement environmental and social management measures in respect of the improving tank systems performance and resilience, improving irrigation efficiency, inflow hydrology management, improving productivity, adapting sustainable agriculture practices, innovative and technology transfer for fisheries production, agri-business promotion etc.

1.16. It is in this context that comprehensive social and environmental assessments have been conducted to enable the preparation of environmental and social management frameworks for the specific identified investments. These will guide the interventions to ensure that the project activities do not cause any harm, are in compliance with the applicable national and local regulations, as well as World Bank safeguards policies. These will also ensure that potential adverse impacts are adequately mitigated and potential benefits of the project are enhanced to improve effectiveness a[nd sustainability of the project. Relevant portions of the frameworks will be suitably integrated with project contract documents to facilitate smooth implementation during the rehabilitation and operation phases.

Scope of Work

1.17. The Terms of Reference for the study lay down the scope of work for the social assessment, environmental assessment and for the development of environment and social management frameworks.

Environmental Assessment

1.18. The key tasks that were associated with the environmental assessment are indicated Table 2.

Table 2: Key Tasks Associated with the Environmental Assessment

Tasks	Activities Undertaken
1- Review of Policy, Legal, and Regulatory Framework	Developed an understanding of environmental compliance requirements with respect to project interventions; present an overview of Government of India's and State Government's environmental policies, legislations, regulatory and administrative frameworks in conjunction with the World Bank's safeguard policies
2- Issue Identification	Identified significant environmental issues associated with project interventions
3- Assessing Environmental Impacts and Mitigation Measures	Identified positive and negative environmental impacts likely to affect different sub-groups or beneficiaries as a result of interventions; assessed and prioritized impacts based on their significance; and suggested measures to minimize negative impacts and derived maximum benefits from positive impacts
4- Environmental Management Framework	Developed to cover aspects such as guidance and specific measures related to tank system improvement, responsibilities for execution and supervision of measures and institutional structure and resources
5- Standalone Documents	These are- Integrated Pest Management Plan (IPMP),Integrated Nutrition Management Plan (INMP), Cultural Property Plan (CPP), Natural Habitat Plan (NHP) and Dam Safety Plan (DSP)
6- Institutional Structure and Budgets	Identification of structures and budgets required for implementing measures

Social Assessment

1.19. The key tasks that were associated with the social assessment are indicated in Table 3.

Table 3: Key Tasks Associated with the Social Assessment

Tasks	Activities Undertaken
1-Beneficiary Assessment	Developed an understanding of socio-economic profiles at state, district and village levels; project beneficiaries' assessment of status of management and services and linkages with governance mechanisms and local operational arrangements
2-Stakeholder Analysis	Identified stakeholders at different levels and mapped key expectations, possible impacts on them due to project and issues and concerns related to them
3- Impact Assessment	Identified positive and negative social impacts likely to occur for different sub-groups or beneficiaries as a result of interventions; assessed and prioritized impacts based on their significance; and suggested measures to minimize negative impacts and derive maximum from positive impacts
4-Institutional Analysis	Identified key institutions/players that are relevant in context of the project, their roles and possible impact due to project were studied
5- Risk Assessment	Identified key social risks, internal and external to the project and develop measures to address them
6-M&E and Grievance Redressal Systems	Developed for implementation by project stakeholders to obtain timely and relevant feedback and consequently scope for corrective action

Tasks	Activities Undertaken
7- Social Management Framework	Developed to address social risks and adjustments in implementation arrangements, capacity building, IEC etc. Implications with respect to Bank's Operational Policies on Involuntary Resettlement and Indigenous Peoples- OP 4.10 and OP 4.12, as well as local level human and institutional development were outlined as relevant
8-Stand-alone documents	These are- Resettlement Policy Framework (RPF), Tribal Peoples Planning Framework (TPPF)

Development of Environmental Management Framework and Social Management Framework

1.20. An Environmental Management Framework (EMF) and Social Management Framework (SMF) have been developed as part of the study and the key tasks that were conducted as part of this are summarized in Table 4.

Table 4: Key Tasks Associated with Development of Environmental and Social Management Frameworks

Tasks	Activities Undertaken
1- Literature Review	Conducted review of existing studies, including previous safeguards documentation available in the context of Andhra Pradesh
2- Baseline Preparation	Documented existing biophysical and socio-economic conditions related to project areas from primary and secondary sources
3- Environmental and Social Legislative Framework	Conducted review and analysis of relevant aspects of project activities which would need to comply with legislative provisions
4- Identification and Assessment of Potential Environmental and Social Impacts	Identified and assessed potential environmental and social impacts of activities proposed, including impacts of different technologies, locations and other project controllable alternatives
5- Formulation of Management Measures	Formulated measures following hierarchy of avoidance, minimization, and mitigation for negative impacts and enhancement of positive impacts
6- Capacity Review	Conducted review of current capacity of stakeholders to implement measures identified and suggested suitable capacity building measures
7- Budgetary Requirements	Developed block cost estimates for management measures
8- Consultations	Conducted consultations with stakeholders- including line departments, NGOs, and local people
9- Environmental Management Plans (EMPs)	Developed model EMPs for select identified sub projects
10- Disclosure workshops	Conduct consultations as a means to elicit explicitly views of community, beneficiary groups and women on their participation of the project *(to be undertaken)*

Methodology

Desk Review

1.21. A wide range of national and state-specific Laws, Acts and Policies applicable to this project and World Bank safeguard policies were reviewed. A list of references is provided in Annexure XIV.

Selection of Sample Tanks

1.22. A baseline assessment was undertaken in a sample of 121 tanks, comprising of 102 project tanks and 19 control tanks. Of this sample, a set of 18 tanks across eleven districts were selected for conducting an in-depth environmental and social assessment. Three of these tanks are in tribal/scheduled areas. The tanks were selected keeping in mind factors such as ACZ and district where they were located, presence of tribal population, registered ayacut area and height of tanks (including a sample of tanks with height above 10 metre for which Dam Safety Plans were to be developed).

1.23. The list of 18 tanks where in-depth environmental and social assessment was conducted was developed and finalised in consultation with the Department and PMU and this is provided in Table 5.

Table 5: List of Tanks for the ESMF Study

Sl	District	Tank	Registered Ayacut (Ha.)	Agro Climatic Zone
1	Anantapur	Singanamala Tank	1,021.86	Scarce Rainfall Zone
2	Anantapur	Y T Cheruvu	365.59	Scarce Rainfall Zone
3	Chittoor	Veeraka Nellore Pedda Cheruvu (Independent)	89.88	South Zone
4	East Godavari	Nalltammaiah Tank	223.89	Krishna Godavari Zone
5	Krishna	Borragudem Tank	90.40	Krishna Godavari Zone
6	Prakasam	Markapur Tank	407.29	Krishna Godavari Zone
7	Sri PS Nellore	Nakkalagandi Reservoir	485.83	South Zone
8	Sri PS Nellore	Ura Tank	220.65	South Zone
9	Sri PS Nellore	Anantha Sagaram Tank	1,417.83	South Zone
10	Srikakulam	Kurmasagaram	174.09	North Coastal Zone
11	Srikakulam	Routhpuram Cheruvu	68.02	High Altitude and Tribal Area Zone
12	Visakhapatnam	Dattapaka Tank (Independent)	127.53	North Coastal Zone
13	Visakhapatnam	Similiguda Tank	72.87	High Altitude and Tribal Area Zone
14	Vizianagaram	Pedda Tank	74.09	North Coastal Zone
15	Vizianagaram	Dommangi Cheruvu	45.75	High Altitude and Tribal Area Zone
16	West Godavari	Gollavani Kunta	55.87	Krishna Godavari Zone
17	YSR Kadapa	Badvel Big Tank	1,485.83	South Zone
18	YSR Kadapa	Chennampalli Tank	431.17	South Zone

1.24. Three out of the total sample tanks selected for the study Viz., Similiguda Tank in Visakhapatnam, Dommangi Cheruvu in Vizianagaram and Routhpuram Cheruvu in Srikakulam district are located in tribal areas.

Stakeholder Consultations and Disclosure Workshops

1.25. The data collected from secondary sources was complemented by information gathered from field level consultations conducted by a multidisciplinary team comprising of experienced social scientists and agriculture and environmental experts. Semi structured interviews were conducted with officials of Irrigation, Revenue, Agriculture and Fisheries Departments and semi structured as well as open ended interviews were conducted with members of WUAs. Focus group discussions were conducted with men and women farmers, members of women self-help groups etc. in the jurisdiction of sample tanks. Consultations were also held with tribal farmers, farmer producer organizations and village/block level officials of line Departments.

1.26. To ensure gender mainstreaming, specific consultations were held with women and men and gender related dimensions were discussed. Consultations were held with members of tribal communities living in scheduled areas to ensure that their voices and needs were recorded. Summaries of consultations are provided in Annexure III.

1.27. A disclosure workshop was held at Araku Valley (a tribal/scheduled area) on the 28th November 2017 to share and evince feedback on the draft ESMF. A state level workshop has also been conducted on 21st December 2017 at Vijayawada to share the final draft ESMF report with the public at large, and stakeholders in particular.

Data Analysis and Report Writing

1.28. A description of environmental and social settings is an integral part of this study. The data already available through various public sources was used appropriately. Visits were made to sample tanks to undertake a primary assessment of key parameters. The various parameters for which data was collected and studied are indicated Table 6.

Table 6: Key Assessment Parameters

Aspects	Tank
Socio-Economic	Demographic details, asset base, landholdings, cropping pattern, water availability and housing and asset status, household income and expenditure and indebtedness etc.
Environmental	Vegetation, floral species and fauna of the study regions and vegetative cover in the catchment in and around tanks and command areas, water and soil quality, meteorological aspects and geological status i.e. regional geology and geological features

1.29. The process of development of the environmental management framework and social management framework was undertaken based on analysis of findings from primary and secondary assessments. Measures to reduce or avoid adverse environmental and social impacts or to enhance beneficial impacts have been suggested. Overall and specific protection measures have been incorporated in the framework and these are in consistence with State, Central and World Bank policies. The frameworks also include recommendations which aim

to address anticipated adverse impacts as well as strengthen predicted positive impacts on various social and environmental aspects.

Structure of the Report

1.30. The structure of this report is as follows:

- **Chapter 1** provides an overview of the project and discussed the scope of work and methodology that was adopted for conducting the study
- **Chapter 2** provides an overview of the legal and policy framework in which the project would operate. This includes legislations of the Government of India and Government of Andhra Pradesh as well as World Bank safeguard policies
- **Chapter 3** provides an overview and characteristics of the sample tanks that were covered as part of the primary survey
- **Chapter 4** discusses the major findings related to the environmental assessment from the field visits along with suggested interventions. It provides the Environment Management Framework and highlights specific plans such as Integrated Nutrient Management Plan (INMP), Integrated Pest Management Plan (IPMP), Cultural Property Plan (CPP), Dam Safety Plan (DSP) and Natural Habitat Plan (NHP).
- **Chapter 5** discusses the social aspects of the project and includes a beneficiary assessment, stakeholder analysis, institutional analysis and identification of impacts and risks, social issues of significance and mitigation measures. It provides a Social Management Framework along with Gender Action Plan (GAP), Resettlement Policy Framework (RPF) and Tribal People Planning Framework (TPPF).
- **Chapter 6** discusses the institutional and implementation arrangements for the project.
- **Chapter 7** discusses systems for monitoring and evaluation from the point of environmental and social aspects and provides the outline of a grievance redressal system.
- **Chapter 8** incorporates the outcome of stakeholder consultations.

- **Plans and Frameworks (Stand Alone Documents)**
  A. Integrated Nutrient Management Plan (INMP)
  B. Integrated Pest Management Plan (IPMP)
  C. Cultural Property Plan (CPP)
  D. Dam Safety Plan (DSP)
  E. Natural Habitat Plan (NHP)
  F. Model Environment Management Plans (EMPs)
  G. Tribal People Planning Framework (TPPF)
  H. Resettlement Policy Framework (RPF)

- **Annexures:**
  I. Gender Action Plan
  II. Summary of Consultations
  III. List of Dams above 10mts height
  IV. Hydraulic Particulars of Sample Tanks
  V. Environmental Analysis Results
  VI. Project Cycle in a Tank System
  VII. Integrated Pest Management Practices for the Common Crops
  VIII. List of Pesticides/ Pesticide Formulation Banned in India

IX. List of Pesticides Refused Registration
X. Pesticides Restricted for Use in India
XI. Code of Practice for Pesticide Handling, Storage, Transport and Disposal
XII. Environmental Screening Tool for Rehabilitation of Tanks
XIII. List of Participants in Disclosure workshop
XIV. References

Conclusion

1.31. This chapter discussed the background of the project along with the major components. It also indicated the scope of work along with the methodology adopted. The following chapter discusses the legal and regulatory framework in the backdrop of which the EMF and SMF have been developed.

Chapter Two: Legal and Policy Framework

Introduction

2.1. The proposed project will be undertaken in the backdrop of the legislative and regulatory framework of the Government of India, Government of Andhra Pradesh and the safeguard policies of the World Bank. It is therefore imperative to identify and adhere to such legal and regulatory provisions in the course of project pre-planning, planning, implementation and monitoring.

2.2. This chapter, based on a review and analysis of existing legal and policy frameworks, highlights the legislations and policies which would have a bearing on the design and implementation of the Andhra Pradesh Integrated Irrigation Agriculture Transformation Project (APIIATP).

Relevant Environmental and Social Policies and Acts

2.3. The environmental and social legislations of GoI and GoAP applicable to the project components have been reviewed. A summary of national and state level legislations and policies relevant to the project are presented in Tables 7 to 9.

Table 7: Applicable Environmental Legislations under GoI and GoAP

Act / Policy	Salient Features	Applicability to APIIAT Project
National Water Policy, *2012*	▪ Directs that water, after meeting the pre-emptive needs for safe drinking water and sanitation, achieving food security, supporting poor people dependent on agriculture for their livelihood and high priority allocation for minimum eco-system needs, be treated as economic good so as to promote its conservation and efficient use ▪ Governs planning and development of water resources and their optimum utilisation by promoting its conservation and efficient use ▪ Ensures access to a minimum quantity of potable water for essential health and hygiene to all citizens, available within easy reach of the household. ▪ Curtails subsidy to agricultural electricity users. ▪ Directs the setting up of a Water Regulatory Authority ▪ Specifies keeping aside a portion of the river flow to meet ecological needs and to ensure that low and high flow releases correspond in time closely to natural flow regime ▪ Gives statutory powers to Water Users Associations to maintain distribution systems ▪ Project benefited families to bear part of the cost of resettlement and rehabilitation of project affected families	▪ *Applicable* ▪ The proposed project involves multiple usage of tank water for various purposes
Water Prevention and Control of Pollution Act, *1974*	▪ Provides for prevention and control of water pollution, and for maintaining or restoring of wholesomeness of water in the country ▪ Provides for constitution of Central and State Boards for preventing water pollution, power to take water samples and their analysis, discharge of sewage or trade	▪ *Applicable* ▪ During the construction phase of the project, there are possibilities of mixing sewage form labour camp

Act / Policy	Salient Features	Applicability to APIIAT Project
	effluents, appeals, revision, minimum and maximum penalties, publication of names of offenders, offences by companies and Government departments, cognizance of offences, water laboratories, analysis etc.	in to tank water
Andhra Pradesh State Water Policy, *2008*	▪ The objective of the policy is to ensure comprehensive multi-sectoral planning, development and management of state's water resources, and effective, efficient, equitable and sustainable service deliveries for various water uses ▪ It aims at ensuring water security for entire population, improving water management and efficiency, improving availability and efficiency of irrigation water and maintaining and sustaining ecological balance ▪ It focuses on key areas of water management which include building an enabling environment; implementing a range of institutional tools, including local capacity building and participatory approaches; integrating new management tools and systems such as integrated data systems, water demand management and a new communication system. ▪ Special focus is given to preventing pollution of water bodies, promoting integrated pest management, integrated nutrient management and organic farming practices; water saving technologies and practices in agricultural practices (drip/sprinkler systems, SRI and less water intensive crops)	▪ *Applicable* ▪ The proposed project considers environmental aspects in the developments of water bodies
Andhra Pradesh Farmers Management of Irrigation Systems Act, *1997(with Amendments of April 2007)*	▪ The Act gives the state the power to create WUAs and federate WUAs into higher level committees ▪ The objective of WUAs shall be to promote and secure distribution of water among its users, adequate maintenance of the irrigation system, efficient and economical utilisation of water to encourage modernization of agriculture, to optimize agricultural production, to protect the environment, and to ensure ecological balance by involving the farmers, inculcating a sense of ownership of the irrigation system in accordance with the water budget and the operational plan ▪ Reform has made the irrigation agency accountable to the Farmer Organizations and resulted in the tripling of water charges and linking the money collected to the costs of operating and maintaining irrigation systems. The goal of the reform will be achieved when WUAs become sustainable by raising funds for irrigation operation and maintenance on their own	▪ *Applicable* ▪ The proposed project shall strengthen the functioning of WUAs
Andhra Pradesh Water Resources Development Corporation Act, *1997*	▪ The Act created the Andhra Pradesh Water Resources Development Corporation for promotion and operation of irrigation projects, command area development and schemes for drinking water and industrial water supply to harness the water of rivers of the state of Andhra Pradesh and for matters connected therewith or incidental thereto including flood control. ▪ The Act brings coordination between conflicting sectors and promotes and operates irrigation projects and command area development. It also promotes irrigation related activities such as fisheries, pisciculture, floriculture, horticulture, sericulture, tissue culture, etc.	▪ *Applicable* ▪ The proposed project shall promote and operate irrigation projects. The proposed project also promotes irrigation related activities.

Act / Policy	Salient Features	Applicability to APIIAT Project
	as well as tourism, water sports etc. in and around the irrigation projects	
Insecticides Act, *1968 (with Amendments of 2002 and 2016)*	▪ Aims to regulate import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risks to human beings or animals, and for matters connected therewith. ▪ The objectives of the Act include: to register only safe and efficacious pesticides; to ensure that the farmers/users get quality product for controlling the pests; to prescribe usages of pesticides both from ground and air and also important precautions for their handling and use; to minimise health hazards from the pesticide residues through contaminated food, water and air; to ensure that the pesticides industry manufacture, transport, distribute, store and sell the pesticides as per the prescribed regulations, failing which legal action is taken; to ensure that pesticides are properly packed and labelled to avoid any leakage of hazardous pesticides in transit and to provide enough instructions for their safe handling and use	▪ *Applicable* ▪ The proposed project improved availability of water for irrigation. Crop intensification and Crop diversification shall involve excess usage of insecticides and pesticides
The Air (Prevention and Control of Pollution) Act, *1981*	▪ The Act states that sources of air pollution such as industry, vehicles, power plants, etc., are not permitted to release particulate matter, lead, carbon monoxide, sulphur dioxide, nitrogen oxide, volatile organic compounds (VOCs) or other toxic substances beyond a prescribed level ▪ The Air Act is implemented by the Central and State Governments and the Central and State Boards. It makes provisions, inter alia, for Central and State Boards, power to declare pollution control areas, restrictions on certain industrial units, authority of the Boards to limit emission of air pollutants, power of entry, inspection, taking samples and analysis, penalties, offences by companies and Government and cognizance of offences etc. ▪ It specifically empowers State Government to designate air pollution areas and to prescribe the type of fuel to be used in these designated areas. According to this Act, no person can operate certain types of industries including asbestos, cement, fertilizer and petroleum industries without consent of the State Board	▪ *Applicable* ▪ During the construction phase, proposed project activities shall result in particulate and gaseous emissions.
The Environment (Protection) Act, *1986*	▪ The Environment Protection Act, 1986 is concerned with projects dealing with water bodies, but these are limited to major activities like reservoir construction, changes in water flow regime and others.	▪ *Not Applicable* ▪ The proposed project shall have impact on Air, Water and Noise.
National Forest Policy, *1988*	▪ National Forest Policy was enacted with the basic objectives of maintenance of environmental stability and restoration of the ecological balance. ▪ It laid emphasis on people's participation through Joint Forest Management Programme and together with Forest (Conservation) Act, 1980 helped in stabilization of country's forest area over the last two decades in spite of huge demand on forest land for development and the ever increasing pressure for forest produces. As a progressive policy, it highlighted primary functions of forests in maintaining ecological and environmental balance and preservation of biodiversity, four years before UNCED (Rio Earth Summit) (Government of	▪ *Not Applicable* ▪ Considering that the Project Tanks do not have much forest cover and there is no impact of the project on the existing forest cover. But if any of the project tanks is found to have catchment area in the forest land then this policy will be applicable.

Act / Policy	Salient Features	Applicability to APIIAT Project
	India, 1988)	
National Conservation Strategy and Policy of Environment and Development, *1992*	▪ The National Conservation Strategy and the Policy Statement on Environment and Development are in response to the need for laying down the guidelines that will help to weave environmental considerations into the fabric of our national life and of our development process. ▪ It talks about the nature and dimensions of the environmental problems, actions taken in response to the problems and lists out priorities and strategies for action. It also views development policies from environmental perspectives and the support policies and systems required. (Government of India, 1992)	▪ *Applicable* ▪ The proposed project involves improvement of irrigation and agriculture
Wildlife Protection Act, *1972*	▪ The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto. It extends to the whole of India, except the State of Jammu and Kashmir which has its own wildlife act. (Government of India, 1972)	▪ *Not Applicable* ▪ This project does not affect any wildlife species listed in various schedules of the Act. But this Act will be applicable if any project tank is found in the forest areas in which case the interventions might affect the wildlife.
Environment Impact Assessment Notification, *2006*	▪ Emphasises need for taking prior environmental clearance in case of new projects or activities or expansion of already existing activities in accordance with the objectives of National Environment Policy. ▪ The Ministry of Environment and Forests published a notification in 2006 under sub-rule (3) of Rule 5 of the Environment (Protection) Rules, 1986 that imposes certain restrictions and prohibitions on new projects or activities, or on the expansion or modernisation of existing projects or activities based on their potential environmental impacts as indicated in the Schedule to the notification, being undertaken in any part of India	▪ *Applicable* ▪ Environmental Impact Assessment, 2006 integrates the environmental concerns in developmental activities so as to ensure that the development activities under consideration are sustainable
Andhra Pradesh Water, Land and Trees Act and Rules, *2002*	▪ The Government of Andhra Pradesh promulgated the Act to promote water conservation, tree cover and regulate exploitation and use of ground and surface water, for protection and conservation of water sources, land and environment in the entire state ▪ The APWALTA Act has been amended and consequently, through GOMs No. 339, PR & RD Dept. dated 06-11- 2004, comprehensive Rules-2004 have been brought out for effective implementation	▪ *Applicable* ▪ The proposed project shall promote water conservation, tree cover and regulate exploitation and use of ground and surface water.
Solid Waste Management Rules, *2016*	▪ The rule provides guidelines for collection, separation and disposal of domestic waste.	▪ *Applicable* ▪ The proposed project could involve generation of solid waste from labour sites during the construction phase
Hazardous And Other Wastes (Management and Trans-boundary Movement) Rules, *2015*	▪ The rule provides guidelines for the management of hazardous and other wastes.	▪ *Applicable* ▪ The proposed project could involve generation of solid waste from labour sites during the construction phase

Act / Policy	Salient Features	Applicability to APIIAT Project
Construction and Demolition Waste Management Rules, *2016*	▪ The rules aim to improve the collection, segregation, recycling, treatment and disposal of solid waste in an environmentally sound manner. ▪ As per the rules every waste generator shall prima-facie be responsible for collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority in consonance with these rules.	▪ *Applicable* ▪ The proposed project shall involve generation of construction and demolition waste such as debris and rubble.
Noise Pollution and Control rules, *2000*	▪ The rule provides standards for noise level in different areas	▪ *Applicable* ▪ The proposed project could involve movement of trucks, operation of heavy machineries which shall result in noise generation during construction phase

Source: Desk Review of GoI and GoAP documents

Table 8: Applicable Social Legislations under GoI and GoAP

Act / Policy	Salient Features	Applicability to APIIAT Project
The Constitution (73rd Amendment) Act, *1992*	▪ The Constitution (73rd Amendment) Act, 1992 vests power in the State Government to endow Panchayats with such powers and authority as may be necessary to enable them to function as institutions of self-government such as: preparation of plans and their execution for economic development and social justice in relation to 29 subjects listed in the XI schedule of the Constitution. It vests authority to Panchayats to levy, collect and appropriate taxes, duties, tolls and fees and transfers taxes, duties, tolls and fees collected by the States to Panchayats. ▪ The Act mandates provisions for: ▪ Establishment of a three-tier structure (Village Panchayat, Panchayat Samiti or intermediate level Panchayat and Zilla Parishad or district level Panchayat). ▪ Establishment of Gram Sabhas at the village level. Regular elections to Panchayats every five years. ▪ Proportionate seat reservation for SCs and STs. ▪ Reservation of not less than 1/3 seats for women. ▪ Constitution of State Finance Commissions to recommended measures to improve the finances of Panchayats.	▪ *Applicable* ▪ The tank systems would operate within villages having a defined panchayat system
5th Schedule of Constitution (Article 244 (1))	▪ The schedule has been added to the Constitution to protect the cultural identity and economic rights of the tribal people. ▪ The schedule provides for the administration and control of Scheduled Areas and Scheduled Tribes. In pursuance of this schedule, the President of India had asked each of the states to identify tribal dominated areas. Areas thus identified by the states were declared as Fifth Schedule Areas. ▪ The schedule enables the Government to enact separate laws for governance and administration of the tribal areas. Para 5 of the schedule divulges the power to the Governor of the State to define laws applicable to the Scheduled Areas. Specifically, the Governor of the state can make regulations that may:	▪ *Applicable* ▪ This Constitutional provision applies to project tanks located in 5th schedule areas

Act / Policy	Salient Features	Applicability to APIIAT Project
	▪ Prohibit or restrict the transfer of land by or among members of the Scheduled Tribes in such areas; ▪ Regulate allotment of land to members of the Scheduled Tribes in such area ▪ Some of the proposed projects will be located in the Schedule V areas and in such cases the provisions of Tribal Peoples Planning Framework (TPPF) will be triggered	
Panchayat Extension to Scheduled Areas Act (PESA), *1996*	▪ The Act provides for extension of provisions of Part IX of Constitution relating to Panchayats to the Scheduled Areas. As per the provisions, every village in Schedule V areas will have a Gram Sabha which will approve of the plans, programmes and projects for social and economic development before such plans, programmes and projects are taken up for implementation at village level. ▪ Some of the proposed projects will be located in the Schedule V areas and in such cases the provisions of Tribal Peoples Planning Framework (TPPF) will be triggered	▪ *Applicable* ▪ This Constitutional provision applies to project tanks located in 5th schedule areas
The Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Rules, *1995*	▪ The Act provides for specific provisions to prevent atrocities on the Scheduled Castes and the Scheduled Tribes and suggests State Government to frame rules for the same. ▪ Provisions include identification of areas where atrocity may take place or there is an apprehension of reoccurrence of an offence under the Act. The State Government is required to set up a Scheduled Castes and the Scheduled Tribes Protection Cell at the State headquarters under the charge of Director of Police, Inspector-General of Police. This Cell is responsible for conducting survey of the identified area; maintaining public order and tranquility in the identified area; recommending to the State Government for deployment of special police force or establishment of special police post in the identified area; and restoring feeling of security amongst the members of the Scheduled Castes and the Scheduled Tribes	▪ *Applicable* ▪ As some of project tanks will be located in areas which have tribal population these Rules would be applicable
The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, *2006*	▪ This Act grants legal recognition to rights of traditional forest dwelling communities/s ▪ This Act is for those who either primarily reside in forests and forest lands or depend on forests and forest land for a livelihood.	▪ *Applicable* ▪ As the project does not affect much of the forest cover, this policy has minimal applicability in the project. But in case of any construction in the tribal tanks, that should not in any way hamper the passage to any kind of forest and forest product.
Agency Tracts Interest and Land Transfer Act, *1917*	▪ The Act checked transfers of land in the Agency tracts of Ganjam (presently in Odisha), Vishakhapatnam (covering the present Srikakulam, Vizianagaram and Visakhapatnam districts) and Godavari (covering the	▪ *Applicable* ▪ As the project involves tribal

Act / Policy	Salient Features	Applicability to APIIAT Project
	present East and West Godavari districts) districts. It regulated debt and interest on the borrowings by the hill tribes and transfer of their immovable property. ▪ It was enacted primarily to safeguard the interest of hill tribes of the area over which it extended and to protect them from exploitation by non-tribals and moneylenders. It permitted transfer of land only among tribals and laid down that the interest accrued over the debts borrowed by the tribals shall not exceed the principal amount.	tanks, for the interest of the tribal folk in the districts of Srikakulam, Vizianagaram, Visakhapatnam and Godavari districts, this Act must be considered.
Andhra Pradesh Scheduled Castes Sub Plan and Tribal Sub Plan (Planning, Allocation and Utilization of Financial Resources) Act No. 1, *2013*	▪ The Act aims to ensure accelerated development of Scheduled Castes and Scheduled Tribes with emphasis on achieving equality focusing on economic, educational and human development along with ensuring security and social dignity and promoting equity among SCs and STs by earmarking a portion in proportion to the population of SC and ST in the state, of the total plan outlay of the state of Andhra Pradesh as the outlay of the SC Sub Plan/ Tribal Sub Plan of the state.	▪ *Applicable* ▪ The project must aim at inclusive growth that includes SCs and STs.
Andhra Pradesh Scheduled Areas Land Transfer Regulation, *1959*	▪ This promulgation extended the provisions of the Agency Tracts Interest and Land Transfer Act, 1917 of the former Madras presidency to the scheduled areas of the Andhra region (Srikakulam, Vizianagaram, Visakhapatnam, East Godavari and West Godavari districts) of the reorganized state of Andhra Pradesh	▪ *Applicable* ▪ In continuation to the Act of 1917, this regulation shall be applicable.
Andhra Pradesh (Andhra Scheduled Areas) Estate (Abolition and conversion into Ryotwari) Act; Andhra Pradesh Mutta (Abolition and conversion into Ryotwari) Regulation,*1948 and 1969*	▪ These are land mark enactments and promulgations that facilitated state ownership of private estates and lands in the scheduled areas and paved way for settlement of land tenure. Prior to these enactments and promulgations lands in the scheduled areas were under private ownership in the form of estates. In the scheduled areas of Visakhapatnam and East Godavari districts, the then rulers granted 'Mokasas' and 'Mutta rights' to certain individuals in recognition of service rendered by them like assisting in collection of land revenue, maintaining law and order etc. Since these were basically grants, the tribals did not have absolute rights over these properties. Through abolition of Estates the state paved way for settlement of rights of all the tribal tenants who tilled these lands. Further through abolition of Mutta rights and their conversion as Ryotwari Pattas, the Mokasas and the Mutta rights were settled in favour of the tribals who tilled these lands.	▪ *Applicable* ▪ This regulation is applicable for the tribal tanks in order to protect their lands from private ownerships
Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), *2013*	▪ The Act regulates land acquisition and lays down procedures and rules for granting compensation, rehabilitation and resettlement to affected persons. ▪ The Act has provisions to provide fair compensation to those whose land is taken away, brings transparency to the process of acquisition of land to set up factories or buildings, infrastructural projects and assures rehabilitation of those affected. ▪ The Act establishes regulations for land acquisition as a part of India's massive industrialisation drive driven by public-private partnership	▪ *Applicable* ▪ This Act would be applicable in case there are instances of involuntary rehabilitation/ resettlement in course of the project
Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and	▪ The Bill allows the government to exempt five categories of projects from Social Impact Assessment, limits on acquisition of irrigated multi-cropped land, through a notification and consent provisions. These five categories are:	▪ *Applicable* ▪ These Rules would be applicable in case there are instances of

Act / Policy	Salient Features	Applicability to APIIAT Project
Resettlement (Amendment) Bill, *2015*	▪ defence, ▪ rural infrastructure, ▪ affordable housing, ▪ industrial corridors, ▪ and infrastructure and social infrastructure	involuntary rehabilitation/resettlement in course of the project
Andhra Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules (RFCTLARRR), *2014*	▪ These rules have been notified by the Government of Andhra Pradesh in exercise of the powers conferred by Section 109 of the RFCTLARRA, 2013. The rules specify: ▪ Process for carrying out the Social Impact Assessments (SIAs) ▪ Institutional Support for SIAs ▪ Other guidelines for carrying out SIAs ▪ Process for conducting public hearings ▪ Declaration of Awards and Compensation ▪ As per Chapter V Sections 25, 26 and 27 of the A.P. RFCTLARRR 2014, awards and compensations are in line with the provisions of the RFCTLARRA, 2013. Section 28, further specifies the following that were to be notified by the State Government: ▪ The multiplication factor mentioned in RFCTLARRA, 2013 is set at 1.25 for rural areas other than scheduled areas and 1.50 for scheduled (tribal) areas. ▪ The one-time grant to artisans, small traders and certain others is set at INR 25,000. ▪ The payment of compensation shall be made expeditiously through account payee cheques / electronic mail transfer.	▪ *Applicable* ▪ These Rules would be applicable in case there are instances of involuntary rehabilitation/ resettlement in course of the project
Andhra Pradesh Government Land Allotment Policy, *2012*	▪ The Government Land Allotment Policy was formulated to create a set of uniform guidelines for the extent and rate of allocation of Government land for various purposes to Government departments and private organizations. ▪ The policy states that Government land should not be auctioned for resource mobilisation, land assigned to poor people for agriculture purpose should not be resumed and in case of inevitable resumption, alternate land should be given to the said assignees apart from rehabilitation; and AP Management Authority (APLMA) is to be constituted for processing and recommending land allotment, with the task of monitoring the utilization of land for the intended purpose and resumption of land in case of violation of conditions.	▪ *Applicable* ▪ These Rules would be applicable in case there are instances of involuntary rehabilitation/ resettlement
Minimum Wages Act, *1948*	▪ The Act defined the wage that has to be given to a person in return for his/her services to the employer. It is dynamic in nature and may vary from time to time and place to place. The major objective of this Act was to decrease the exploitation of labour. The need of the workers, the capacity to pay and the wages paid for comparable work elsewhere in the economy to maintain a general standard of living of other social groups are three defined criteria used by International Labour Organisation (ILO) for fixing Minimum Wage	▪ *Applicable* ▪ This Act ensures the apt payment to the daily wage labour who will be deployed for the development of tank areas.
Mahatma Gandhi National Rural Employment Guaranty Act, *2005*	▪ The Act was initiated with the objective of "enhancing livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year, to every household whose adult members volunteer	▪ *Applicable* ▪ Any tank development or

Act / Policy	Salient Features	Applicability to APIIAT Project
	to do unskilled manual work". ▪ Along with providing certain days of employment MGNREGA aims to create durable assets (such as roads, canals, ponds, wells). Employment is to be provided within 5 km of an applicant's residence, and minimum wages are to be paid. If work is not provided within 15 days of applying, applicants are entitled to an unemployment allowance. MGNREGA is to be implemented mainly by gram panchayats (GPs). ▪ The involvement of contractors is banned. Labour-intensive tasks like creating infrastructure for water harvesting, drought relief and flood control are preferred.	construction activities can be converged with the MGNREGA by employing the village people for the required work with fair wages
National Policy for Farmers, *2007*	▪ This policy was developed in order to improve economic viability of farming substantially increasing net income of farmers. ▪ To protect and improve land, water, bio-diversity and genetic resources essential for sustained increase in productivity, profitability and stability of major farming systems; to develop support services including provision for seeds, irrigation, power, machinery and implements, fertilizers and credit at affordable prices in adequate quantity for farmers; to strengthen bio security crops; to provide appropriate price and trade policy etc.	▪ *Applicable* ▪ The major beneficiaries and stakeholders of the project are the farmers in the tank areas.
National Policy for Women (Draft), *2016*	▪ This policy aims to create an effective framework to enable the process of developing policies, programmes and practices which will ensure equal rights and opportunities for women in the family, community, workplace and in governance. ▪ Mainstreaming gender in all-round development processes/programmes/projects/ actions is an objective. A holistic and life-cycle approach to women's health for appropriate, affordable and quality health care is adopted. Stress is laid on improving and incentivizing access of women/ girls to universal and quality education and increasing and incentivising work force participation of women in the economy.	▪ *Applicable* ▪ Inclusiveness and equity are key principles of the project and formal representation of women is necessary to ensure that all the voices are heard and accounted for

Source: Desk Review of GoI and GoAP documents

World Bank Safeguard Policies

2.4. When identifying and designing a project/ sub-project, World Bank's Operational Policies help to assess the possible environmental risks and the impacts (positive or negative) associated with the development interventions proposed for various sectors. During project implementation, safeguards help in defining measures and processes to effectively manage risks and enhance positive impacts. The process of applying safeguard policies is an important opportunity for stakeholder's engagement, enhancing the quality of project proposals and increasing ownership. Key Operational Policies and their applicability are listed in the following table.

Table 9: Applicable World Bank Safeguard Policies

Sl	Safeguard Policy	Description	Applicability to this Project
1.	**OP 4.01: Environmental Assessment (EA)**	EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation EA takes into account natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and trans-boundary and global environmental aspects	*Applicable* Significant adverse social and environmental impacts are not expected as physical interventions are expected to be in the nature of rehabilitation of existing assets. However, an Environmental Assessment has been undertaken to manage risk and maximize environmental benefits wherever applicable
2.	**OP 4.04: Natural Habitat**	Bank's economic and sector work includes identification of (a) natural habitat issues and special needs for natural habitat conservation, including degree of threat to identified natural habitats (particularly critical natural habitats), and (b) measures for protecting such areas in context of country's development strategy Flora and fauna in the biodiversity of the tank area are protected under this policy where the Bank supports protection, maintenance and rehabilitation of the natural habitats	*Applicable* The proposed project activities are to be carried out in man-made (Tank/Reservoir) environment however it is possible that some flora and fauna residing in surrounding areas could be affected
3.	**OP 4.09: Pest Management**	Objective of this policy is to promote use of biological or environmental control methods and reduce reliance on chemical pesticides.	*Applicable* Project activities would be undertaken keeping in mind the norms laid down under the plan
4.	**OP/BP 4.10: Indigenous People**	This policy refers to a distinct, vulnerable, social and cultural group such as Scheduled Tribes or Tribal Folks. People who have lost collective attachment to geographically distinct habitats or ancestral territories in project areas because of forced severance remain eligible for coverage under this policy. Majority of tribals are socially and economically weak, prone to vulnerability and often feel excluded from development initiatives To ensure project benefits on par with others, specific targeting is essential and accordingly in line with the Bank's OP 4.10, a Tribal Peoples Planning Framework (TPPF) has been prepared which includes measures to enhance the positive impact of the project for Scheduled Tribes	*Applicable* Some of the proposed projects will be located in Schedule V areas and in such cases the provisions of Tribal Peoples Planning Framework (TPPF) will be triggered
5.	**OP/BP 4.11: Physical Cultural Resources**	Physical cultural resources component of EA includes (a) an investigation and inventory of physical cultural resources likely to be affected by project; (b) documentation of significance of physical cultural resources; and (c) assessment of nature and extent of potential impacts on these resources.	*Applicable* No major cultural properties have been found in sample tanks. However in case such properties are found in case of any other project tanks, the policy will be

Sl	Safeguard Policy	Description	Applicability to this Project
			triggered
6.	**OP/BP 4.12: Involuntary Resettlement**	This policy covers direct economic and social impacts that both result from Bank Assisted Investment Projects and are caused by the involuntary taking of the land or the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. The project is not expected to involve land acquisition or physical displacement. However, incidences of seasonal encroachments if any will be assessed.	*Applicable* Significant land acquisition will not be conducted as part of the project and existing tank systems will be rejuvenated. However this OP/BP would be triggered in cases where seasonal agriculture is being undertaken in tanks beds.
7.	**OP 4.37: Safety of Dams**	This policy is intended to manage and maintain the dams in the project areas. Where appropriate, as part of policy dialogue with the country, Bank staff discuss measures necessary to strengthen the institutional, legislative, and regulatory frame-works for dam safety programs in the country For large dams above 10 metre height a plan for constitution of a dam safety panel which conducts regular monitoring and provides recommendations has been provided. Dam safety evaluation and monitoring systems that are put in place in the earlier phase would be reviewed and agreed to.	*Applicable* The project interventions involve restoration of few tanks with earthen embankments exceeding 10 m in height

Source: Desk Review of World Bank Policies

Conclusion

2.5. There are a number of national and state level policies related to the environmental and social aspects of the project which would need to be considered while managing the project and this chapter summarized these policies. In addition various World Bank safeguard policies come into effect on account of proposed project interventions and these were also summarized in the chapter. The following chapter discusses the sample tanks that were covered as part of the study.

Chapter Three: Tank Descriptions and Characteristics

3.1. This chapter provides base line information related to the tanks covered as part of the primary survey to have a better understanding of the functioning of tank resource systems. An attempt is also made here to understand the stakeholders' dependence on the tank system.

Distribution of Sample Tanks across Agro Climatic Zones

3.2. A baseline assessment was undertaken in a sample of 121 tanks, comprising of 102 project tanks and 19 control tanks. Of this sample, a set of 18 project tanks across eleven districts were selected for conducting an in-depth environmental and social assessment. The selected tanks are broadly categorized into five agro climatic zones depending on their location.

3.3. The representative sample tanks taken for the study are spread across different regions of the state and fall under different agro climatic zones. The selected tanks are broadly categorized into five agro climatic zones depending on their location.

Table 10: Project Tanks across Agro-Climatic Zones Covered in Baseline Study

Sl	Zone	Baseline Project Tanks	ESMF Sub-sample Tanks	Baseline Control Tanks
1	Krishna Godavari Zone	26	5	6
2	North Coastal Zone	27	3	4
3	Scarce Rainfall Zone	12	2	3
4	Southern Zone	34	5	5
5	High Altitude and Tribal Area Zone	3	3	1
	Total	102	18	19

Distribution of Sample Tanks by Age

3.4. In Andhra Pradesh the existence of tanks systems dates back to the period 1336-1565 A.D. when the rulers of Vijayanagaram Empire had given priority to tank systems. The exact age of the study tanks is not available. The inscriptions and the water regulating structures stand as a witness of the age of the tanks. According to the stakeholders, the newest constructed tank is more than 75 years old while the oldest tanks in scarce rainfall and southern zones have been in existence for more than 500 years.

Condition and Usage of Sample Tanks

3.5. The tanks are the major source of irrigation and support various livelihood options for the rural community. Decline of tank irrigation systems was found in the first half of the 19th century which forced the then Government of Madras to act for revival of such structures. Despite this a large number of tanks continued to ruin. All the sample tanks are multipurpose in terms of usage; however their usage has declined over the years due to the reduced and unreliable water availability. Continuous dry spells have led to a situation wherein villagers are not entirely dependent on tanks either for drinking or domestic use.

Other Users of Tank Water

3.6. Apart from farmers, several other stakeholders were dependent on tank water for their livelihoods. The other users of tank system consisted of washer men, cattle grazers, potters, brick makers and industries.

Water Availability in Sample Tanks

3.7. Due to uneven rainfall most tanks are not filled up to their full capacity. Discussion with key informants revealed that nearly 25 % of project tanks have more than 75% of water.

Inflow Systems in Sample Tanks

Status of Catchment

3.8. The catchment area acts as the feeding system of a tank and its size determines the effectiveness and life of the tank. The dependence of a tank on its catchment cannot be overemphasized. All the tanks were dependent on the catchment area. Siltation of tanks is taking place largely because of degradation of catchment forests and vegetation. There is a direct co-relation between vegetative conditions of the tank catchment area and decline in functionality of tank.

Water Storage Systems in Sample Tanks

3.9. Storage in the tank system is influenced by the condition of its components, viz., tank bed, bund, surplus arrangements and sluices. The study accordingly made an attempt to understand the condition of the aforesaid components to provide a broad picture of the status and the impact of the same on the storage.

3.10. Water spread area in the tanks at Full Tank Level condition is the tank bed area which normally holds the water in the tank. Silt deposited on the bed reduces the tank bed storage capacity. Hence silt accumulation reflects upon the irrigated area under a given tank. Further the tank-bed is also used for different purposes such as cultivation of seasonal crops, collection of silt for application on farm fields, commercial activities like brick kilns, pottery etc. In the process tank-beds are prone to weed growth which affects the storage capacity and ultimately the efficiency of the tank system. Hence the study focused on the status of tank-bed and its present utilization in order to link to the overall status of the irrigation system.

Silt

3.11. Silt deposition in tanks is a common feature due to the changing land utilization pattern. The practice of silt application on farm fields was a common feature among farmers until a few decades ago but this has subsequently declined. Siltation levels and loss of tank capacity can be accurately assessed only after reservoir capacity surveys. However a broad assessment has been made based on the level of silt deposit (categorized as low in cases when the deposit is 0.50 m below sill level (sluice), medium when it is up to sill level and high when it is above sill level). Project tanks with high level of siltation accounted for a higher share in YSR Kadapa, Kurnool and Chittoor districts.

3.12. While farmers are themselves not collecting silt from tanks for use in their own fields, some programs were taken up to promote de-silting of tanks by Government agencies. De-silting has been taken up actively through National Rural Employment Guarantee Scheme and Neeru Chettu programme in some of the sample tanks.

Weed Growth

3.13. Prolonged dry spells resulting in low or no storage condition in the tank system over few years normally aggravates growth of weeds on tank beds. Around61% of project tanks have varied degree of weed growth. Predominantly three types of weeds are found in the tank bed areas, viz. Water hyacinth, Ipomea cornea and Prosopis juliflora.

Tank Command Area

3.14. Over the years farms close to the boundary of the command area are also using water from the tanks. Focus Group Discussions revealed that the command area typically ranges from 55 ha to 1500 ha. Scarce rainfall and southern zone regions have larger command areas compared to Krishna Godavari and north coastal regions.

Distribution System

3.15. Distribution system of a tank depends on the strength of the bund and functional status of the sluices, field channels and drops. The tank bund is crucial for retaining water and to meet the requirements of the stakeholders throughout the year. If the bund is weak there is a danger of breach of the tank or leakages which results in wastage of water. Similarly the condition of the sluice gates and field channels is equally important for distributing the water across the command area.

Tank Bund Condition

3.16. The tank bund is most visible component of the tank system and the study observed the present condition of bunds in both project and control tanks with reference to physical status and growth of scrub jungle and bushes. In case of 59% of project tanks, the tank bunds have light trees and weed Prosopis juliflora. Most of the tank bunds require strengthening. Seepage was observed in 24% project tanks and there is need for urgent attention to arrest the seepage and strengthen the bunds.

Condition of Sluices

3.17. The number of sluices varies from tank to tank depending on the size of the tank (storage) and terrain of the ayacut. All project tanks have sluices present with the range varying from one to five. Majority of project tanks (61%) have two sluices. Only 2% of tanks have five sluices. The condition of the sluices as reported by the key informants of WUA, Laskar and Irrigation department officials has been categorized as Satisfactory and Requires Repairs. Around 56% project tanks require repairs. Leakages are observed in sluices in 37% of project tanks and 56% need repairs. A majority of sluice repair woks in project tanks have been undertaken by the Department of Water Resources, with farmers and WUAs having taken up the activity in a few cases.

Surplus Weirs

3.18. The number of surplus weirs in a tank is based on its size and ranges from one to four. The study indicates that 75% of project tanks have a single surplus weir and a much lower 22% have two.

Feeder Channels

3.19. The condition of feeder channels was assessed and has been graded into three categories, i.e., need repairs, silted and in satisfactory conditions based on discussions with key informants and observations. Around 43% tanks project tanks need repairs and 23% tanks are silted in project tanks.

3.20. Scrub jungle was observed in 69% tanks. Jungle clearance is required for free flow of water to the tank and repairs are required for Link channels (bridges, drops etc. wherever they exist) in 64% project tanks according to key informants. The cross section of the link channel/supply channel is intact in all tanks except in a few places which need to be closed before the monsoon season.

Encroachments in Tank Bed

3.21. Seasonal encroachment in tank bed was observed in one out of 102 project tanks. This is low considering the overall picture. However suitable plans have to be developed for addressing such issues. An RPF has been developed in this context to address issues related to securing of lands including instances of involuntary acquisition.

Conclusion

3.22. The tanks in Andhra Pradesh are characteristically quite diverse on many fronts; age of the tanks, size of the ayacut, sources of water, a good number of them are related to cascades as well as to socio-economic and cultural aspects. On the social front, diversity is distinguishable based on caste, resource endowment and tribal/cultural parameters. This chapter discussed the diversity observed across project tanks and provided an overview of their condition in context of proposed project interventions. The following chapter provides a discussion on the findings from the environmental assessment and provides the EMF for the project.

Chapter Four: Environmental Assessment and Environmental Management Framework

Environmental Baseline of State and Project Districts

Climate

4.1. Andhra Pradesh has a tropical climate with moderate to subtropical weather. Humid to semi-humid conditions prevail in the coastal areas while arid to semi-arid situations are prevalent in the interior parts of the State, particularly Rayalaseema (Kurnool, Chittoor, YSR Kadapa and Anantapur districts). The areas covered by the Deccan Plateau are characterized by hot summers with relatively mild winters.

4.2. Summer temperatures range from a mean maximum of 40°C to a mean minimum of 30°C, while winter temperatures range from22°C to 14°C. The monsoon season from June to December registers rainfall of about89 cm. In coastal areas, the mean maximum temperature ranges from 27oC to 30oC in January and from 34oC to 41oC in May which is the hottest month. The mean minimum temperature varies from 17oC to 20oC in December, which is the coolest month, to27oC or 28oC in May and June. In Rayalaseema region, the mean maximum temperature ranges from 30oC in December to 40oC in May. Maximum temperature even up to 47oC has also been recorded though for few days.

4.3. The state receives rainfall from South-West (June-September) and North-East (October-November) monsoons; however there is large variation in the distribution of rains. While Rayalaseema region is a zone of scanty rainfall and the Coastal areas generally receives highest average rainfall. The annual rainfall variability is about 20 to 25% for the northern half of the coastal belt and 25 to 30% for Rayalaseema and the rest of the coastal belt. The annual rainfall in the coastal region is 700 to 1500 mm. The rainfall over the western part of Rayalaseema region is less than 600 mm. This is the driest part of the State, getting 300 mm to 500 mm of precipitation mostly from south-west monsoon.

4.4. Humidity is high in the coastal belt throughout the year with an average of 70 to 80% in the morning but decreases in the afternoon by 10 to 15% in the areas away from the coast. In the interior, the afternoon values are low and the humidity drops sometime seven below 30%. March is the driest month, when the relative humidity drops down to less than 20% in the afternoon.

4.5. Along the Andhra Pradesh coast, the section between Nizampatnam and Machilipatnam is most prone to storm surges. Andhra Pradesh coast between Ongole and Machilipatnam is recognized as being vulnerable to high surges among the segments of the east coast. The severity of cyclones and storm surges is expected to increase as a consequence of climate change.

4.6. Floods by nature depend on several factors; one being incessant rains, cyclonic rains in a short period of time crippling natural drainage. However, other factors such as nature of the collecting basin, nature of the streams, type of soil, natural and man-made vegetation, amount of rainfall, obstruction to natural drainage etc. determine the type and extent of floods. The Godavari and the Krishna rivers have well-defined stable courses; their natural and manmade

banks are capable of carrying flood discharges, with the exception of their delta areas. Floods are often caused by unplanned growth, improper upkeep of drainage systems and mismanagement of discharges from dams, though floods are erroneously thought to be always of natural origin.

4.7. The Central Water Commission defines drought as a situation occurring when the annual rainfall is less than 75percent of the normal (defined over 30 years average). Drought is a normal, recurrent feature of climate. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. Andhra Pradesh has historically been prone to drought conditions especially in Rayalaseema and parts of Andhra region and has been third highest drought prone state after Rajasthan and Karnataka.

Climate Change Trends

4.8. There is adequate evidence about climate change and the consequences thereof. The Inter-Governmental Panel on Climate Change (IPCC) has observed that warming of climate systems is now unequivocal, as is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global sea levels and atmospheric concentration of carbon dioxide.

4.9. The PRECIS model projections indicate that significant warming conditions would continue over Andhra Pradesh towards the end of the 21st century. The highest temperature pocket spans over south coastal Andhra Pradesh (SPS Nellore and Prakasam districts). The surface annual air temperature is set to rise in Andhra Pradesh which will further increase the intensity of cyclones and storm surges. Certain parts of Andhra Pradesh have historically been prone to drought-like conditions, especially in the Rayalaseema region. Due to varied rain patterns, there will be an increase in drought like conditions in various districts of the state. Some of the districts which have high exposure to droughts are dry regions like Anantapur, Chittoor and YSR Kadapa. Temperature-Humidity Index (THI) represents thermal stress due to the combined effects of air temperature and humidity. The coastal regions in Andhra Pradesh are likely to remain affected throughout the year in 2030 scenario with THI above 80. THI above 80 severely impacts livestock health and productivity.

4.10. Climate change is a main challenge for agriculture, food security and rural livelihoods. The agriculture sector is the most vulnerable to climate change due to its high dependence on climate and weather conditions. Temperature plays a significant role in the growth and productivity of agriculture, and impacts agriculture in the following ways:

- Higher maximum daytime temperature accelerates crop maturity, resulting in reduced grain filling
- Higher minimum night time temperature increases respiration losses.
- Temperature fluctuations and high night temperature can severely affect the Rabi crops.
- Heat waves result in permanent and irrecoverable dehydration of plants. Heat waves also lead to rapid dissipation of reserve carbohydrates that slow down new leaf production and recovery from defoliation.
- Temperature increases are predicted to reduce rice yields.

4.11. Keeping such factors in mind it would be safe to state that impending climate change trends would need to be accounted for and initiatives would need to be planned that would enable the agriculture and allied sectors to withstand the changes.

Agro Climatic Zones

4.12. The state can be divided into five agro-climatic zones (ACZs) namely, scarce rainfall, south coastal, north coastal, Krishna Godavari and high altitude and tribal areas. Table 11 plots the ACZs across all districts of the state and provides salient characteristics.

Table 11: Salient Characteristics of Agro-Climatic Zone in Andhra Pradesh

Agro-climatic Zone	Districts	Rainfall	Temperature	Soil Type	Crops Grown
North Coastal	Srikakulam, Vizianagaram, Visakhapatnam and uplands of East Godavari	Southwest monsoon 1,000 – 1,100 mm	Max. 29-42ºC Min. 18-27ºC	Red soils with clay base, pockets of acidic soils, laterite soils with PH 4-5	Rice, groundnut, mesta, jute, Sunhemp, sesamum, sorghum, pearl millet, blackgram and horticultural crops
Southern	Sri PS Nellore, Chittoor, southern parts of Prakasam and Kadapa and Eastern parts of Anantapur	Southwest monsoon 700 – 1,000 mm	Max. 28-40ºC Min. 13-27ºC	Red loamy soils, shallow to moderately deep.	Rice, groundnut, cotton, sugarcane, millets and horticultural crops
Scarce Rainfall	Kurnool, Anantapur, Prakasam (western part), YSR Kadapa (northern part)	Southwest monsoon 500 – 750 mm	Max. 32-40ºC Min. 13-28ºC	Red earths with loamy soils (chalkas), red sandy soils and black cotton soils in pockets.	Cotton, sorghum, millets, groundnut, pulses and rice
Krishna Godavari	East Godavari, West Godavari, Krishna, Guntur and Prakasam	Southwest monsoon 800-1,100 mm	Max. 29-42ºC Min. 16-24ºC	Deltaic alluvium, red soils with clay, black cotton soils, red loams, coastal sands and saline soils	Rice, groundnut, sorghum, pearl millet, tobacco, cotton, chilli, sugarcane and horticultural crops
High Altitude and Tribal Areas	Hilly areas on the Northern borders of Srikakulam, Vizianagaram, Visakhapatnam and East Godavari	Southwest monsoon >1400 mm	Max. 17-35ºC Min. 6-24ºC	Hill slopes, undulating transported soils	Horticultural crops, millets, pulses, chilly, turmeric and pepper

Source: http://apwsipnsp.gov.in/APWSIP/Downloads/PIP

Soil

4.13. The state is dominated by red soils (less fertile) covering about 65% of area, followed by black soils (Medium fertile 25%) and alluvial soils (Most fertile 10%) as against 80% of black and alluvial soils at all India level. A variety of soils ranging from poor coastal sands to highly fertile deltaic alluviums are found in the state.

4.14. Red soils occupy over 66% of the cultivated area and are mostly situated in Rayalaseema districts. These soils have a low nutrient status. Red soils can be sub classified as (a) Dubba soils (loamy sands to sandy loams) (b) Chalkas (sandy loam soils) (c) sandy clay loams (d) loams including silt soils (e) deep loamy sands and (f) sandy loams with clay sub soil. Red loams combined with sands are present in the upland regions of coastal districts.

4.15. Black soils cover nearly 25% of the cultivated area and are generally associated with poor drainage. They are also called as Regurs or vertisols and are of two types. The first category is in-situ soils. The other one is transported soils while the first category can be noticed in the coastal districts and parts of Rayalaseema, the second category are in the valley regions of the slopes with calcareous concentrations. The in- situ soils are generally heavy in texture and high salt concentration. The alluvial loamy clay soils found in Krishna and Godavari deltas cover 5% of the cultivated area. The coastal sands occupy only 3% while the remaining 2% is covered by laterite soils in certain pockets of the State.

Forest

4.16. Forests play the multipurpose role in water and soil conservation, production of valuable timber fuel, fodder and non-wood produce and in maintaining biodiversity. As per the ISFR, 2015, published by the Forest Survey of India, Dehradun, the forest cover was 24,424 sq. km. which is 15.2% of the state geographical area. The changes in forest cover as per 2015 assessment as compared to 2013 assessment shows a gain of 67 sq. km.3. These are in the districts, which happen to be catchment areas of Godavari, Vamsadhara, Swarnamuki and other small rivers, with rich biodiversity.

Table 12: District Wise forest Coverage in Andhra Pradesh

Sl	District	Geographical Area (Sq.km)	Very Dense Forest (Sq.km)	Mod. Dense Forest (Sq.km)	Open Forest (Sq.km)	Total (Sq.km)	Percent of GA
1	Anantapur	19,130	0	144	545	689	3.6
2	Chittoor	15,151	0	1249	1325	2574	16.99
3	East Godavari	10,807	77	2493	979	3549	32.84
4	Guntur	11,391	0	219	650	869	7.63
5	YSR Kadapa	15,,359	8	2447	1640	4095	26.66
6	Krishna	8,727	0	87	259	346	3.96
7	Kurnool	17,658	73	1486	550	2109	11.94
8	Sri PS Nellore	13,076	6	424	750	1180	9.02
9	Prakasam	17,626	199	1684	1415	3298	18.71
10	Srikakulam	5,837	0	108	511	619	10.6
11	Visakhapatnam	11,161	0	2007	1439	3446	30.88
12	Vizianagaram	6,539	0	154	599	753	11.52
13	West Godavari	7,742	12	591	294	897	11.59
State Total		**1,60,204**	**375**	**13,093**	**10,956**	**24,424**	**15.25**

Source: Government of India, 2015 (Forest Survey of India Report)

[3] The main reason for increase in forest cover is due to plantation activities carried by A.P forest department and Forest Development Corporation (APFDC) in Anantapur, Chittoor, East Godavari, Guntur, and Krishna, Vizianagaram, Vishakhapatnam and West Godavari districts.

Flora and Fauna

4.17. The State of Andhra Pradesh, due to its strategic location and its geographical variation is considered as one of the rich Bio-Diversity states in India. Andhra Pradesh being located strategically in the central region of the Indian sub-continent has representatives of the magnificent Indian plant &animal life. Its varied topography ranging from the hills of Eastern Ghats and Nallamalas to the shores of Bay of Bengal supports varied ecotypes, which in turn support a rich diversity of flora & fauna. The forest in the state can broadly be divided into four major biotic provinces: Deccan Plateau, Central Plateau, Eastern Highland and East Coastal Plains.

4.18. The vegetation found in the state is largely of dry deciduous type with a mixture of Teak, Terminalias, Dalbergias, Pterocarpus, Anogeissus etc. The hills of Eastern Ghats add greatly to the biological diversity and provide centers of endemism for plants, birds and lesser forms of animal life. The varied habitat harbors a diversity of fauna which includes Tiger, Panther, Wolf, Wild Dog, Hyena, Sloth Bear, Gaur, Black Buck, Chinkara, Chowsingha, Nilgai, Cheetal, Sambar and a number of Birds and Reptiles. The long sea coast provides the nesting ground for sea turtles, the back water of Pulicat lake are the feeding grounds for Flamingo & Grey Pelican, the estuaries of river Godavari and Krishna support rich mangrove forests with Fishing Cat and Otters as key stone species.

4.19. The State is a proud possessor of some rare and endemic plants like Cycas beddomei, Pterocarpus santalinus, Terminalia pallida, Syzygium alternifolium, Shorea talura, Shorea tumburgia, Psilotum nudam etc. Similarly the Double banded or the Jerdon's Courser, the Golden Gecko, and the Slender Loris, which are rare and endangered, are endemic to the State. Andhra Pradesh has a network of 11 Sanctuaries and three National Parks covering an area of 12,579.205 Sq. Kms. or 4.57 % of the geographical area of the state.

Water Resources

4.20. The state of Andhra Pradesh is blessed with about 40 major and medium rivers out of which Godavari, Krishna and Pennar rivers contribute to the major chunk of the surface waters. The state has about 40000 minor irrigation sources spread over the thirteen districts. The geographical area of the state is about 402.70 lakh acres out of which the total cultivable area is 199.04 lakh acres. An irrigation potential for 103.11 lakh acres has been created through the existing major, medium and minor irrigation projects.

4.21. The state has fifteen major reservoirs across the Godavari, Krishna, Pennar and other basins. There are five barrages which are SAC Barrage Dowaleswaram, Prakasam Barrage, Gotta Barrage, Swarnamukhi Barrage and Sangham Barrage. The state has a total of seventeen medium reservoirs across Godavari, Krishna, Gundlakamma, Manneru, Nagavali, Pennar, Sarada, Tammileru and Yerra Kalva basins.

Tanks

4.22. Many tanks were built in a series (cascade type) so that surplus from one tank fills the next one in the series. Moreover, the storage tanks helps in ground water recharge. An institutional system also evolved and enabled tanks to be the major source of irrigation. The gamut of minor irrigation comprises minor irrigation tanks (>40 hectare command), Panchayat Raj

Tanks (<40 hectare command), lift irrigation schemes and ground water based irrigation systems (Government of Andhra Pradesh, 2017).

Table 13: District wise Tank Coverage in Andhra Pradesh

Sl	District	Number of Tanks	Registered Ayacut (Acres)
1	Anantapur	2,502	141,936
2	Chittoor	8,063	300,307
3	East Godavari	1,516	130,415
4	Guntur	294	31,708
5	YSR Kadapa	1,776	107,872
6	Krishna	911	103,693
7	Kurnool	611	80,160
8	Sri PS Nellore	1,706	282,852
9	Prakasam	890	140,242
10	Srikakulam	8,554	275,386
11	Visakhapatnam	3,343	230,665
12	Vizianagaram	6,262	268,319
13	West Godavari	1,389	112,655
	Total	**40,817**	**2,206,210**

Source: Water Resources Department, GoAP, 2017.

Agriculture

4.23. The agriculture sector is one of the most critical sectors in the economy of Andhra Pradesh. The Government under the Primary Sector has indicated its focus on increasing productivity, mitigating the impact of droughts through water conservation and micro-irrigation, post harvest management to reduce wastage and establishment of processing, value addition capacity and supply chain of identified crops. The net area sown as percentage of geographical area in the state is highest in West Godavari district and lowest in YSR Kadapa district.

Table 14: District wise Data of Net Area Sown and Cropping Intensity in Andhra Pradesh

Sl	District	Net Area Sown as a % of Geographical Area	Cropping Intensity
1	Anantapur	53.3	1.07
2	Chittoor	23.4	1.15
3	East Godavari	39.1	1.69
4	Guntur	50.6	1.36
5	YSR Kadapa	23.2	1.33
6	Krishna	57.3	1.59
7	Kurnool	52	1.15
8	Sri PS Nellore	28.2	1.22
9	Prakasam	34.4	1.11
10	Srikakulam	52.5	1.39
11	Visakhapatnam	25.6	1.24
12	Vizianagaram	42.3	1.36
13	West Godavari	61.0	1.66

Source: Statistical Abstract, Andhra Pradesh, 2012-13

4.24. Rice is the most important cereal crop grown in the state and the percentage of gross cropped area under rice cultivation is highest in SPS Nellore and lowest in Anantapur. The percentage gross cropped area under cereals and millets is highest in West Godavari and lowest in

Anantapur. Prakasam and YSR Kadapa have the highest percentage of gross cropped area under pulses while the highest percentage under oilseeds is in Anantapur district.

Table 15: District wise Area under Different Crops

Sl	District	% Area Under Rice	% Area Under Cereals and Millets	% Area Under Pulses	% Area Under Oilseeds	% Area Under Fruits and Vegetables
1	Anantapur	2.7	7.2	13.9	70.6	3.6
2	Chittoor	11.8	14.6	4.7	37.8	19.4
3	East Godavari	57.3	58.9	7.2	1.4	10.1
4	Guntur	24.7	39.9	14.7	2	2.4
5	YSR Kadapa	7.2	12.6	31.6	28.6	13.1
6	Krishna	35.7	39.2	24.2	1.5	8.5
7	Kurnool	9.0	24.6	28	24.2	3.1
8	Sri PS Nellore	58.5	59.7	10.8	4.4	7.7
9	Prakasam	8.0	19.6	31.7	6.7	5.1
10	Srikakulam	49.4	52.2	20	5.1	8.9
11	Visakhapatnam	28.8	41.9	6.4	5.3	14.3
12	Vizianagaram	33.7	40.6	11.3	8.4	17.0
13	West Godavari	56.7	63.8	2	5.2	6.0

Source: http://www.ap.gov.in/wp-content/uploads/2016/01/5-AP-Agri.pdf

4.25. Cropping intensity is the number of times a crop is planted per year in a given agricultural area. It is the ratio of effective crop area harvested to the physical area. The cropping intensity is highest in East Godavari and lowest in Anantapur.

Fertilizers

4.26. As farming is the primary activity in the study area, with paddy being the most preferred crop in the command area, the use of fertilizers is common in the study area. Usage of organic manure is a traditional practice among the farmers having livestock and cattle dung is applied to agricultural lands before tilling. Un-decomposed green leaves are also used as manure either by growing green manure crops belonging to leguminous family or by collecting green leaf (along with twigs) from plants.

4.27. Major fertilizers used are N, P, and K. Excess usage of chemical fertilizer's may have potential to influence the soil and water quality, the details regarding the agrochemicals was collected from district statistical handbooks, 2015. Excess percentage of fertilizer above the national consumptions 128.08 kg/ha is used in all the districts except Krishna and Vishakhapatnam.

4.28. The consumption of fertilizers in India in terms of NPK has increased substantially from a mere 1.1 million tonnes in 1966-67 in the pre-green revolution period to more than 25 million tonnes in 2014-15. As per the International Fertilizer Association, India ranked second in total world fertilizer consumption in 2012. The all-India average consumption of fertilizers has increased from 69.84 kg per hectare in 1991-92 to 128.08 kg per hectare in 2014-15. In Andhra Pradesh, per hectare consumption of over 200 kg exceeds the national average.

Table 16: District wise Fertiliser Consumption in Andhra Pradesh, 2014-15*

Sl	Districts	Gross cropped area *(Ha.)*	Fertilizer Consumption (Tonnes)						
			Urea	*NPK*	*DAP*	*Others*	*Total*	*Average kg/ha#*	*% above National Average*
1	Anantapur	8,46,045	57,428	73,775	12,432	8,187	1,51,822	179	39.76
2	Chittoor	2,38,508	46,973	36,689	11,070	14,237	1,08,969	457	256.81
3	East Godavari	6,83,859	1,42,740	85,178	31,407	29,585	2,88,910	422	229.48
4	Guntur	8,09,674	1,70,656	1,36,522	63,385	19,503	3,90,062	482	276.33
5	YSR Kadapa	3,35,052	45,423	40,185	22,972	14,198	1,22,778	366	185.76
6	Krishna*	5,96,342	2,96,023	86,512	58,649	1,99,051	6,40,235	107	-16.46
7	Kurnool	10,14,098	76,731	94,625	51,177	9,216	2,31,749	229	78.79
8	Sri PS Nellore	3,94,565	1,32,923	48,707	25,911	18,460	2,26,001	573	347.38
9	Prakasam	5,25,076	1,16,345	85,781	24,914	33,211	2,60,251	496	287.26
10	Srikakulam	3,57,410	65,666	15,412	10,454	11,316	1,02,848	288	124.86
11	Visakhapatnam	3,62,847	39,732	2,015	3,359	2,399	47,505	125	-2.4
12	Vizianagaram	3,72,693	54,026	18,957	16,082	10,602	99,666	267	108.46
13	West Godavari	5,41,146	2,14,947	1,31,999	33,645	35,026	4,15,617	762	494.94

**Krishna district value is based on 2013-2014 data; other district data are based on the 2014-2015 published in respective districts statistical handbooks*

4.29. The Indian crop protection market is dominated by insecticides, which form almost 60% of the domestic crop protection chemicals market. The major applications are found in rice and cotton crops. Fungicides and herbicides are the largest growing segments accounting for 18% and 16% respectively; the sale of herbicides is seasonal. Rice and wheat crops are the major application areas for herbicides. Increasing labor costs and labor shortage are key growth drivers for herbicides. Fungicides find application in fruits, vegetables and rice. The key growth driver for fungicides includes a shift in agriculture from cash crops to fruits and vegetables. Bio-pesticides include all biological materials organisms which can be used to control pests. Bio-pesticides constitute a meager percentage of the Indian crop protection market.

4.30. Erstwhile undivided Andhra Pradesh (Seemandhra and Telangana), Maharashtra and Punjab are the top three states contributing to 45% of pesticide consumption in India. Erstwhile Andhra Pradesh was the leading consumer with 21% share. The usage pattern of pesticides is more dependent on dealer recommendations and experiences of fellow farmers rather than any scientific recommendation of agricultural extension services.

Table 17: Chemicals with Level of Toxicity

Toxicity Hazard class	Chemicals
Extremely hazardous	Phorate (OP*)
Highly hazardous	Carbofuran (Carbamates), Monocrotophos (OP$^{\#}$), Profenofos (OP)
Moderately hazardous	Dimethate (OP), Quinalphos (OP), Endosulfan (OC), Carbaryl (Carbamate), Chloriyrifos (Pyrethroid)
Slightly hazardous	Malathion (OP)
Unlikely to present acute hazardous	Carbendazim (carbamate)

**OP- Organophosphorus, $^{\#}$OC-Organochlorine*

4.31. Pesticides can enter the body through the skin, eyes, mouth and lungs. Skin contact is the most common cause of pesticide poisoning for applicators and some pesticides may enter the body through the skin quite readily. At the time of mixing, pesticides are more concentrated

and the likelihood of injury is increased during this time. Some parts of the body absorb pesticides extremely fast (within a few minutes) and need extra protection. Absence of Personal Protective Equipment (PPE) usage during spraying of pesticides which was observed is therefore extremely worrisome. Environmental contamination can also result in human exposure through consumption of residues of pesticides in food and, possibly, drinking water.

Livestock

4.32. Livestock rearing is an alternate livelihood option for farming communities. Commonly reared animals are cows, buffaloes, goats, sheep and pigs. Due to lack of availability of water and fodder in the agricultural lands, vegetation in the tanks serves as alternate for grazing.

Fisheries

4.33. There are a total of 104 reservoirs in the state with 2.40 lakh hectares water spread area. There are about 25,400 tanks with an area of about 3.38 lakh ha, aquaculture ponds 42,100 with an extent of 1.25 lakh ha, one fresh water Kolleru lake with an extent of 0.90 lakh ha and rivers and canals covering a length of 11,514 Kms.

4.34. There are 132 Fish Seed Farms (Government 50 and 82 Private) and about 300 Shrimp hatcheries and catering the needs of fish and prawn seed to aqua farmers of the state and also to other states. The state produced 13, 98,015 tonnes of inland fishes and prawns during 2014-15. 81% of the total catch is contributed from Krishna (40%) and West Godavari (41%) districts due to the presence of Prakasam barrages across Krishna River and Dowleswaram barrage across Godavari River. SPS Nellore district contributes 6 percent of the total catch due to the presence of Penna River, Somasila dam and other large tanks. Other districts contribute only minor quantity to the state production. (Government of Andhra Pradesh, 2015)

4.35. Study area tanks have been used for fish culturing by fisheries cooperative societies. Fish production details are provided in Table 18.

Table 18: District wise Details of Fish Production

Sl	District	Production (Tonnes)	% of State's total production
1	Anantapur	6,647	0.48
2	Chittoor	4,125	0.30
3	East Godavari	46,299	3.31
4	Guntur	33,707	2.41
5	YSR Kadapa	3,269	0.23
6	Krishna	5,60,127	40.07
7	Kurnool	24,253	1.73
8	SPS Nellore	86,340	6.18
9	Prakasam	24,974	1.79
10	Srikakulam	11,912	0.85
11	Visakhapatnam	15,591	1.12
12	Vizianagaram	11,510	0.82
13	West Godavari	5,69,261	40.72

Environmental Baseline of Sample Tanks

Location of tanks

4.36. **Singanamala tank** is an independent tank located in Singanamala Mandal of Ananthapur district. Rain water is the only source for the lake; due to lack of rainfall in the Rayalaseema region the tanks was completely dried up, no agricultural activities since 2007. Average rainfall in the area is about 552 mm. The total water spread area is 115.21 sq. miles and total catchment area is 1632.95 sq.km.

4.37. **Y.T Cheruvu** is a cascade tank (cascade 02), located in Guntakal Mandal of Anantapur district. The tank is located about 360 m above msl, catchment area of the tank is 488.78 sq.km. Total storage capacity of the tank is 331.50 mcft designed to irrigate an area of 903 Acres. Average rainfall in the area is about 515 mm. Scanty rainfall in the Rayalaseema region, the tanks was partially filled in the past years led to cultivation of crops in the tank head reach.

4.38. **Veeraka Nellore pedda tank** is an independent tank, located in G.D Nellore Mandal of Chittoor district. The tank is located about 280 m above msl, catchment area of the tank is 18.59 sq.km. Total storage capacity of the tank is 33.79 mcft designed to irrigate an area of 214 Acres. Average rainfall in the area is about 918 mm.

4.39. **Nallatammaiah tank** is an independent tank located in Yerravaram village, Yeleshwaram Mandal of East Godavari district. The tank is located about 40 m above msl, catchment area of the tank is 11.46 sq.kms. Total storage capacity of the tank is 10.63 mcft designed to irrigate an area of 553.48 Acres. Average rainfall in the area is about 1093.10 mm.

4.40. **Badvel big tank** is a cascade tank (cascade 03), located in Anantharajapuram village, Badvel Mandal of YSR Kadapa district. The tank is located about 100 m above msl, catchment area of the tank is 173.28 sq.km. Total storage capacity of the tank is 1364 mcft designed to irrigate an area of 4200 Acres. Average rainfall in the area is about 866.20 mm.

4.41. **Chennampalli tank** is a cascade tank (cascade 03), located in Badvel Mandal of YSR Kadapa district. The tank is located about 100 m above msl, catchment area of the tank is 50.55 sq.km. Total storage capacity of the tank is 145.50 mcft designed to irrigate an area of 1065.4 Acres. Average rainfall in the area is about 866.20 mm.

4.42. **Borragudem tank** is a cascade tank located in Chandragudem village, Mylavaram Mandal of Krishna district. The tank is located about 70 m above msl, catchment area of the tank is 6.32 sq.km. Total storage capacity of the tank is 16.358 mcft designed to irrigate an area of 226.01 Acres. Average rainfall in the area is about 950.30 mm.

4.43. **Nakkalagandi Reservoir** is an earthen dam constructed across Uppuvagu River, the reservoir is located in Thimmareddipalli village, Varikuntapadu Mandal of SPS Nellore district. The tank is located about 110 m above msl, catchment area of the tank is 53.00 sq.miles. Total storage capacity of the tank is 167 mcft designed to irrigate an area of 800 Acres. Average rainfall in the area is about 700 mm.

4.44. **Ura tank** is an independent tank located in Seetharamapuram village and Mandal of SPS Nellore district. The tank is located about 215 m above msl, catchment area of the tank is 21.50 sq.miles. Total storage capacity of the tank is 40 mcft designed to irrigate an area of 120 Acres. Average rainfall in the area is about 700 mm.

4.45. **Ananthasagaram tank** is an independent tank located in Ananthasagaram village and Mandal of SPS Nellore district. It is located about 65 m above msl, catchment area of the tank is 134 sq.miles. Total storage capacity of the tank is 21.13 mcum designed to irrigate an area of 3500 Acres. Average rainfall in the area is about 805.10 mm.

4.46. **Markapur tank** is an independent tank located in Markapur (Rural) village and Mandal of Prakasam district. It is located about 150 m above msl, catchment area of the tank is 31.25 sq.km. Total storage capacity of the tank is 217.92 mcft designed to irrigate an area of 1005.99 Acres. Average rainfall in the area is about 805.10 mm.

4.47. **Kumarasagaram tank** is a cascade tank (cascade no.2) located in Thotavada village, Burja Mandal of Srikakulam district. The tank is located about 39 m above msl, catchment area of the tank is 0.52 sq.kms. Total storage capacity of the tank is 41.25 mcft designed to irrigate an area of 330.69 Acres. Average rainfall in the area is about 1007.6 mm.

4.48. **Routhpuram Pedda Cheruvu** is located in Pathapatnam Mandal and Srikakulam district. The tank is located about 60 m above msl, catchment area of the tank is 10.156 sq.kms. Total storage capacity of the tank is 29.35 mcft designed to irrigate an area of 587.18 Acres. Average rainfall in the area is about 1007.6 mm.

4.49. **Dattapa tank** is an independent tank located in Peddipalem village, Anandapuram Mandal of Vishakhapatnam district. The tank is located about 30 m above msl, catchment area of the tank is 3.24 sq.kms. Total storage capacity of the tank is 31.81 mcft designed to irrigate an area of 216.32 Acres. Average rainfall in the area is about 1032.1 mm.

4.50. **Similiguda Mini Reservoir** is located in Araku valley Mandal, Visakhapatnam. It has 1 sq km water spread area and 3.5 sq.km catchment area. The tank village is Similiguda consisting of tribal population with a population of 370 people i.e., 55 families and all of them are Ayacutdars. Average rainfall in the area is about 1032.1 mm.

4.51. **Gunkalam Pedda tank** is a cascade tank (cascade 02) located in, Vizianagaram Mandal and district. The tank is located about 30 m above msl, catchment area of the tank is 2.06 sq.kms. Total storage capacity of the tank is 10.86 mcft designed to irrigate an area of 173.83 Acres. Average rainfall in the area is about 964 mm.

4.52. **Dummangi Cheruvu tank** is located in, Vizianagaram Mandal and district. The tank is located about 100 m above msl, catchment area of the tank is 0.78 sq.kms. The tank irrigates an area of 112.08 Acres. Average rainfall in the area is about 964 mm. Tank ayacut has 100 families of Jatapa tribes.

4.53. **Gollavani tank** is a cascade tank (cascade 01) located in Dwarka Tirumala Mandal of West Godavari district. It is located about 45 m above msl, catchment area of the tank is 1.27 sq.km. Total storage capacity of the tank is 6.9 mcft designed to irrigate an area of 137.98 Acres. Average rainfall in the area is about 1049 mm.

Surface Water Quality

4.54. Surface water quality was measured, results are provided in Important observations of the water quality result indicated the tanks, particularly close to urban centers, were found to contain contaminants originating from the urban centers, for instance Markapur. Open defecation and Fecal were observed in almost all the tanks. Solid waste dumping in the lake fringe area was observed Chennampalli, Markapur, Gunkalam and Dattapaka tanks.

4.55. Water colour varied from light brown to dark brown due to runoff and suspended sediments in the water column. Amount of suspended solids in the water column affects light penetration. Measurement of transparency indicated most of the tank values are below 10 inches indicating high amount of suspended solids in water column except Nallatammaiah tank were the transparency value was 33 inches (0.8 m).

4.56. pH of the water of study area study tanks are alkaline except Veeraka Nellore and Nallatammaiah tanks where the pH value is slightly below neutral. Total Dissolve Solids (TDS) values are well below the drinking water permissible limits (500 mg/l) in all the tanks except Markapur tank. Dissolved oxygen levels are satisfactory in all the tanks, the value ranged between 5 mg/l to 7.3 mg/l.

Tank Bed Sediment Quality

4.57. Tank bed sediments were collected and analyzed for Soil texture, pH, Electrical conductivity, Nitrogen, Phosphate, Potassium and micronutrients such as Copper, Zinc, Iron and Manganese. Tank bed sediments was generally clay, which improves moisture retention, water holding capacity and provides essential macro and micro nutrients required for the plant growth. Thus, it is important to assess the characteristic of the bed sediments before using in the agricultural fields. Important observations were, most of the sediment texture was clay, whereas sand was found in Anantasagaram tank and Nakkalgandi Reservoir. Silt texture was found in Anantasagaram tank.

Forest and Biodiversity

4.58. The cyclic nature of the tanks, as dry bodies for some months has also helped in the diversity of species. The vegetative growth in and around the tank and its environs has attracting various forms of life – avian, amphibians, reptiles etc as it offers good base. A survey was conducted across 18 tanks in different agro-climatic zones as part of this study to list species diversity – floral and faunal variety.

- All the tanks in the study are has good range of dissolved oxygen to support aquatic organisms.
- Tanks near rural areas: Majority of the study tanks belong to this category. Salient features of these tanks are: a) inflows are influenced by run-off from cultivated lands with possible contamination of agrochemicals; b) tanks conversion into dry bed for a couple of months, and c) high levels of siltation.
- Tanks with catchment in undisturbed area: Badvel Pedda tank, Anantasagaram tank, Ura tank, Nakkalagandi Reservoir catchment are either natural forest and/ or degraded natural forest with forest types of scrub forest and dry deciduous forest.

Avian Diversity

4.59. A detailed survey of the avian community was carried out. Avian community being natural predator in ecosystem forms ready indicator for not only the quality but also ecosystem at large. The details of field survey of 29 species of birds were identified in the study area.

Floristic Diversity

4.60. Floral habit observed in and around the tanks is given in Table 19. Tanks with good catchment area conditions were found to have more diversity in terms of the species present.

Table 19: Details of Floristic Diversity

Habit Type	Number of Species
Aquatic	6
Climbers and creepers	15
Grasses	5
Herb	42
Shrub	22
Tree	22

Source: Observations during field visits, 2017

Fish Diversity

4.61. Study area tanks have been used for fish culturing by fisheries society. Important fishes cultured in the tank are provided in Table 20.

Table 20: Fish Diversity in Sample Tanks

Common Name	Local Name
Common Carp	Bangaru teega
Katla	Bochcha
Rohu	Ragandi
White Carp	Mirgala (Mosu)
Cat fish	Jella
Tilapia	Queiloo
Fresh water prawn	Royya

Source: Observations during field visits,2017

Environmental Issues of Significance

Siltation and Sedimentation

4.62. Siltation is a chronic problem which was observed across all the sample tanks visited by the study team. Although the degree and extent of siltation varies from tank to tank, it has considerably affected the tank storage capacity and reduced the overall performance of tank systems. Three types of siltation were observed during the visit to sample tanks viz. siltation in the feeder channels, siltation in tank bed and siltation in tank distributaries. Key factors that have led to high level of silt deposition in the tank systems include:

- Ineffective catchment area treatment
- Age old feeder channels without silt control mechanism
- Absence of eco-friendly silt disposal practices
- Poor operation and maintenance of tank systems

However it may be noted that except reducing the storage capacity of tank bed, the silt deposition has not caused major threat or damage to the tank proper and embankment.

Water Logging

4.63. During the study of the sample tanks in different agro climatic zones and inference drawn from stake holders' consultation is that the streams and nalas feeding the tanks are seasonal and extent of command area is small being located mostly in well drained areas, the problem of water logging is not commonly experienced.

4.64. Water logging may not pose a major challenge for the project because almost all tanks are seasonal in nature thereby the scope for perennial water logging, salinity and sodicity can be ruled out. However, water logging problem observed in small pockets in the coastal area (Krishna, West Godavari and East Godavari Districts) due to high and erratic rainfall (above 1200mm) water table nearer to surface 1.5 to 2.0 m bgl may pose some problem which requires greater inter-departmental coordination for developing a sustainable land use measure. Especially, in case of some low lying pockets in coastal areas, there may be instances of water logging that would require attention.

4.65. Recommended mitigation measures for water logging in command area of minor irrigation tanks located in the coastal area include checking the canal leakages, practicing water efficient methods and conjunctive use of surface and ground water for lowering the water table. The other issue associated with water logging is salinity which is found to be normal.

Water Quality

4.66. For ensuring use of available and required quality water for domestic and other purposes, the Bureau of Indian Standard have classified the inland surface water and standards are fixed based on their designed best use depending upon its quality parameters. Meaningful evaluation of water quality status requires that the quality be viewed in the context of the uses which the society wishes to make of the stream, each of which requires special characteristics. Water quality parameters are described in IS 2296/1982. The quality criteria of water are derived from the criteria developed and adopted in other parts of the world, namely USA, UK, Germany and Japan.

4.67. Biological assessment is based on the fact that pollution of water bodies will cause changes in the physical and chemical environment of water, which in turn, will disrupt the ecological balance of the ecosystem. Through bio-monitoring, the cumulative effects of all the pollutants can be determined and the overall health of the ecosystem can be properly assessed. Bio-monitoring results are generally expressed in terms of two indices, namely the Saprobic Index [SI] and the Diversity Index [DI]. Water quality criteria in terms of SI and DI are reflected in Table 21.

Table 21: Biological Assessment of Water Quality

Water Quality, SI and DI Biological Indicators	
Monitoring Station	**Water Quality**
High biodiversity DI>=0.6 SI = 6.10 BOD <=3mg/l	Clean
Moderate biodiversity DI = 0.2 – 0.6 SI = 2 to 6 BOD = 3-6mg/l	Slight to Moderate Pollution
Poor Biodiversity DI <=0.2 SI <=2 BOD >=6mg/l	Heavy to Severe Pollution

Water Quality in Terms of Wholesomeness

4.68. The first priority in water quality assessment and management should be to maintain and restore a desirable level of its environmental quality.

Ground Water Quality

4.69. The ground water in the State is generally slightly alkaline. In the consolidated and semi consolidated formations, the quality of ground water is generally fresh and is suitable for all types of uses including drinking. However the ground water in shallow aquifers in general is suitable for irrigation and other purposes. In coastal tracks, sea water ingress and tidal incursions have contaminated the ground water. In this tracks the ground water quality varies widely from calcium bicarbonate in inland areas to sodium chloride near the sea. The depth wise hydro chemical quality profile is also non-uniform. This is due to a variety of situations that has evolved depending upon the nature of sediments, aquifer properties, fresh water head and hydrology of the basin. Complexity of situation arises due to non-homogeneity of aquifer resulting in penetration of sea water wedge into the coastal track. However in the inland, the ground water from deeper aquifers has pH value from 6.62 to 8.2, Total Dissolved Solids (TDS) from 265-134 ppm, hardness as CaCO3 from 21 to 263 ppm and Chloride from 14 to 307 ppm. The Sodium Adsorption Ratio (SAR) varies from 0.54 to 8.2.

Fluoride Contamination

4.70. In the state of Andhra Pradesh, fluoride contamination in ground water is reported from different pockets like Markapur of Prakasam district, Badvel of YSR Kadapa district and Guntakal of Anantapur district. Fluoride contamination has resulted in severe health hazard in above areas. Based on quality parameters, the tank water can be brought under the classification of C, D and E. During the study, different water quality parameters were tested, both for surface and ground water. The tested parameters are pH, BOD, COD, DO, F, Cl, NO3, EC, B, Fe, TC, and free ammonia. Findings of samples of surface and ground water tested for 18 sample tanks for above quality parameters presented in Annexure VI. After testing, it is inferred that all the values of tested sample are within the permissible limit with minor variation.

Impact due to Water Quality

4.71. Water quality assessment under overall EA framework is an important consideration as the tanks will have direct effect on the village folk, habitat and agricultural production. In order to assess the present status of water quality, surface and ground water samples were analyzed.

Besides the quality of tube well water (ground water) in the vicinity of villages located near the tank were also collected and tested. The tank water and tube well water cater to the following primary requirements of the village population.

Drinking Water Requirement

4.72. Surface Water: From the interaction with local stakeholders it came to light that normally people don't use tank water for drinking purpose. Samples of surface and ground water tested for 18 tanks for quality parameters have shown that the tank waters are within the permissible limit with minor variation. However the use of tank water for drinking is not ruled out especially during emergency needs after imparting proper treatment.

4.73. Ground Water: As it is observed and verified, normally the villagers use available tube wells and dug-wells as their sources of drinking water and cooking purposes. Water quality analysis reveals that ground water tested for 18 tanks for quality parameters are not within the permissible limits of drinking water standards.

Pisciculture Requirement

4.74. As per the activities outlined in APIIATP, fisheries activity has been given substantial importance as it will address to the income generation and livelihood support to the landless and other vulnerable groups. Accordingly water samples were tested to find out its standard and its suitability for sustaining the pisciculture. It is inferred from the water test results that in most of the tanks the dissolved oxygen (DO) remains 4.0 mg/l which is conducive for fish breeding.

4.75. Quality of Water: Considering the fact that tank water is not being used as primary source for drinking water, the water quality in most of the tanks does not emerge as a serious concern. Total Dissolved Solids (TDS) values are well below the drinking water permissible limits (500 mg/l) in all the tanks except Markapur tank located in the urban area.

Agriculture Sustainability

4.76. Improvement of crop production is a primary objective of the rehabilitation of tank system. It is expected that with the rehabilitation of tank system, farm sector will improve and by that farmer's income supporting livelihood can be ensured. To understand the suitability of available water to farm promotion, water samples were tested and inferences were drawn accordingly. All the water samples from 18 tanks and tube wells were tested. The inference drawn from the test result is that the Sodium Absorption Ratio (SAR) of tank waters is below the permissible limit (SAR=26) and thus tank waters are suitable for agriculture purposes.

4.77. So, overall it can be concluded by saying that quality of water for the specified purpose is within the permissible limit and suitable for earlier specified purposes based on its sources. No such alarming threat is marked with regard to the water quality test results.

Fertiliser and Pest Management

Use of Fertilizer and Pesticides in Different Sample Tanks

4.78. Study tanks are spread in five agro-climatic zones and pest incidence varies from one zone to another and their intensity also varies according to zone and climatic conditions as well. Most of the command area is under paddy cultivation and the common pests affecting paddy are provided in Table 22.

Table 22: Pest and Diseases found in Paddy

Insect Pest	Fungal Disease	Bacterial Disease	Viral Disease
Brown plant hopper (*Nilaparvata lugens*)	Blast disease (*Scirpophaga incertulas*)	Bacterial leaf blight (*Xanthomonas oryzae*)	Rice Tungro Disease (RTD) - Rice tungro bacilliform virus(RTBV) and Rice tungro spherical virus(RTSV)
Paddy stem borer (*Pyricularia oryzae*)	Sheath blight (*Rhizoctonia solani*)	Bacterial leaf streak – (*Xanthomonas oryzae pv. Oryzicola*)	

Source: Observations during field visit, 2017

Table 23: Usage of Fertilizers in ESMF Sample Tanks

Name of Tank	ACZ	Fertilizer Consumption (per acre)				
		Nitrogen	Phosphorus	Potassium	Micronutrients	Others
Anantapur, Guntakal Y T Cheruvu (V&T)	Scarce Rainfall Zone	69	48	28	10	
Anantapur, Singanamala (M&V), Rangaraya Cheruvu	Scarce Rainfall Zone	46	9	15	10	
Chittoor, G.D. Nellore, Veeraka Nellore, Peddacheruvu	Southern Zone			15		40
East Godavari, Yeleswaram, Yerravaram, Nalltammaiah Tank	Krishna Godavari Zone					25
Krishna, Mylavaram, Borragudem (V&T)	Krishna Godavari Zone					15
Prakasam, Markapur (M, V, Tank)	Krishna Godavari Zone					
Sri PS Nellore Seetharamapuram, Sangasanipally, Ura Tank	Southern Zone		9			18
Sri PS Nellore, Anantha Sagaram (M, V, Tank)	Southern Zone			12	10	10
Sri PS Nellore, Varikuntapadu, Kakulavaripalli, Nakkalagandi Reservoir	Southern Zone			15	10	10
Srikakulam, Burja, Kurmasagaram (V&T)	North Coastal Zone			9	10	10
Srikakulam, Patapatnam, Routhulaksmipuram, Pedda Tank	High Altitude &Tribal Area	9		15		5
Visakhapatnam, Araku, Similiguda (V&T)	High Altitude &Tribal Area	9		30	10	5
Vizianagaram (D&M), Gunkalam, Pedda tank	North Coastal Zone					10
Vizianagaram, Gummalaxmipuram, Dommangi (V&T)	High Altitude &Tribal Area	9		30		5
West Godavari, Dwaraka Tirumala, Tirumalampalem, Gollavani Kunta	Krishna Godavari Zone			12	20	10
YSR Kadapa, Badvel (M&V), Chennampalli (V&T)	Southern Zone			30		5

Source: Primary Survey, 2017

Table 24: Usage of Pesticides in ESMF Sample Tanks

Name of Tank	ACZ	Paddy	Cotton	Maize	Jowar	Vegetables
Anantapur, Guntakal Y T Cheruvu (V&T)	Scarce Rainfall Zone	Rogor - 200 ml Fenval-100 ml Quinolophos-500 ml Cantago-200 ml				
Anantapur, Singanamala (M&V), Rangaraya Cheruvu	Scarce Rainfall Zone	M 45- 200 gms				
Chittoor, G.D. Nellore, Veeraka Nellore, Peddacheruvu	Southern Zone					
East Godavari, Yeleswaram, Yerravaram, Nalltammaiah Tank	Krishna Godavari Zone	Fame - 250 ml; Keldane – 500gms	Fame - 250 ml; Keldane - 250 ml			
Krishna, Mylavaram, Borragudem (V&T)	Krishna Godavari Zone					
Prakasam, Markapur (M, V, Tank)	Krishna Godavari Zone					
Sri PS Nellore Seetharamapuram, Sangasanipally, Ura Tank	Southern Zone					
Sri PS Nellore, Anantha Sagaram (M, V, Tank)	Southern Zone	Keldane – 500gms				
Sri PS Nellore, Varikuntapadu, Kakulavaripalli, Nakkalagandi Reservoir	Southern Zone	M 45- 200 gms				
Srikakulam, Burja, Kurmasagaram (V&T)	North Coastal Zone	Keldane – 500gms				
Srikakulam, Patapatnam, Routhulaksmipuram, Pedda Tank	High Altitude &Tribal Area	Keldane – 500gms				
Visakhapatnam, Araku, Similiguda (V&T)	High Altitude &Tribal Area	Keldane – 500gms				
Vizianagaram (D&M), Gunkalam, Pedda tank	North Coastal Zone					
Vizianagaram, Gummalaxmipuram, Dommangi (V&T)	High Altitude &Tribal Area	Keldane – 500gms				
West Godavari, Dwaraka Tirumala, Tirumalampalem, Gollavani Kunta	Krishna Godavari Zone			Chloropyriphos- 500ml, M-45- 200gms 1/2 litre Blitax – 500gms		Chloropyriphos- 500ml, Blitax- 500gms
YSR Kadapa, Badvel (M&V), Chennampalli (V&T)	Southern Zone	Chloropyriphos- 500ml M-45-200gms			Sadolder - 250 ml	

Source: Primary Survey, 2017

Bio-diversity and Fishery

4.79. Field visits and consultation meetings held with project stakeholders revealed that out of sample 18 tanks, fishery activity is practiced in 8 tanks. Fisheries activity can be taken-up in the currently unsuitable 10tanks once appropriate rehabilitation of tank system is completed.

4.80. Short seasonal availability of water for less than six months is marked in 8 tanks of the total tanks found suitable for pisciculture. Based on the water quality test report, it is inferred that existing water quality is suitable for pisciculture and no such remarkable hazardous implications are expected by using the available tank water for pisciculture. As estimated, the tank water pH in the visited sample tanks normally falls in between 6.2 to 8.4 with a BOD range of 0.6 to 3.2.

4.81. Promotion of fishery will provide livelihood support to fisher folk and other landless population. The additional income so generated out of fish production would add to corpus fund of the Water Users Association (WUA) and will help the sustainability of project in the long run. In this regard, measures such as technology based augmentation of fish production, capacity building and skill up-gradation of fisher men and establish a credit and market linkages have been planned as part of EMF. As far as fish farming is concerned, formation of fish pits; and barricading of spillway and sluice are the methods recommended in the EMF. With regard to fish feed, the use of cattle dung and supply of oil cakes and rice bran are suggested. However, the use of any toxic chemicals for fish feed needs to be banned.

Aquatic Weeds

4.82. The growth of aquatic plants like Ipomea cornea, Eichornia crassipes and Pistia stratiotes are some of the aquatic weeds identified in the study area tanks. Among these, the growth of Ipomea is common in almost all tanks which created water congestion and thereby reduces the water efficiency of tank systems. Manual de-weeding of these aquatic plants is recommended in small streams and channels by deploying labor to cut plant support by manual means. Tank bed de-weeding using biological control methods (introduction of an herbivorous organism, fungus or virus into the affected ecosystem) potentially provides better long-term success. Chemical control method should be avoided because they adversely affect the fishery activity. The de-weeded plant material can be applied after composting, directly spread on the surface, or mulched into the top layer of the soil in the lands of resource poor stakeholders and backward communities through WUA.

Table 25: Key Issues and Challenges Identified in Environment Assessment

Key Issues and Challenges	
1. Dam safety Embankment	**Embankment** ▪ Cracks on crest ▪ Settlement of embankment ▪ Rain cuts, ant hills, rodent holes ▪ Invisible toe drains due to weed growth and covered up by soil ▪ D/S area slushy ▪ Lack of surface drainage arrangement **Spill way** ▪ Seepage and status of toe drains ▪ Cracks, leakage in spillway ▪ Inadequate spillway capacity **Head Regulators** ▪ Leakage of water through the Head regulator gates ▪ Seepage and status of toe drains ▪ Cracks, leakage in spillway ▪ Inadequate spillway capacity
2. Siltation & Sedimentation	**Catchments** ▪ Improper land use pattern in the catchments ▪ Denuded catchments

Key Issues and Challenges	
	▪ Sediment load from each catchments is not calculated ▪ Development of wastelands due to lack of soil conservation practices **Foreshore and Feeder Channels** ▪ Siltation of feeder channel ▪ Silted foreshore, tank proper and canal/drainage line ▪ Tank peripheral area with active gullies ▪ Silt disposal ▪ Vacant land in tank periphery **Tank Proper** ▪ Heavy Siltation ▪ Reduced storage capacity **Drainage** ▪ Siltation of canal/drainage line ▪ Flooding due to choked drainage/canal
3. Pest & Fertilizer Management	▪ Non-availability of Integrated Pest Management mechanism ▪ Quantum of application based on crop typology ▪ Physical safety methods during application ▪ Ground water pollution due to heavy leaching of nitrogenous fertilizer (Nitrate pollution) ▪ Soil microbes will die resulting in deterioration of soil health ▪ Soil salinity may increase ▪ Change in soil physical structure and texture ▪ Hard pan may result in the soil surface make difficulties in intercultural operation

Environmental Management Framework (EMF)

Introduction

4.83. The Environmental Management Framework (EMF) document is intended to inform and guide the Project Implementing Agency or departments at a strategic decision-making level. The frame work produces a mechanism to identify the key environmental concerns and to screen projects on the basis of the impacts and risks. The objective is to minimize impacts and risks, and mitigate them to the extent possible. This framework will also act as a guideline for strategic environmental impact assessment to be undertaken at the preparation stage of individual packages. Implementation of the EMF will also support and assist in complying with applicable (both national and state) laws and regulations and also with the relevant Bank's operational policies on environment issues. Development of the EMF therefore is intended to respond to the issues arising out of the rehabilitation and restoration measures proposed under the project and would:

- Enhance positive and sustainable environmental outcomes associated with the project implementation
- Support the integration of environmental aspects into the decision making process in the planning and implementation process at the individual package level
- Minimize environmental degradation as a result of either individual sub-projects or their cumulative effects
- Help the marginalized sections including tribal, women and other vulnerable sections in their active involvement in the project activities and to access project benefits at par with others
- Protect human health and
- Minimize impacts on cultural property

4.84. The EMF therefore attempts to respond to the needs of the rehabilitation works proposed under the project and help the local people to avail of opportunities provided by it. It includes Action Plans containing measures to address key issues like Dam Safety, Nutrient Management, Pest Management, Cultural Property Management and Natural Habitat that arise as part of the project. The EMF is prepared to serve as a road map to be followed by the implementing agencies during the different stages of sub-project activities. The EMF serves as a road map to be followed by the implementing agencies during the different stages of sub-project activities.

- Identification
- Preplanning
- Planning
- Implementation and
- Post-implementation

EMF for the Project

Need for Environmental Management

4.85. The interventions proposed under Component A: Improving Irrigated Agriculture Efficiency at Farm level and its two sub-components (i) Improving tank system performance and resilience and; (ii) inflow hydrology management for improving water productivity and efficiency are likely to have environmental impacts during the construction phase.

4.86. Given that investments are geographically dispersed, no significant cumulative impacts are envisaged. The Environmental Assessment has assessed potential impacts and risks and provides Environmental Management Plans and an Environment Management Framework with suitable mitigation measures for the anticipated impacts.

4.87. The interventions of Component A: (iii) Building Synergy with the Primary Sector Mission is likely to have environmental impacts during the operation phases, particularly related to use of agro-chemicals and accordingly suitable mitigation measures, and including a Pest Management Plan has been prepared.

4.88. Component B- Promoting Adaptive Sustainable Agriculture Practices and Component C- Climate Friendly Market and Agribusiness Promotion are unlikely to result in significant environmental impacts. Environmental impacts are not anticipated under this Component D, as it is mostly centered on project management. However as part of the capacity building, safeguard training has been proposed at various levels of implementing agencies for implementation of the proposed mitigation.

Objectives of Environment Management Framework

4.89. Typically, the tank restoration projects focus mainly on de-silting of tank bed, strengthening of tank bund, cleaning of feeder channel, lining of irrigation channels and repair of sluices and surplus weirs. The proposed project interventions involve the restoration of tanks spread all over the state, which have multiple issues relating to environmental aspects.

4.90. The EMF focuses on identifying and addressing environmental concerns in the sub-project by incorporating the safeguards for environmental aspects in the main planning and implementation process. The overall framework covers the following aspects:

- Identify environment concerns at the sub-project level.
- Identify anticipated environmental impacts of the proposed interventions at the sub-project level.
- Propose management measures to address identified environmental issues and possible impacts, at various stages of sub-project cycle along with outcomes at each stage.
- Prepare detailed strategies for addressing key environmental issues, for the project implementation agency, to serve as the basis for preparation of specific environmental management plans for each specific sub-project.
- Develop indicators for monitoring of environmental parameters and implementation of environmental management plans.
- Propose appropriate institutional arrangements to ensure effective management of the identified environmental aspects of the project interventions at each level.
- Identify critical gaps and suggest any additional studies required to address them.

Outcomes of EMF

4.91. The Environment Management Framework needs to be integrated into the preparation and implementation stages of the various project components. It is an essential ingredient aligned with the project/sub-project activities and is to be followed through the entire project cycle from planning, including site identification; design; implementation and operation/ maintenance to attain the above outlined purpose and objectives.

4.92. The application and implementation of the Environment Management Framework will also support the achievement of compliance with applicable laws and regulations as well as with the requirements of relevant Bank policies on environment aspects.

4.93. This EMF has been developed based on the national and state laws and regulations and World Bank guidelines, as applicable on the date of this document. Any proposed laws and regulations or guidelines that were notified as 'draft' at the time of preparation of this document have not been considered.

4.94. The overall outcome of the EMF is to ensure that environmental opportunities are enhanced and adverse impacts are minimized and fully mitigated. In particular, the EMF for this project seeks to ensure the achievement of the following outcomes:

- Dam safety concerns are addressed effectively (e.g. Dam safety panel formed and operational, dam safety measures/instrumentation completed)
- Sustainable agriculture (including fisheries and livestock) practices effectively promoted in tank command (e.g. awareness building, IPM, INM, organic farming, water conservation, conjunctive use, etc.)
- Silt and weeds in tanks effectively managed

Anticipated Impact of the Proposed Project

4.95. Interventions essentially relate to the development of appropriate tank improvement/rehabilitation systems and agricultural technologies in command areas, and the impacts are expected to be mostly positive.

4.96. While the project is not likely to have any adverse environmental impacts, all possible safeguard measures for the challenges mentioned are integrated into the project cycle. In light of this, the project has triggered five World Bank Safeguard Policies: OP 4.01: Environment Assessment; OP 4.09: Pest Management, OP 4.37: Safety of Dams, OP/BP 4.04: Natural Habitats and OP/BP 4.11: Physical Cultural Properties.

4.97. The proposed project will induce both positive and negative impacts. For instance on the negative side, owing to increased use of irrigated agriculture, the project will lead to increased use of agro-chemicals. This triggers the World Bank Operational Policy OP 4.09 on pest management. According to the Millennium Development Goals, although irrigated agriculture has negative impacts, as far as groundwater recharge is concerned it has positive connotations. However, it is necessary that the proposed project provides plans and strategies to safeguard the wider interests of the community members. The list of project activities, likely impact, mitigation measures and responsible agencies are provided in Table 27.

Table 26: Environmental Management Framework

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures	Responsibility
Irrigation improvement and construction related			
Tanks Rehabilitation • 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	• 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 labour • Refer to Tank Specific Environment Management Plan (EMP). • As far as possible, use silt (if suitable) in strengthening the tank bunds • The debris of the dismantled structures to be used for levelling 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	Contractor, WUA, DPU, SPMU

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures	Responsibility
	• 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 • 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	• Plan heavy vehicle and machine movement route that avoid productive fields; 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	
Rehabilitation of Channels: Silt removal from supply channels, irrigation channels and canal linings	• 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	Contractor, WUA, DPU, SPMU
Rehabilitation of surplus weirs and sluices: Reconstruction and Repair of sluices and surplus weirs	• Dumping of Iron and concrete debris within canal and/or near banks • Sewage and solid waste generation due to congregation of labour population • Air pollution and noise pollution due to increased vehicular movement and construction equipment	• 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 contract period • Implementation of measures to control air pollution and noise from various sources • Providing ear plugs and other safety equipment to protect workers	Contractor, WUA, DPU, PMU
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	• 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	DPU, WUAs, SPMU and Line Departments

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures	Responsibility
	• Increased groundwater extraction for enhancing productivity and from shifting from single crop to multicropping • 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	with help from Acharya N.G. Ranga Agricultural University (ANGRAU) • 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 agrochemicals • Promote wide application of safe and biopesticides, 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 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	
Post-Harvest Infrastructure: Construction of Cold Storage , Warehouses and Agriculture Product Market Committee	• Risk of disturbance to natural areas (wetlands, streams etc.) in locating new markets Lack of civic amenities in new markets developed for sellers and customers • Intensive use of energy/electricity due to	• Sites for establishing any new markets are free from natural features Use anti-mosquito sprays/fogging during construction and in labour camps • As far as possible develop design for markets with adequate introduction of green building norms – natural light, cross ventilation, use of solar power	Contractor, DPU, SPMU

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures	Responsibility
	poor market design poorly planned loading/unloading decks etc. • Lack of transparency in weighing and paying systems • Issues with respect to waste disposal	of lighting etc. • 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 pits are made to prepare good quality compost from organic wastes of the markets	
Agriculture related infrastructure and Marketing			
Fisheries Related			
Innovation and Technology Transfer for Fish Production	• 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	Fisheries Department , Fisheries Society and DPU
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	DPU, WUAs, NGOs, SPMU
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	SPMU and DPU
Training of line	• Ad hoc approach for	• Undertake Training Needs	SPMU and

Sub-Projects / Activity	Potential Risks & Impacts	Suggested Mitigation Measures	Responsibility
department staff and community members	training resulting in mismatch of training and demand and low participation of trainees	Assessment • Prepare a training calendar and widely disseminate it	DPU

Plans and Frameworks

4.98. Based on the need the following plans has to be prepared, Integrated Nutrient Management Plan (INMP), Integrated Pest Management Plan (IPMP), Cultural Property Plan (CPP), Dam Safety Plan (DSP), Natural Habitat Plan (NHP) and Model Environment Management Plans (EMPs) are provided as stand-alone documents to this Report.

Conclusion

4.99. This chapter provided the environmental assessment for the sample tanks and detailed out the Environmental Management Framework. The following chapter will discuss the social assessment and Social Management Framework.

Chapter Five: Social Assessment and Social Management Framework

Demographic Profile of the State

5.1. Andhra Pradesh ranks as the eighth largest state in the country accounting for 4.9% of the country's area. Situated in a tropical region, the state has the second longest coastline in the country with a length of 974 km.

5.2. The state population is 49.6 million with a population density of 304.5/sq km. The state accounts for 4.1% of the country's population as per Census 2011. The decadal growth of population at 9.2% in the period 2001-11 was lower than the all India growth rate of 17.7%. The state has a sex ratio of 996 females per 1000 males which is better than the national average of 926 per 1000. Children in the age group of 0–6 years number 5.2 million and constitute 10.6% of the total population. An overview of key district level demographic indicators is provided in the following table.

Table 27: District wise Demographic Details of Andhra Pradesh (2011)

Sl	**District**	**Population (Million)**	**Male (Million)**	**Female (Millions)**	**Density (persons per sq.km)**	**Literacy %**	**Sex Ratio**(Females per 1000 males)
1.	Anantapur	4.1	2.1	2	213	63.6	977
2.	Chittoor	4.2	2.1	2.1	275	71.5	997
3.	East Godavari	5.2	2.6	2.6	477	70.9	1006
4.	Guntur	4.9	2.4	2.4	429	67.4	1003
5.	Krishna	4.5	2.3	2.3	518	73.7	992
6.	Kurnool	4.1	2	2	230	59.9	988
7.	Prakasam	3.4	1.7	1.7	193	63.1	981
8.	Sri PS Nellore	3	1.5	1.5	227	68.9	985
9.	Srikakulam	2.7	1.3	1.4	463	61.7	1015
10.	Visakhapatnam	4.3	2.1	2.2	384	66.9	1006
11.	Vizianagaram	2.3	1.2	1.2	359	58.9	1019
12.	West Godavari	3.9	2	2	509	74.6	1004
13.	YSR Kadapa	2.9	1.5	1.4	188	67.3	985

Source: Census 2011

Scheduled Tribe (ST) Population

5.3. The term "Indigenous People" or "Tribal People" is used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- An indigenous language, often different from the official language of the country or region.

5.4. The term 'Scheduled Tribe' is defined in Article 366 (25) of Indian constitution as, "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as

are deemed under Article 342 to be Scheduled Tribes for the purposes of this Constitution". Article 342 prescribes the procedure to be followed in the matter of specification of Scheduled Tribes. The criterion followed for specification of a community as a Scheduled Tribe, as per Ministry of Tribal Affairs, Government of India, is:

- Indications of primitive traits
- Distinctive Culture
- Geographical isolation
- Shyness of contact with the community at large, and
- Backwardness

List of Notified Scheduled Tribes in AP

5.5. The list of Scheduled Tribes of Andhra Pradesh as per the Scheduled Castes and Scheduled Tribes Orders (Amendment) Act, 2002 is provided in Table 27.

Table 28: Scheduled Tribe Population in Andhra Pradesh

Sl	Name of Tribe	Sl	Name of Tribe
1	Andh, Sadhu Andh	18	Koya, Doli Koya, Gutta Koya, Kammara, Koya, Musara Koya, Oddi Koya, Pattidi, Koya, Rajah, Rasha Koya, Lingadhari, Koya (ordinary), Kottu Koya, Bhine and Koya, Rajkoya
2	Bagata	19	Kulia
3	Bhil	20	Malis
4	Chenchu	21	Manna Dhora
5	Gadabas, Bodo Gadaba, Gutob Gadaba, Kallayi Gadaba, Parangi Gadaba, Kathera Gadaba, Kapu Gadaba	22	Mukha Dhora, Nooka Dhora
6	Gond, Naikpod, Rajgond, Koitur	23	Nayaks
7	Goudu	24	Pardhan
8	Hill Reddis	25	Porja, Parangiperja
9	Jatapus	26	Reddidora
10	Kammara	27	Rona, Rena
11	Kattunayakan	28	Savaras, Kapu Savaras, Maliya Savaras, Khutto Savaras
12	Kolam	29	Sugalis, Lambadis, Banjara
13	Konda Dhoras, Kubi	30	Valmik
14	Konda Kapus	31	Yenadis, Chella Yenadi, Kappala Yenadi, Manchi Yenadi, Reddi Yenadi
15	Kondareddis	32	Yerukulas, Koracha, Dabba Yerukula, Kunchapuri Yerukula, Uppu Yerukula
16	Kondhs, Kodi, Kodhu, Desaya Kondhs, Dongria Kondhs, Kuttiya Kondhs, Tikiria, Kondhs, Yenity Kondhs, Kuvinga	33	Nakkala, Kurvikaran
17	Kotia, Bentho Oriya, Bartika, Dulia, Holva, Sanrona, Sidhopaiko	34	Dhulia

Scheduled Areas in AP

5.6. The criteria followed for declaring an area as Scheduled Area are preponderance of tribal population, compactness and reasonable size of the area, under-developed nature of the area and marked disparity in economic standard of the people. These criteria though not spelt out in the Constitution of India have become well established. They embody principles followed in declaring Excluded and Partially-Excluded Areas under the Government of India Act 1935, Schedule B of recommendations of the Excluded and Partially Excluded Areas Sub Committee of Constituent Assembly and the Scheduled Areas and Scheduled Tribes Commission 1961. Special Provisions for Fifth Schedule Areas are as follows:

- The Governor of each State having Scheduled Areas shall annually, or whenever so required by the President, make a report to the President regarding the administration of Scheduled Areas in that State
- The Union Government shall have executive powers to give directions to the States as to the administration of the Scheduled Areas
- Para 4 of the Fifth Schedule provides for establishment of a Tribes Advisory Council (TAC) in any State having Scheduled Areas. If the President so directs, there will be established a TAC in a State having Scheduled Tribes but not Scheduled Areas therein, consisting of not more than twenty members of whom, three-fourths shall be the representatives of the Scheduled Tribes in the Legislative Assembly of the State. If the number of representatives of the STs in the Legislative Assembly of the State is less than the number of seats in the TAC to be filled by such representatives, the remaining seats shall be filled by other members of those Tribes
- The TAC shall advise on such matters pertaining to the welfare and the advancement of the STs in the State as may be referred to them by the Governor
- The Governor may make rules prescribing or regulating (a) the number of members of the Council, the mode of their appointment and the appointment of the Chairman of the Council and of the officers and servants thereof, (b) the conduct of its meetings and its procedure in general; and (c) all other incidental matters
- The Governor may, by public notification, direct that any particular Act of Parliament or of the Legislature of the State shall or shall not apply to a Scheduled Area or any part thereof in the State, subject to such exceptions and modifications, as specified. The Governor may make regulations for the peace and good Government of any area in the State which is for the time being a SA. Such regulations may (a) prohibit or restrict the transfer of land by or among members of the Scheduled Tribes in such area; (b) regulate the allotment of land to members of the STs in such area; (c) regulate the carrying on of business as money-lender by persons who lend money to members of the STs in such area
- In making such regulations, the Governor may repeal or amend any Act of Parliament or of Legislature of the State or any existing law after obtaining assent of the President
- No regulations shall be made unless the Governor, in case a TAC exists, consults such TAC

5.7. The scheduled areas in Andhra Pradesh are as follows:

- Visakhapatnam Agency area (excluding areas comprised in villages of Agency Lakshmipuram, Chidikada, Konkasingi, Kumarapuram, Krishnadevipeta, Pichigantikothagudem, Golugondapeta, Gunupudi, Gummudukonda, Sarabhupalapatnam, Vadurupalli, Pedajaggampeta)

- Sarabhupathi Agraharam, Ramachandrarajupeta Agraharam, and Kondavatipudi Agraharam in Visakhapatnam district
- East Godavari Agency area 2 (excluding area comprised in village of Ramachandrapuram including its hamlet Purushothapatnam in East Godavari district)
- West Godavari Agency area in West Godavari district (Inserted by Madras Scheduled Areas (Cesser) Order, 1951, Inserted by Andhra Scheduled Areas (Cesser) Order, 1955)

5.8. The ST population in the state is around 2.6 million accounting for 5.3% of the total state population. The sex ratio for the ST population is 1009 which is better than the state average. The district-wise distribution of scheduled tribes as per Census 2011 is presented in the following table.

Table 29: Scheduled Tribe Population in Andhra Pradesh

Sl	District	Total Population (In Millions)	Total SC Population (In Millions)	% Total population	Total ST population (In Millions)	% Total Population
1.	Anantapur	4.1	0.6	14.3	0.2	3.8
2.	Chittoor	4.2	0.8	18.8	0.2	3.8
3.	East Godavari	5.2	0.9	18.3	0.3	5.6
4.	Guntur	4.9	1	19.6	0.2	5.1
5.	Krishna	4.5	0.9	19.3	0.1	2.9
6.	Kurnool	4.1	0.9	18.2	0.08	2
7.	Prakasam	3.4	0.8	23.2	0.2	4.4
8.	Sri PS Nellore	3	0.7	22.5	0.3	9.7
9.	Srikakulam	2.7	0.3	9.5	0.2	6.1
10	Vishakhapatnam	4.3	0.3	7.7	0.6	14.4
11	Vizianagaram	2.3	0.2	10.6	0.2	10
12	West Godavari	3.9	0.8	20.6	0.1	3.4
13	YSR Kadapa	2.9	0.5	16.2	0.08	2.6

* *Data includes ST population of Submergence of Scheduled villages of 7 mandals from Khammam district to the A.P. State (as per Reorganisation Act 2014) Note: As per Andhra Pradesh organisation Ordinance 2014, 7 Mandals (5 Complete & 2 Partial) of Khammam District are removed from Telangana State and tentatively added to Andhra Pradesh State.*

5.9. It can be observed that the highest percentage of tribal population is found in Vishakhapatnam, Vizianagaram and SPS Nellore districts. The decadal growth rate of ST population in Andhra Pradesh between 2001 and 2011 was 17.8% which is lower than the national decadal growth rate of 23.7% (Source: Statistical Profile of STs in 2013- data for undivided Andhra Pradesh). The sex ratio of the ST population in the state improved between 2001 and 2011 from 972 to 993 (Source: Statistical Profile of STs in 2013- data for undivided Andhra Pradesh).

Scheduled Caste (SC) Population

5.10. The SC population in the state is around 8.4 million and accounts for 17.1% of the total population. The sex ratio for the SC population at 1007 is higher than the average state level sex ratio. The highest percentage of SC population is found in Prakasam, SPS Nellore and West Godavari districts.

Sex Ratio

5.11. The state has a sex ratio of 993which is the fourth highest in the country, Kerala being the first. Vizianagaram district has the highest sex ratio of 1019 females per thousand males and Anantapur has the lowest at 977.

Urban and Rural Distribution

5.12. 70.5% of the state's population resides in rural areas. Srikakulam district has the highest percentage of rural population (83.8%) followed by Prakasam district (80.4%). Visakhapatnam district has the maximum percentage of urban population (47.5 %), followed by Krishna district (10.8%).

5.13. The decadal (2001 to 2011) growth rate of the urban population was 33.4 %. The highest growth rate in urban population was recorded by YSR Kadapa (66.6%), followed by Srikakulam (56.7%) Negative growth rates in rural population were seen in Krishna, YSR Kadapa and Visakhapatnam districts.

Literacy Rates

5.14. The literacy rate of the state was 67.4% in 2011 which is lower than the national average of 72.9%. The rate has demonstrated an increase from 2001 when it stood at 62.1%. Female literacy rate has gone up from 52.7% in 2001 to 59.9% in 2011. The highest literacy rate was prevalent in West Godavari district and the lowest in Vizianagaram district.

Economic Profile of the State

Growth Rate

5.15. The state registered a growth rate of 11.6% in the Gross State Domestic Product (GSDP) in 2016-17, which was considerably higher than the national growth rate of 7.1%. The growth rate in the Gross Value Added (GVA) stood at 11.2%. The Per Capita Income (NSDP) of Andhra Pradesh at current prices increased to Rs.1, 22,376 from Rs.1, 08,163 in 2015-16 registering a growth of 13.1%.

Employment Levels

5.16. 62.4% of the total working population in the state is dependent on agriculture. Around 14.5% of total workers are cultivators and 47. 9 percent are agricultural labourers. West Godavari has the highest percentage of agricultural labourers (60.2%) while Chittoor has the highest percentage of cultivators (22.5 %).

5.17. The rate of unemployment in united AP during 2009-10 (66th Round NSSO survey) for rural areas was 12, and for urban areas was31. During 2011-12 (68th Round NSSO survey) the figures were 12 and 43 respectively, showing increase in urban unemployment. The corresponding figures at All India level for 2009-10 were 16 and 34 respectively.

Agriculture Sector

5.18. The Government of Andhra Pradesh is focusing on the agriculture sector and seeks to transform the sector into a powerhouse. The plan is to double the contribution of the sector to GSDP from its current levels by 2021-22. The Government is committed to transform the primary sector with a goal of making Andhra Pradesh one of the top three states in the country through Sunrise Andhra Vision by 2029. The focus areas under the primary sector include:

- Increasing productivity
- Mitigating impact of droughts through water conservation and micro irrigation
- Post harvest management to reduce wastage
- Establishment of processing, value addition capacity and supply chain of identified crops

5.19. Of the total geographical area in the state of 162.9 Lakh Hectares, 38.1% is under net area sown. The total area under food grains is estimated at 41.34 Lakh Hectares in 2016-17 against 41.36 Lakh Hectares in 2015-16 (Source: Socio-Economic Survey 2016-17). District wise area under food and non-food crops is provided in Table 29.

Table 30: District wise Area under Food and Non-Food Crops in Andhra Pradesh

Sl	District	Area under Food Crops (Ha)	Area under Non Food Crops (Ha)	Total Area (Ha)
1.	Anantapur	271,863	670,446	942,309
2.	Chittoor	221,528	157,311	378,839
3.	East Godavari	577,020	106,839	683,859
4.	Guntur	561,434	248,240	809,674
5.	Krishna	579,858	97,141	676,999
6.	Kurnool	522,919	475,040	997,959
7.	Prakasam	343,617	261,552	605,169
8.	Sri PS Nellore	326,537	68,028	394,565
9.	Srikakulam	363,955	55,109	419,064
10.	Vishakhapatnam	303,568	59,279	362,847
11.	Vizianagaram	302,236	70,457	372,693
12.	West Godavari	574,428	116,681	691,109
13.	YSR Kadapa	253,067	101,667	354,734
	Total AP	**5,202,030**	**2,487,790**	**7,689,820**

Source: Statistical Abstract Andhra Pradesh 2015

5.20. Paddy is the most important cereal grown in Andhra Pradesh and was cultivated in an area of 2,393,955 Ha in 2014-15. Other cereal crops grown include Maize, Bajra, Jowar, Ragi and Wheat.

Table 31: Area Sown and Out-turn of various Crops in Andhra Pradesh, 2014-15

Sl	District	Rice		Wheat		Jowar		Bajra		Maize		Ragi		Total Minor Millets	
		Area (Ha)	Out-turn (Tonnes)	Area (Ha)	Out-turn (Tonnes)	Area (Ha)	Out-turn (Tonnes)	Area (Ha)	Out-turn (Tonnes)	Area (Ha)	Out-turn (Tonnes)	Area (Ha)	Out-turn (Tonnes)	Area (Ha)	Out-turn (Tonnes)
1.	Anantapur	29,211	82,532	46	61	18,452	5,602	1,799	1,056	21,313	74,305	1,870	2,835	647	73,429
2.	Chittoor	40,965	132,424			23	16	2,072	4,624	3,677	15,249	5,108	4,530	97	52,090
3.	East Godavari	394,117	1,563,229	-	-	2,086	1,621	58	75	12,911	1,00,757	412	396	469	260
4.	Guntur	285,302	1,111,932	-	-	21,939	151,031	751	826	64,068	612,235	400	595	-	-
5.	Krishna	288,042	998,795	-	-	524	2,370	-	-	25,632	161,481	-	-	-	-
6.	Kurnool	114,898	444,262	274	195	67,167	135,952	5,240	7,341	46,166	186,064	-	-	6,343	240,978
7.	Prakasam	105,297	405,915			12,899	19,645	11,780	12,086	17,072	131,295	960	1,451	1,230	1,344
8.	Sri PS Nellore	240,723	969,015	-	-	2,352	4,260	637	1,703	823	5,984	90	115	-	244,625
9.	Srikakulam	210,215	447,672	-	-	44	65	196	522	14,874	82,654	1,176	1,446	-	-
10.	Vishakhapatnam	105,428	177,807			398	610	2,395	2,170	7,191	19,635	21,121	20,341	9,627	5,426
11.	Vizianagaram	124,586	331,840	-	-	130	209	132	95	30,974	157,946	2,214	2,562	124	88
12.	West Godavari	409,286	1,624,324	-	-	179	63	-	-	55,272	369,889	-	-	10	5
13.	YSR Kadapa	45,885	165,837			15,268	22,455	3,118	8,001	3,353	20,579	89	129	371	68,136
	TOTAL	**2,393,955**	**8,455,584**	**320**	**256**	**141,461**	**343,899**	**28,178**	**38,499**	**303,326**	**1,837,316**	**33,440**	**34,400**	**18,918**	**686,381**

Source: Statistical Abstract Andhra Pradesh 2015

5.21. The pulses grown in Andhra Pradesh include Horse gram, Green gram, Black gram, Red gram, Bengal gram and Cow gram. The total area under pulse cultivation in 2014-15 was 10, 42,300 Ha with an out-turn of 9,49,207 Tonnes.

Horticulture Sector

5.22. An area of 2.33 lakh Ha was estimated to be under vegetable crops in the state as per 2015-16 estimates. Production of vegetables was estimated to be 5.3 lakh tonnes. Tomato and onion are the most commonly grown vegetables. Brinjal, beans, green chillies, tapioca, potato, lady's finger and yam are also produced in significant areas. Production of fruits was estimated to be 100.488 MT during 2015-16.

5.23. Chillies are the most widely grown among spices. In 2015-16, chillies were grown in 1.427 lakh Ha, with an estimated production of 7.63 MT. Turmeric, black pepper, coriander, tamarind, ginger, betel vine and ajwain are the other spices grown. Marigold, chrysanthemum, jasmine, rose and crossandra are the popular flower varieties grown.

Livestock

5.24. As per Livestock Census 2012, nearly 50% households in the state are engaged in livestock and livestock related rearing activities. The livestock resources in the state include cattle, buffaloes, sheep, goats and pigs. The state stands second in egg production, fourth in meat production and fifth in milk production in the country as per the estimates of GoI during 2015-16.

Fisheries

5.25. Andhra Pradesh is endowed with a coastline of 974 kilometers providing scope for development of fisheries. The ocean backwaters and tanks and lakes also encourage inland fishing. Nine of the thirteen districts have a sea coast and fishing is a major economic activity in these districts. Marine fishing is concentrated in East Godavari, SPS Nellore, Srikakulam and Krishna districts. The state produces marine shrimp, marine fish and fresh water shrimp and fishes. East Godavari, Visakhapatnam and SPS Nellore are the major producers of marine fish and prawns. Krishna district leads in inland fish and prawn production followed by West Godavari district. Brackish water prawn production is concentrated in West Godavari and SPS Nellore districts.

Status of Beneficiaries in Sample Tanks

5.26. As part of the baseline study undertaken for the project a sample of 102 project tanks and 19 control tanks were covered. A detailed environmental and social assessment was undertaken in 18 sample project tanks based on which the environmental management framework and social management framework were developed. This section focuses on the socio-economic profiles of the households covered in the 102 project tanks.

Farmer Classwise Break Up

5.27. A classification of sample households across the 102 sample project tanks according to land holding sizes shows that a little over 50% fall in the category of marginal farmers in the project area. Small and medium farmers form nearly 29% and 17% of the sample respectively. Large farmers constitute a little more than 4%. It can be seen that small and marginal farmers together form slightly more than 79% of the total farmers in the project area.

Table 32: Distribution of Sample Households According to Classes

	Marginal	*Small*	*Medium*	*Big*	*Total*
No. of HH	770	442	253	65	1530
Percentage	50.33	28.89	16.54	4.25	100.00

5.28. It is important to note that while 50% of the farmers are marginal they own only 18% of the land in the ayacut. Small farmers forming 29% of the sample own around 28% of the land. The 21% medium and large farmers account for the majority 54% of the land.

Table 33: Landholding of Sample Households According to Classes

	Marginal	*Small*	*Medium*	*Large*	*Total*
Land holding	1,074.10	1,673.40	1,989.74	1,267.15	6,004.39
Percentage	18	28	33	21	100

5.29. The gender wise break-up of the household heads of the total command area indicates that female headed households constitute almost 15% of sample households.

Table 34: Number of Households – Gender-wise

Households	**Project**	**Percentage to Total Project HH**
Male Headed Households	18,237	85.07
Female Headed Households	3,200	14.93
Total	21,437	100

Community Wise Break Up

5.30. The state/country distinguishes social strata/households into Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Community (OBC) and others. Backward Castes (BC) households form nearly 44% of the sample and the Scheduled Castes (SC) and Scheduled Tribes (ST) households are 5.82% and 6.54% respectively. The forward communities (OC) constitute nearly 44 % in the project area. Thus BC households along with SC and ST households form over 56% of the sample households in the project area at the aggregate level. That is to say that a large majority of the project beneficiaries belong to the vulnerable sections of the society.

Table 35: Households According to Communities

Category	BC	%	OC	%	SC	%	ST	%	Total	%
Project	671	43.86	670	43.79	89	5.82	100	6.54	1530	100.00

Population of Sample Households

5.31. The population data of the sample households indicate an average household size of 3.91 in project tanks. The male population is 53.8% in project tanks and ratio of females to males is 0.86 in project tanks.

Table 36: Population and Male-Female Ratios

Sl	Particulars	Unit	Project Tanks
1	Total Households	N	1530
2	Males	N	3222
3	Females	N	2767
4	Total Population	N	5989
5	Male (%)	%	53.80
	Female (%)	%	46.20
6	Average household size	N	3.91
7	Female to male ratio	Per 1000 males	859

Literacy Status of Sample Households

5.32. The level of literacy of the population shows that 26% of males and 40% of females are non-literate. Among males, 24.31% have dropped out after primary education, nearly 27% have gone up to middle school level and 16 % have reached up to SSC level. Only around 3% are graduates. Among the female population, a little more than 24% had primary education and 23% had middle school education. Those who reached secondary school are only 9%. Among women, 0.72% are graduates. A large percentage of women are disempowered due to their relatively lower levels of education.

Table 37: Literacy Status of Sample Population (Percentage)

Sl	Literacy level	Percentage	
		Male	*Female*
1	Non literates	26.01	40.57
2	Up to Primary	24.31	24.21
3	Middle School	26.72	23.12
4	Up to SSC	16.17	9.14
5	Up to Graduation	3.32	0.72
6	Age below 5 years	3.47	2.24
Total		100.0	100.0

Employment Status of Sample Households

5.33. A classification of the sample population according to their employment shows that 54.57% in project area are cultivators. Agricultural labour is the major activity after cultivation. People working in casual manual jobs are only 1.3% in project area indicating that such opportunities are very limited. Similar was the case in industrial and service sector jobs. In brief, it is the agricultural sector that accommodates the large majority of the work force.

Income Status of Sample Households

5.34. The marginal farmer households have reported an annual income of Rs. 50834/- and the large farmers have reported an annual income of Rs. 113847/- per annum. Marginal, small and medium farmers derive significant share of income from other sources like casual manual labour (including agricultural labour). This indicates the subsistence nature of their cultivation and the fact that they cannot make a living by cultivation alone. They are therefore forced to take up multiple activities like casual manual labour, dairying, poultry rearing and many other traditional activities.

Table 38: Annual Household Income (in Rupees) - Farmer Category-wise

Sl	Farmer Class	Per HH (Rs/Annum)
1	Marginal	50,835
2	Small	62,983
3	Medium	80,574
4	Big	113,848

Expenditure Status of Sample Households

5.35. Food is the single largest item of expenditure among all classes of farmers and the landless. The fact that a substantial part of income is spent on food indicates the low level of income status. Nearly 35% of the total expenditure of marginal, small and medium households was on food items. Large farmers recorded the highest annual expenditure among the sample households. Expenditure on religious functions and marriages was found to be another major item invariably in all the classes.

Table 39: Annual Expenditure of Sample Households (Rs)

Category of Household	Housing	Food grains	Other Food Items	Education	Clothing	Health	Transport	Other (Fuel, Electricity, Interest Charges)	Total
Marginal	626	14,171	9,520	9,025	7,061	8,259	3,747	12,460	**64,870**
Small	509	14,849	10,105	10,186	7,860	7,773	3,539	14,690	**69,510**
Medium	600	13,511	9,455	13,340	8,181	10,164	4,961	20,788	**81,000**
Large	792	15,606	12,223	14,662	12,298	15,400	6,426	21,166	**98,574**
Total	595	14,319	9,793	10,313	7,700	8,737	4,002	14,851	**70,309**
%	0.8%	20.4%	13.9%	14.7%	11.0%	12.4%	5.7%	21%	**100.0%**

Asset Possession of Sample Households

5.36. Asset holding of households is also an index of their economic status. A substantial number of households (58%) live in pucca houses and over 31% of the households live in semi-pucca houses. The rest of the households (11%) have kutcha houses. Among marginal farmers, nearly 58% households possess pucca houses. It is interesting to note that over 85% have television sets. Luxury consumer durables like four wheelers are owned only by a very small percentage of farmers (2%).

Table 40: Ownership of Household Assets- Sample category wise

Category	Type of House			Telephone/Mobile	TV	Internet	Refri-gerator	Bicycle	Two wheeler	Four wheeler
	Kutcha	*Pucca*	*Semi Pucca*							
Marginal farmers	92	454	224	620	640	9	117	190	209	0
Small farmers	47	261	134	366	383	2	84	95	154	0
Medium farmers	22	131	100	159	214	3	41	45	83	1
Big farmers	3	37	25	51	60	3	21	15	39	24
Overall	**164**	**883**	**483**	**1,196**	**1,297**	**17**	**263**	**345**	**485**	**25**
%	**11%**	**58%**	**32%**	**78%**	**85%**	**1%**	**17%**	**23%**	**32%**	**2%**

Agricultural Asset Possession of Sample Households

5.37. A large majority of farmers possess few agricultural assets. Costly assets like tractor, pump sets, thresher and weeders are mostly insignificant in the asset profile of marginal and small farmers.

Table 41: Possession of Agricultural Assets

		Project tanks			
Sl	**Asset**	*Marginal*	*Small*	*Medium*	*Big*
1	Tractor	-	-	8.70	41.54
2	Plough (Iron/Wood)	10.13	14.03	7.51	7.69
3	Bullock cart	1.95	3.39	3.16	4.62
4	Oil Engine	0.13	0.45	3.95	9.23
5	Weeder	1.69	2.49	5.53	18.46
6	Duster	0.00	0.00	0.40	1.54
7	Cultivator	0.13	0.45	1.58	7.69
8	Pump set (Electric)	-	0.23	1.98	1.54
9	Thresher	-	0.00	1.98	6.15
10	Sprayer	42.86	42.99	71.15	96.92

Livestock Asset Possession of Sample Households

5.38. Livestock rearing is a significant activity and a large majority of households (78.6%) have one or the other animal in their possession. The rearing of cows, buffaloes, bullocks and calves is more compared to other varieties of livestock.

Table 42: Households Owning Livestock by Different Types

Sl	Livestock Type	Farmer Category									
		Marginal		*Small*		*Medium*		*Large*		*Overall*	
		N	%	N	%	N	%	N	%	N	%
1	**Cows**	63	8.18	45	10.18	10	3.95	11	16.92	129	8.43
2	**Bullocks**	56	7.27	29	6.56	18	7.11	10	15.38	113	7.39
3	**Cow calves**	48	6.23	24	5.43	24	9.49	4	6.15	100	6.54
4	**He buffaloes**	24	3.12	6	1.36	5	1.98	1	1.54	36	2.35
5	**She buffaloes**	217	28.18	140	31.67	73	28.85	28	43.08	458	29.93
6	**Buffalo calves**	144	18.70	99	22.40	44	17.39	21	32.31	308	20.13
7	**Sheep**	11	1.43	6	1.36	6	2.37	2	3.08	25	1.63
8	**Goats**	19	2.47	5	1.13	9	3.56	1	1.54	34	2.22

Indebtedness of Sample Households

5.39. Nearly 58% of the households have borrowings and borrowers among the landless households are less compared to land owing households. However this only indicates that their borrowing ability is limited. Better off sections like the medium and large farmers have large borrowings which would be indicative of their borrowing ability. Commercial banks constitute the largest source of borrowings along with SHGs. More than 87% of the households use SHGs as a borrowing source.

Table 43: Indebtedness of the Sample Households

Sl	Farmers Category	Total HH	HH availed Loan		Source of Loan					
			No. HH	*%*	*Banks*	*Co-operative Society*	*SHG*	*Friends/ Relatives*	*Money Lender*	*Traders*
1	**Marginal**	**765**	398	52.0	335	29	374	38	35	216
2	**Small**	**445**	276	62.0	244	16	265	23	32	189
3	**Medium**	**253**	167	66.0	155	9	158	14	10	112
4	**Large**	**65**	46	71.0	44	2	39	4	7	21
5	**Overall**	**1529**	887	58.0	778	56	836	79	84	538
	%				87.7	6.3	94.3	8.91	9.47	60.65

Source: Primary Survey

Status of Water User Associations

5.40. Andhra Pradesh deploys Water User Associations (WUAs) as vehicles of community participation, viz, local level institutions, primarily to ensure effective and decentralized local level operation and maintenance of Minor Irrigation tanks. This has legitimacy through the Andhra Pradesh Farmers Management of Irrigation Systems Act, 1997 (APFMIS Act). According to the APFMIS (Amendment) Act, 2017 every water users area shall be divided into Territorial Constituencies which shall be minimum of six and maximum of twelve depending on the extent of command area and administrative feasibility. The selection of a managing committee consisting of one member from each of the territorial constituencies of a water users area by a simplified procedure of selecting the representative by consensus and where there is no consensus, it shall be by simplified procedure like show of hands or distribution slips in the manner prescribed.

5.41. The Government of Andhra Pradesh had amended section 34 of APFMIS Act, 1997 (Act 11 of 1997) on the 16th June, 2015 through an Ordinance for constituting the WUAs with President/Chairman, Vice President/Vice Chairman and 4 members as appointed by the General Body of the Farmers' Organizations by consensus to exercise powers and perform the functions of a farmers organization and the Managing Committee thereof till such time such farmers organization is duly constituted or re-constituted and such Managing Committee assumes office under the provisions of this Act. The current set of WUAs started functioning from the year 2015 and all of them are working under transitional arrangements. In respect of inclusion and equity, certainly there is further scope for participation by SCs, STs and women. The provision of co-opting women GP members also needs to be fully made use of.

Constitution of Water User Associations

5.42. The WUA constituted in a tank system should be representative of various stakeholders present in the tank area. This would lead to equity in distribution of water to all the stakeholders. The baseline study shows that the WUAs were formed in over 88% tanks in 1997 and the remaining WUAs were formed between 1997 and 2003.

Table 44: Constitution of WUAs (1995-2003)

Sl	District	WUA Year of Constitution					
		1997	*1998*	*1999*	*2000*	*2001*	*2003*
1	Anantapur	6					
2	Chittoor	4				1	
3	East Godavari	5					
4	YSR Kadapa	9		1	2		
5	Krishna	5					
6	Kurnool	1					
7	SPS Nellore	11				1	1
8	Prakasam	11					
9	Srikakulam	2	1		2	1	
10	Visakhapatnam	10					
11	Vizianagaram	7					
12	West Godavari	3					
	Grand Total	74	1	1	4	3	1
	%	88%	1%	1%	5%	4%	1%

Source: Baseline Survey, 2017

5.43. The present WUAs are constituted according to the amendment to the APFMIS Act in 2015. Of the total tanks covered under the study only one MC in SPS Nellore was constituted in 2014 and 92% of the MCs were constituted in 2015 and only 6% were constituted in the year 2016.

Table 45: Year of Formation of Existing WUA Managing Committees (2014-2016)

Sl		Year of WUC MC formation			
		2014	*2015*	*2016*	*Total*
1	Anantapur		6		6
2	Chittoor		4	1	5
3	East Godavari		5		5
4	YSR Kadapa		12		12
5	Krishna		5		5
6	Kurnool		1		1
7	SPS Nellore	1	12		13
8	Prakasam		11		11
9	Srikakulam		5	1	6
10	Visakhapatnam		10		10
11	Vizianagaram		3	4	7
12	West Godavari		3		3
	Grand Total	1	77	6	84
	%	1%	92%	7%	100%

Source: Baseline Survey, 2017

Representation of Farmers in WUA

Community wise Representation in WUA

5.44. The representation of farmers in WUAs leads to justice and equity in distribution of water to all the stakeholders. The present WUA committees were formed by consensus as per the 2015 amendment made to the APFMIS Act. The representation of ST farmers is 3%, SC farmers is 9%, BC farmers is 41% and OC farmers is 47% in project tanks.

Women Representation in WUA

5.45. It is noticed that there is predominance of male farmers in the Managing Committees of the Water User Associations. Women's representation in MC is only 4% in project tanks.

Educational Status of MC members

5.46. Findings on the education profile of the Managing Committee members indicate that 62% of the members having completed primary education followed by 31% of the members having completed secondary education and 7% of the members having completed college education in the project area tanks. This has an implication on the project strategy for strengthening the WUAs through trainings.

Co-Option Status

5.47. In 2005 the APFMIS ACT was amended making a provision for inclusion of GP members as cooption members. The Gram Panchayat shall nominate two Gram Panchayat members, i.e., of whom one shall be a woman member into the Managing Committee of WUA without voting rights. The study reveals that co-option from GP has been carried out only in 2% of the project tanks.

Formation of Sub Committees

5.48. The General Body of a Water User Association shall constitute specific Sub Committees to carry out specific functions as assigned by the general body. The members of the sub committees shall be drawn from out of members with voting rights. No member shall represent more than one sub- committee. The following sub committees shall be constituted by the Water User Association:

- Finance and Resource Sub Committee: to support the WUA in mobilize and collect resources and maintain records related to financial matters
- Works Sub Committee: to recommend estimates of works for administrative approval. They will also supervise works and ensure quality control and payment for works
- Water Management Sub Committee: to carry out the decisions of the Managing committee and of the GB on water regulation, schedule of water release
- Monitoring Evaluation and Training Sub- Committee: to identify the training needs and create awareness among the members on important aspects like productivity, optimum use of water etc

5.49. The study revealed that sub-committees have not been formed in any of the tanks.

Conducting WUA Meetings

5.50. Around 40% of the sample in project tanks was aware of the need to conduct general body meetings and meetings were actually conducted in 17% of the project tanks. On an average at least one GB meeting was conducted in 18% of the tanks and two meetings were conducted in 14% of the tanks.

Table 46: Awareness on Conducting GB Meetings

Sl	District	Awareness on Conducting GB Meetings	
		No of WUAs	*Awareness*
1	Anantapur	6	3
2	Chittoor	5	3
3	East Godavari	5	0
4	YSR Kadapa	12	3
5	Krishna	5	0
6	Kurnool	1	0
7	SPS Nellore	13	11
8	Prakasam	11	4
9	Srikakulam	6	1
10	Visakhapatnam	10	1
11	Vizianagaram	7	6
12	West Godavari	3	2
	Grand Total	84	34

Source: Baseline Survey, 2017

Table 47: Conducting WUA GB Meetings, 2016-17

Sl	District	Studied WUAs	Meetings conducted during 2016-17			
			To be Conducted	*Total WUAs which conducted*	*1 Meeting*	*2 Meetings*
1	Anantapur	6	12	2	2	
2	Chittoor	5	10	3	2	1
3	East Godavari	5	10	0		
4	Kadapa	12	24	4	3	1
5	Krishna	5	10	0		
6	Kurnool	1	2	0		
7	Nellore	13	26	8	2	6
8	Prakasam	11	22	3	1	
9	Srikakulam	6	12	1		1
10	Visakhapatnam	10	20	0		
11	Vizianagaram	7	14	5	4	1
12	West Godavari	3	6	2	1	2
	Grand Total	**84**	**168**	**28**	**15**	**12**
	% WUAs			**17%**	**18%**	**14%**

Source: Baseline Survey, 2017

5.51. As per the APFMIS Act all the Managing Committee meetings shall be held at least once in every month at the office of the Water User Association. This meetings may however be held more frequently as per the need of the WUA. It is noticed that minimum of 1 MC meeting out of 12 meetings was held in 27% of the project tanks.

Table 48: Conducting WUA MC Meetings

District	MC Meetings last year								
	Studied WUAs	*As per Act No. of Meetings due*	*No. of WUAs conducted*	*No. of Meetings Conducted*					
				1	*2*	*3*	*4*	*5*	*6*
Anantapur	6	72	3	1	1		1		
Chittoor	5	60	1		1				
East Godavari	5	60	0						
Kadapa	12	144	3	1	2				
Krishna	5	60	3	1		2			
Kurnool	1	12	0						
Nellore	13	156	5		3	1	1		
Prakasam	11	132	2		1				1
Srikakulam	6	72	0						
Visakhapatnam	10	120	1		1				
Vizianagaram	7	84	2	1	1				
West Godavari	3	36	3	1	1	1			
Grand Total	**84**	**1008**	**23**	**5**	**11**	**4**	**2**	**0**	**1**

Source: Baseline Survey, 2017

Participation in Meetings

5.52. It is noticed that participation and attendance in General Body and Managing Committee is very important for the functioning of the WUAs. The General Body meetings shall be conducted with 1/3rd of the members as quorum. The MC meetings shall be held at least once in every month at the WUA Office with 1/3rd of the members as quorum. It is noticed that the attendance in GB meetings is by 8% of male Ayacutdars and by 4%of female Ayacutdars.

Table 49: Participation & Attendance in WUA GB Meetings

Sl	District		Participation in GB Meetings				
		Total Male Ayacutdars	***Male ayacutdars attended***	***% of attendance***	**Total Female Ayacutdars**	***Female ayacutdars attended***	***% of attendance***
1	Anantapur	2848	179	6.29	721	24	3.33
2	Chittoor	922	88	9.54	193		0.00
3	East Godavari	550		0.00	90		0.00
4	YSR Kadapa	4695	170	3.62	437		0.00
5	Krishna	1009		0.00	102		0.00
6	Kurnool	70		0.00	5		0.00
7	SPS Nellore	3810	392	10.29	526		0.00
8	Prakasam	2352	225	9.57	323	50	15.48
9	Srikakulam	878	100	11.39	237		0.00
10	Visakhapatnam	756	50	6.61	99		0.00
11	Vizianagaram	336	290	86.31	74	40	54.05
12	West Godavari	205	40	19.51	36		0.00
	Grand Total	**18431**	**1,534**	**8.32**	**2,843**	**114**	**4.01**
	%		**8.32**			**4.01**	

Source: Baseline Survey, 2017

5.53. Participation in MC meetings is 88%. The MC male members participation is 86% and female members participation is 100% against the total members in project tanks.

Table 50: Participation & Attendance in WUA MC Meetings

District	MC Meetings Attendance				
	Studied WUAs	*No. of MC members to have attended*		*Actual Attended*	
		Male	Female	Male	Female
Anantapur	3	51	3	42	3
Chittoor	1	6	0	4	0
East Godavari	0	0	0	0	0
Kadapa	3	51	3	45	3
Krishna	3	51	3	51	3
Kurnool	0	0	0	0	0
Nellore	5	135	5	105	5
Prakasam	2	24	0	20	0
Srikakulam	0	0	0	0	0
Visakhapatnam	1	5	1	5	1
Vizianagaram	2	20	4	16	4
West Godavari	3	51	3	51	3
Grand Total	**23**	**394**	**22**	**339**	**22**
% WUAs				**86%**	**100%**

Source: Baseline Survey, 2017

Localised and Non-Localised Ayacut

5.54. The major objective of creating the institution of WUA was to systematize the water distribution system, encourage judicious use of water and to generate required revenue in the form of water cess/ tax regularly from the designated Ayacutdars (localized).

Table 51: Ayacut and Average Ayacut for WUA (Localised Ayacut)

SL	District	Localised Ayacut			
		No. of WUAs	*Total Acres*	*Total ha*	*Ave ha/WUA*
1	Anantapur	6	6,209	2,513.77	359.11
2	Chittoor	5	2,130	862.35	215.59
3	East Godavari	5	1,183	478.74	95.75
4	YSR Kadapa	12	7,855	3,180.35	265.03
5	Krishna	5	1,766	714.98	143.00
6	Kurnool	1	103	41.70	41.70
7	SPS Nellore	13	8,085	3,273.22	251.79
8	Prakasam	11	3,849	1,558.30	141.66
9	Srikakulam	6	1,240	502.02	83.67
10	Visakhapatnam	10	1,594	645.34	64.53
11	Vizianagaram	7	705	285.43	40.78
12	West Godavari	3	458	185.25	61.75
	Grand Total	**84**	**35,176**	**14,241**	**169.54**

Source: Baseline Survey, 2017

5.55. The data collected revealed that apart from localized Ayacutdars, there are non-localised farmers (cultivators outside the command area) who also utilize the tank water for cultivation. Non-localised area was noticed in 45% of the project tanks. SPS Nellore district is the highest

followed by Prakasam, Vizianagaram, Srikakulam, Krishna, West Godavari, Chittoor and Anantapur. It was relatively less in East Godavari, Visakhapatnam and YSR Kadapa districts.

Table 52: Ayacut and average ayacut for WUA (Non-Localised Ayacut)

Sl	District	Non-Localised Ayacut			
		Project			
		No. of WUAs	*Total Acres*	*Total ha*	*Ave ha/WUA*
1	Anantapur	1	150	60.73	60.73
2	Chittoor	3	176	71.26	23.75
3	East Godavari	3	55	22.27	7.42
4	YSR Kadapa	1	20	8.10	8.10
5	Krishna	2	275	111.34	55.67
6	Kurnool			0.00	
7	SPS Nellore	9	3060	1,238.87	137.65
8	Prakasam	7	1110	449.39	64.20
9	Srikakulam	2	300	121.46	60.73
10	Visakhapatnam	3	85	34.41	11.47
11	Vizianagaram	6	305	123.48	20.58
12	West Godavari	1	200	80.97	80.97
	Grand Total	38	5736	2322	61.11

Source: Baseline Survey, 2017

Land Owners and Tenants in Command Area

5.56. Under the 102 tanks covered under baseline study nearly 83% of the Ayacutdars were cultivating lands on their own. Of this 14.93 % were women Ayacutdars.

Table 53: Distribution of Ayacutdars

Sl	**District**	**Ayacutdars**			
		Male (N)	*Female*	*Total*	*% Female to total*
1	Anantapur	2848	721	3569	20.20
2	Chittoor	922	193	1115	17.31
3	East Godavari	550	90	630	14.29
4	YSR Kadapa	4695	437	5547	13.65
5	Krishna	1009	102	1051	9.71
6	Kurnool	70	5	120	4.17
7	SPS Nellore	3810	526	4209	13.30
8	Prakasam	2352	323	2650	12.87
9	Srikakulam	878	237	1076	20.63
10	Visakhapatnam	756	99	855	11.58
11	Vizianagaram	336	74	380	19.47
12	West Godavari	205	36	235	15.32
	Grand Total	**18431**	**2843**	**21437**	**14.93**

Source: Baseline Survey, 2017

Other Users of Tank Water

5.57. Farmers / Ayacutdars are the primary stakeholders, the other tanks users like fishermen, cattle grazers, washer men and other domestic users constitute other stakeholders. Majority of the tanks serve the needs of stakeholders such as fishermen, cattle grazers and washer men. Prakasam district is observed to have the highest in number of users followed by SPS Nellore. Except Prakasam district none of the tanks covered in the study are serving domestic needs.

Table 54: Various Existing Tank Users (No. of Stakeholders)

Sl	District	Various Users (No. of Stakeholders)								
		Project								
		Domestic Users	*Panchayat /Municipality*	*Fishermen*	*Washermen*	*Cattle Grazers*	*Potters*	*Brick Making*	*Industry*	Total
1	Anantapur			40	47	1,575	49	1		1,712
2	Chittoor		1,576			460	13			2,049
3	East Godavari			400	10	730				1,140
4	YSR Kadapa			60	584	1,730	61	6		2,441
5	Krishna		200	75		2,440				2,715
6	Kurnool									
7	SPS Nellore	2		135	191	420	82	49		879
8	Prakasam	0	10,002	55	286	1,870	103	33	0	12,349
9	Srikakulam		240	53	47	323				663
10	Visakhapatnam			20	20	1,200				1,240
11	Vizianagaram		1	360	4	570	1			936
12	West Godavari			420		500	1	1	1	923
	Grand Total	**2**	**12,019**	**1,618**	**1,189**	**11,818**	**310**	**90**	**1**	27,047
	%	**0.01**	**44.44**	**5.98**	**4.40**	**43.69**	**1.15**	**0.33**	**0.004**	**100.00**

Source: Baseline Survey, 2017

Resource Mobilisation

5.58. The WUAs are solely dependent on the Government for the necessary resources for tank maintenance. The revenue from the fisheries is nominal. In a few tanks human resources are being mobilized for undertaking weed removal and restoration of bunds of the field channels.

Reasons/constraints in record maintenance
(As expressed by WUA members during FGD)

- Most of the WUA Presidents towards the end of tenure, had not handed over the documents and registers to the newly elected representatives.
- Those who handed over the records is kept with the Department due to non-availability of office accommodation
- Majority of the newly elected WUA members are unaware of the documents to be maintained.
- These who are aware, have not received the training on registers and records maintenance.
- Some WUAs were not interested in maintaining records as no funds have been

Office Establishment and Record Maintenance

5.59. The APFMIS 1997 Act suggests functioning of WUAs from its office. The Act also indicates minimum records to be maintained by the WUA which include:

- Up-dated copy of APFMIS 1997 Act;
- Relevant specified maps;
- Statement of the assets and liabilities;
- Minutes books;
- Books of accounts showing receipts and payments.
- Books of accounts of all purchases and sales of foods by the farmer organizations;
- Register of measurement books, level field books, work order and the like;
- Copies of audit reports and enquiry reports; and
- All such other accounts, records and documents as may be prescribed from time to time. The Act also specifies to keep transparency; these records & registers should be made available to members of the organization (WUA) and also for inspection to any authorized officer /officers by government.

5.60. The newly formed WUAs are not aware of the importance of records maintenance. More than 80% of the WUAs do not maintain any records except Minutes' books. Records that were

maintained by the earlier WUAs have not been handed over to the newly formed WUA committees including Bank Pass Books. In general, the records if any maintained by WUA are kept either with the WUA President or the MI department.

Water Regulation

5.61. Water management is one of the important functions of WUA. Therefore, it is essential to look into the prevailing water management practices and perceptions of the respondents about water management. The understanding of water management was captured through FGDs. Around 80% of the farmers expressed that the WUA is responsible for water management. The remaining 20% of the farmers indicated that the MID is responsible for water management.

Conflict Resolution

5.62. Conflicts related to water sharing are inevitable among primary stakeholders and also among primary and other stakeholders who are dependent on the tank system. It emerged that the conflicts between head reach and tail end farmers are quite common in all tanks. However, these are being resolved by the stakeholders amicably. Whenever the issue is not resolved at the stake holders level it is resolved to the level of the MID and Panchayat. Conflicts of high magnitude leading to imposition of penalty and other stringent actions have not been reported in any of the tanks.

Willingness to Contribute to Tank Improvement

5.63. Tank improvement is the central theme of the study. Hence, the opinion of respondents on willingness to contribute was sought as part of the study. In majority of the tanks systems the water distribution systems and tank bund repairs involve high costs and due to continuous drought, farmers' response on contributing for the tank improvement is poor. However, the farmers expressed that they will continue to contribute in kind, i.e., for regular maintenance of field channels as usual once the systems are restored.

Indicators of Good Water Management

5.64. Stakeholder discussions revealed that equity in distribution of water to all the Ayacutdars is considered to be the most important indicator of good water management. Timely water supply is the second most important indicator. WUA meetings and management are not given importance possibly due to the non-involvement of the stakeholders in decision making process.

Key Issues and Action Areas with Regard to WUAs

5.65. The key issues and action areas related to WUAs are indicated in Table 55.

Table 55: Issues Related to WUAs

Issue	Description
Stakeholders in tank management	APFMIS Act has identified tank as a multiple use resource and provided for inclusion of tank users other than command area farmers. This process is not being undertaken in tank areas and it needs to be completed right at the beginning of tank improvement so as to create stake among various tank users. Inclusion of

Issue	Description
	fisher folk is well understood at community level and 62% respondents indicate need of inducting them in tank management. Specific facilitation will be needed to create stake for other tank users
Co-option of GP members	The Act provides for co-option of GP members in WUA managing committee. The study results indicate that this is not done at the field level which leads to tank management through informal arrangements. The tank improvement plan should take up this as an important and early stage intervention as the GP as an institution has a major stake in managing the tank resource. This is especially important for works to be taken up under the convergence of various government schemes such as de-silting under the Neeru Chettu, NREGS etc. The inclusion of GP members will strengthen the WUA in terms of better Coordination, Convergence and Management of the tank system and also mobilization of resources.
Women's representation and participation in tank management	Women form one of the important stakeholders group in tank areas. However, the study observed that though the participation of women in Governing body is good the non-inclusion of the women in the WUA committee is a matter of concern. There is a specific need for creating awareness among women about WUAs, roles and responsibilities of WUA as well as providing specific leadership development trainings for women. These efforts will provide encouragement to women to contest WUA elections. It is also essential to plan specific actions that would help involve women in tank based livelihoods as well as increase their technical knowledge and skill in agro-based livelihood activities. Another action required is introduction of policy changes for inclusion of more women farmers/other stakeholders. This can be done by introducing household based membership of WUAs similar to VSS.
Awareness and capacity building of WUA	The state reforms agenda has a focus on decentralized community based management of water resources. APFMIS Act is a clear indication of the commitment of Govt. of AP. However, there is a need for specific efforts including resource allocation and capacity building for implementation of the Act. The efforts need to start from awareness generation about the WUA, its roles and responsibilities, and providing handholding support to WUAs to set up self-management systems.
Introduction of participatory planning and implementation process for tank improvement	The field study observed a direct relationship between physical status of tanks and community involvement in tank management. It is essential that the tank improvement is planned by the state government in consultation with the community members. Physical works for tank improvement need to be planned with the WUA and the WUA should also be encouraged to take up some works on their own with the cooperation of the members. Contribution of WUA members should also be made mandatory so as to create a sense of ownership. The contribution can be planned both in cash and kind so that all WUA members including the beneficiaries of the tank systems like bore well users of tank influence zones and other stakeholders can participate.
Role of WUA in tank restoration and protection of the catchments	The farmers reported that the survey of the tanks and fixing of the boundaries of the tank is the first and foremost action to be taken up as part of the project to avoid land issues. Similarly, the field channels inflows in the catchment need to be surveyed and fixed. Illegal activities that hamper the inflows from the catchments need to be taken care of. Tank improvement works will necessitate removal of encroachments if any. WUA needs to be given the primary responsibility of identification of such encroachments, discussion with community members, mobilizing them for voluntary surrender and providing

Issue	Description
	support to the poor and vulnerable through need based support of tank based livelihoods. This will be a crucial activity for the tank improvement. The project needs to make specific support provision to poor whose livelihood depends upon the tank.
WUA involvement in water charges collection	Water charges are the main source of WUA for regular operations and maintenance. The field study observed that multiple departments are involved in water charges demand estimation and collection. WUA plays a minimal and supportive role in this activity. It is crucial that WUA takes up active role in the collection of water charges. These need amendments in the APFMIS Act which will go a long way in improving efficiency of WUA and implementation of Participatory Irrigation Management.
Interventions for resources mobilization by WUA	Apart from water charges, the APFMIS Act provides for resources mobilization by WUA for undertaking regular O&M activities. The tank improvement needs to include activities for this purpose. The state experience indicates foreshore plantation as one of the promising avenues. Similarly, improvements in fisheries production, support for marketing and review of lease amounts should be undertaken. The convergence of Fisheries, Revenue department and Fisheries Cooperatives is to be streamlined for WUAs to have a reasonable stake in the process for improved revenue generation. Mobilizing water charges from the bore well users in the influence zone is another source which needs to be given importance.
Convergence with other government programme/schemes	The study identified that the de-silting activities that are being taken up by the Government under various schemes and programs are not taken up in convergence with the WUAs. There is also need for effective convergence between WUAs and programmes related productivity enhancement and credit linkages.
Tank improvement	The intervention approach should not overlook gradual evolution of a tank's role in the community and contributions of tank systems to the village livelihood. The classical rehabilitation approach (renovating the tanks by de-silting the tank-beds or raising the bunds, repairing the outlets and lining the canals leading into them) may deprive a sizeable proportion of poor population in return to few advantages to farmers irrigating in the command areas. There is a need to have a balance in interventions involving various groups of stakeholders.
Setting up a coordination authority/ body for overall improvement	The multiple uses of tanks and the multi-disciplinary issues of tank management necessitate coordination of activities and events to achieve optimum benefits. The field study observed multiple institutions playing role in tank management not only at tank level but also at higher levels. At tank level, WUA, gram panchayat, fisheries cooperatives are the institutions engaged in tank management. At the district level, there are a number of departments/agencies which are engaged in contributing to improving returns from tank systems. These include Minor Irrigation Department, Panchayat Raj Department, Water Resources Department, Agriculture and Horticulture Department, Forest Department, Fishery Department and Environment Department etc. There is a need to have a coordinated effort among these departments for tank improvement and management.

Stakeholder Analysis

5.66. A stakeholder analysis has been undertaken to identify the issues and the concerns of the stakeholders who are will be directly or indirectly impacted/benefited by the project or assume a position wherein they can have a significant role to play in project implementation.

The analysis has been carried out to identify existing relationships and also to understand the roles, responsibilities and relations of these stakeholders in context of shaping social issues with respect to proposed project.

Major Stakeholders

5.67. A wide gamut of stakeholders across tank, village, Panchayat, sub-district, district and state levels would be involved in the proposed project. While some of these stakeholders would be directly affected by the project others would be indirectly involved. A list of project stakeholders at various levels is provided in Table 56.

Table 56: Direct and Indirect Stakeholders at Different Levels in Sample Tanks

Village/ Tank level	
Direct Stakeholders	**Indirect Stakeholders**
▪ **Community:** o Ayacutdars (including marginal, small, medium and large farmers) o Women o Tribal population o Fisher folk o Leased-in farmers o Agricultural labourers o Non-farm wage workers o Cattle grazers o Traditional occupation holders (potters, washer folk, carpenters, blacksmiths, mason etc.) ▪ **Groups:** o Water User Associations o Women's SHGs ▪ **Government and PRI Representatives** o Ward member/representative o Government functionaries such as Village Revenue Officer, Minor Irrigation Work Inspector, Village Agriculture Worker, Panchayat Secretary etc. ▪ **Other service providers**	▪ **Members of supply chain**: o Traders o Retailers (sellers of products like agriculture seeds, pesticides, fertilizers and implements) ▪ **Local credit institutions (money lenders, pawn brokers etc.)** ▪ **Government Staff** o Anganwadi staff and ANMs o Primary school teachers ▪ **Money Lenders**
Panchayat level	
Direct Stakeholders	**Indirect Stakeholders**
▪ **Government and PRI Representatives** o President/Sarpanch (Gram Panchayat) o Ex-President/Sarpanch (Gram Panchayat) o Panchayat Secretary o Technical Assistants (NREGA) o Village Agriculture Worker o Panchayat level SHG Federations o Fishery Department officers o Animal Husbandry/Livestock Department officers o Horticulture Department officers o Forest Department officers	▪ **Members of supply chain**: o Traders o Retailers (sellers of products like agriculture seeds, pesticides, fertilizers and implements) o Millers o Transporters ▪ **Money Lenders** ▪ **Media**
Sub-division Level	
Direct Stakeholders	**Indirect Stakeholders**
▪ **Government Representatives** o Minor Irrigation Assistant Engineers, Deputy Executive	▪ **Members of supply chain**: o Traders

Engineers ○ Agriculture Officer, Additional District Agriculture Officer ○ Horticulture Officer ○ Fisheries Development Officer ○ Agriculture Market Yard Officer	○ Retailers (sellers of products like agriculture seeds, pesticides, fertilizers and implements) ○ Millers ○ Transporters ▪ Bankers/ Financial Institutions ▪ Media
District Level	
Direct Stakeholders	**Indirect Stakeholders**
▪ **Government Representatives** ○ Minor Irrigation Executive Engineer ○ DPU, APIIATP ○ Joint Director and Additional District Agriculture Officer ○ Soil Conservation Officer ○ Assistant Director, Horticulture ○ Revenue Divisional Officer ○ Assistant Director Veterinary Officer ○ Divisional Forest Officer ○ Project Director-DRDA ○ District Fishery Officer ▪ **NGO Functionaries**	▪ Members of supply chain: ○ Traders and Retailers ○ Marketing Agencies ○ Agro Industry Representatives ○ Transporters ▪ Formal Credit Institutions ▪ Other development programs ▪ Political Representatives ▪ Media
State Level	
Direct Stakeholders	**Indirect Stakeholders**
▪ **Government Representatives:** ○ Project Team, APIIATP ○ Chief Engineer, Minor Irrigation ○ Directorate of Agriculture and Food Production ○ Directorate of Horticulture ○ Directorate of Soil Conservation ○ SC & ST Development department ○ Directorate of Animal Husbandry & Veterinary Services ○ Directorate of Fisheries; ○ Revenue Department; ○ Department of Water Resource ○ Training Institutions ○ Department of Women & Child Development ○ Department of Forest ▪ **Other Institutions:** ○ Technical Agencies ○ Research Institutions ○ Development Agencies / NGOs	▪ **Members of supply chain:** ○ Traders ○ Seed Companies ○ Fertilizer Companies ○ Pesticide Companies ○ Transporters ▪ **Formal Credit Institutions** ▪ **Other development programs** ▪ **Media**

Expectations of Major Stakeholders

5.68. The various stakeholders who will affect or will be affected by the proposed project have a number of expectations from the proposed project. Key expectations indicated by some of the major stakeholders during the course of discussions are summarized in the following table.

Table 57: Key Expectations from Major Stakeholders

Stakeholders	Expectations

Stakeholders	Expectations
Farmers	▪ Renovation of tank structures and water distributary systems ▪ Adequate water storage in tank reservoirs for all season cultivation ▪ Mechanisms through which tail end farmers can access tank water ▪ Availability of extension services such as subsidized seeds, fertilizers, pesticides and technical know-how on aspects such as multi–cropping, cultivation of cash crops and light-duty crops ▪ Inclusion of marginal and vulnerable farmers in WUAs and consideration of their requirements
Women	▪ Availability of facilities that would help reduce levels of drudgery in day to day life ▪ Increased involvement and participation in decision making in bodies such as WUAs ▪ Increased collectivisation of women into groups such as SHGs and resultant increase in levels of empowerment ▪ Enhanced role in project in terms of activities such as tank maintenance and management ▪ Development of knowledge and skill levels through training and capacity building
Tribal and Scheduled Caste Population	▪ Increased involvement and participation in decision making in bodies such as WUAs ▪ Enhanced role in project in terms of activities such as tank maintenance and management ▪ Development of knowledge and skill levels through training and capacity building
Agricultural Labour and Landless	▪ Availability of wage earning opportunities on account of renovation, operation and maintenance of tank systems ▪ Increased number of annual cultivations leading to increased agricultural labour work ▪ Increased involvement in various tank based livelihood opportunities like pisciculture, duck rearing, fingerling cultivation, fodder cultivation etc. and in household enterprises such as rice processing units etc.
WUAs	▪ More equitable and broad based participation and actual adoption of co-option norms ▪ Strengthening and capacity building of WUA members ▪ Availability of facilities required for WUAs to function effectively including office space and records and registers
Women's SHGs	▪ Increased involvement in tank development activities ▪ Convergence between APIIATP and various livelihood schemes such as NREGA and DRDA which would enable women to take up income-generating activities ▪ Involvement in supervision of treatment activities instead of engaging contractors ▪ Provision of a special grant or fund for SHGs ▪ Interventions for improving level of drinking water availability ▪ Participation in monitoring tank development activities ▪ Training and capacity building for development of livelihood and leadership skills
Fisheries Groups	▪ Round the year water retention in tanks ▪ De-siltation of tank bed for creating adequate water storage facility for pisciculture ▪ Clearing weeds and stumps in the tank bed for making it suitable for pisciculture ▪ Adoption of a transparent mechanism for leasing out tanks by Panchayats ▪ Effective resolution of conflicts with farmers by Panchayat ▪ Training and infrastructural support such as boats, nets, fish-houses etc. ▪ Consultation by farmers or WUA Committee members with fishery groups prior to opening sluice gates
Brick Makers	▪ Approval for usage of tank silt and water for brick making without any objection or hindrance
Cattle Grazers and Livestock Owners	▪ Increased fodder availability; new and drought-resistant forage crops; use of common lands for growing fodder crops ▪ Increased water availability for livestock through water conservation measures ▪ Veterinary services ▪ Market facilities ▪ Financial assistance for either starting or improving livestock-based activities

Stakeholders	Expectations
Workers from Traditional Occupation Groups	▪ Provision of alternative livelihood options for potters considering reduced demand for pottery ▪ Free access to tank water by washer men ▪ Repairing of canal systems so that washer men can use canal water for washing ▪ Increased scope for repairing of agricultural implements by carpenters and masons in case of more intensified agriculture
PRI Members	▪ Active role in the implementation of project interventions
Minor Irrigation Department	▪ Provision of adequate funds for renovation of tank systems ▪ Sensitization of tank users through awareness programs ▪ Training and capacity building of WUA members before handing over tank renovation work ▪ Increased field staff support e.g. increase deployment of Work Inspectors, AEs and JEs ▪ Convergence systems at block and district levels to ensure inter-departmental coordination ▪ Support from social development agencies for formation and strengthening of WUAs ▪ Adequate fund flow for regular and timely renovation and maintenance work of tank systems
Agriculture Department	▪ Construction of proper water distribution channels which would benefit farmers ▪ Availability of adequate fund support for providing trainings to farmers on agriculture practices ▪ Provision for appointing village level animators to assist WUAs in awareness and mobilisation activities ▪ Availability of adequate fund support to provide agriculture inputs to farmers and take up demonstrations and exposure visits
Fishery Department	▪ Maintained of adequate water levels in the tank to allow for fishing activity ▪ Adequate fund support from Government for stocking of fingerlings at tank level ▪ Support from Minor Irrigation Department in developing fish nursery tanks ▪ Support from Minor Irrigation Department in clearance of weeds and stumps in the tank bed ▪ Support to start polyculture or single prawn crop culture ▪ Fund support for training of Fishing Cooperative Society and providing infrastructural support like boats, nets, pump-sets, etc. ▪ Preference to traditional fishermen groups in project design ▪ Collection of water charges from fishery groups in proportion to quantity of fish production

Impacts and Risks

5.69. This section identifies the potential intended and unintended social impacts of the proposed project. The section further disaggregates the impacts on vulnerable population including farmers, women, STs and SCs. The impacts can result from activities throughout the project life cycle from project design, construction, operations and maintenance stages.

Table 58: Potential Social Impacts

Impact	Description
Improved agriculture and irrigation outcomes	▪ Improved access to water for different purposes such as irrigation, drinking and livestock ▪ Enhanced agricultural productivity and production, particularly of horticultural and other high value crops leading to improved incomes ▪ Capacity building with respect to agricultural technologies and practices ▪ Reduced input costs through application of organic inputs and other sustainable practices ▪ Better marketing linkages ▪ Increased access to and income from leasing in and sharecropping ▪ Improvements in number and quality of agricultural assets and household savings
Improved fishery outcomes	▪ Reduced conflict relating to use of water with farmers groups ▪ Increase in fish production and income ▪ Adequate fishing infrastructure ▪ Improved market linkages ▪ Increased knowledge and skills relating to pisciculture ▪ Establishment of Primary Fishery Cooperative Society and more representation of landless and traditional fishermen community in FCS
Impact on women and girls	▪ Increased involvement and participation in decision making in bodies such as WUAs ▪ Enhanced role in project in terms of activities such as tank maintenance and management ▪ Development of knowledge and skill levels through training and capacity building
Impact on tribal population	▪ Increased involvement and participation in decision making in bodies such as WUAs ▪ Enhanced role in project in terms of activities such as tank maintenance and management ▪ Development of knowledge and skill levels through training and capacity building
Impact on Water User Associations	▪ Strengthening of WUAs and representation of all types of water users ▪ Improved functioning of WUAs as reflected through adoption of norms, timely and regular meeting of WUAs, well defined water distribution agreements and well maintained records and books related to accounts ▪ Increased involvement of community especially members from marginal groups in the WUAs ▪ Increase in level of involvement of WUA members for generating WUA members' contribution ▪ Active involvement of WUA members in community mobilization for operation and maintenance of tank systems ▪ Reduced incidence of conflicts over use of water and reduced incidence of tampering of field outlets
Impact due to Securing Land	▪ The project interventions chiefly relate to repairs and rehabilitation works of the existing tanks and supplemented/complemented by effecting forward and backward linkages. While civil works are envisaged, no new construction is planned. However there could be some circumstances wherein land related impacts may occur. These include cases where some kind of encroachment has taken place in the tank bed/vicinity. In an extremely unlikely situation, technical remedial measures too may have land related impacts.

Social Issues of Significance for the Project

5.70. There are a number of significant social issues that would have a bearing upon the project design. These are summarized in the following table.

Table 59: Social Issues of Significance for the Project

Issue	Description
Dominance by Economically and Socially Better-off Groups	▪ The socially and economically stronger groups currently have a higher level of representation and participation in community based groups. This results in the absence of adequate articulation and addressal of issues faced by weaker groups. The relatively more powerful groups could potentially attempt to capture most of the activities and contracts under the project.
Vulnerability of ST Groups	▪ A majority of the tribal population are small and marginal farmers. Their incomes are low and they have to depend on other source of livelihood such as agriculture labour, manual works and livestock rearing. They are affected by low literacy, lack of knowledge on policies and development schemes and inadequate access to markets and advanced technologies. Such factors have a role in reducing the levels of participation and involvement by ST groups in tank development and management activities. This has a bearing on the extent to which they can access benefits from various tank development initiatives. The Tribal People Planning Framework (TPPF) proposed as part of the social management framework would act as a guiding point for development of tank specific Tribal Development Plans (TDPs)
Inadequate Representation of and Participation by Women	▪ Women are as such disempowered at individual and household levels by a number of factors such as lack of adequate education, lack of access to resources and limited or no role in decision making processes. This is combined with the fact that majority of household responsibilities are shouldered by women and in addition they are expected to take up significant share of the work load in agricultural fields. At the community level they are affected by lack of representation in key decision making structures and fora and even if they are represented to a certain extent their voices are left unheard. Specifically women are not adequately represented in WUA Committees and have highly limited attendance in meetings organized by the WUAs. They are not involved in planning and implementation of tank renovation works, and operation and maintenance. Women have not been encouraged to participate in trainings on technical aspects of tank and advanced agriculture technologies and practices. The Gender Action Plan (GAP) developed as part of the social management framework provides the overall plan that would be adopted with a view to ensure gender based inclusion and equity in the project.(Annexure I)
Issues Related to Securing of Land	▪ The project interventions chiefly relate to repairs and rehabilitation works of the existing tanks and supplemented/complemented by effecting forward and backward linkages. While civil works are envisaged, no new construction is planned. However there could be some circumstances wherein land related impacts may occur. The Resettlement Policy Framework (RPF) proposed as part of the social management framework would act as a guiding point for development of tank specific Resettlement Action Plans (RAPs)
Composition and Functioning of WUAs	▪ Several issues have been identified with respect to formation and functioning of WUAs. These include o The elite in the village and politically powerful found representation in majority of the Committees due to the process followed the constitution of Managing Committees. The scheduled castes, women, small and marginal are found to be discriminated/ oppressed and are inadequately or not even represented in the Committees o General Body meetings and Managing Committee meetings have become an act of formality and record maintenance is completely absent. The Committees rarely take charge of tank management o Sufficient trainings were not provided to WUA Committee Members.

Issue	Description
	The members were found to be poorly informed about the Act and Roles and Responsibilities. Records and registers and other infrastructure facilities were not provided to committee to discharge their duties. o The financial position of WUAs was found to be very poor and they are not in a position to take up simple tasks also. Water cess is not being collected by the Revenue department o Disputes and conflicts arise between diverse groups including fisher folk, SCs and STs etc. This is primarily due to the difference in their expectations from the tanks and related structures
Political Influence over Project Activities	▪ Extraneous factors such as involvement of political representatives in aspects such as management of the tank and WUA activities lead to lowering of levels of transparency and accountability in decision making processes

Implications on Project Design and Strategy

5.71. The various social issues observed during the course of the assessment would have significant implications on project design and strategy and these are summarized as follows.

- **Inclusion and Equity:** Some of the groups which would need to be consciously included in the project framework include women, people from ST and SC communities as well as landless and small and marginal farmers residing in tanks areas. Active mechanisms would need to be developed which would encourage and enhance the level of participation of excluded and vulnerable groups in project decisions and activities.
- **Cohesion:** A related outcome of the existence of stakeholders from multiple strata is the lack of a sense of cohesion. The possibility of conflicts and disagreements among groups with divergent interests is high and it would therefore be important to develop mechanisms that would instill a sense of cohesion among stakeholders.
- **Transparency and Accountability:** It would be important to develop and implement a system that would exclude such factors and allow the community members to obtain benefits from the project in a fair and transparent manner.
- **Tribal Development Focus:** With a view to address the issues faced by tribals a Tribal People Planning Framework has been developed as part of the project which aims to outline the steps that need to be taken to ensure that issues of tribal people are addressed as part of the project. The aim of the framework is to ensure project benefits are accessible to the tribals living in the project areas and enable them to participate in community institutions with better capacity for decision making processes. Tribals would be consciously involved in WUAs, NGOs, Tribal Village Heads/Traditional bodies who can communicate with Tribal groups and inform them about the project. Skill based training programmes would be conducted for STs to improve their skills for effective participation in various project activities and in income generating activities.
- **Gender Focus:** Considering specific conditions and gender based needs it becomes imperative for the project to adopt approaches that would encourage and enable participation by women. A Gender Action Plan has been developed in this context and would need to be adhered to while implementing the project. (Annexure I) As part of this gender sensitisation training would be provided to the community, WUAs and

project staff. Project planning and implementation activities would be designed with sensitivity towards women's needs. Capacity building programme would be held for women before entrusting them with responsibilities and capacities of existing SHGs, women groups, and female heads of households would be utilised.

- **Resolving Issues related to Land:** While the proposed project does not anticipate any land acquisition activities, the RPF has been developed keeping in mind any cases which may result in displacement. The main objective of RPF is to appropriately identify, address and mitigate adverse socio-economic impacts that may occur due to securing of lands in general, and particularly involuntary acquisition of land. The RPF aims to avoid involuntary acquisition of land (and subsequent resettlement) wherever possible and in cases where it is unavoidable, the RPF requires the Appropriate Government to develop a robust rehabilitation and resettlement plan to effectively manage the social impacts created by the project. The plan identifies the full range of people affected by the project and justifies their displacement after consideration of alternatives that would avoid or minimize displacement.
- **Capacity Building:** Capacity of stakeholders to manage and execute programs at different levels (community, block, district and state level) of project operation is another important issue or challenge before the project. WUA members, fishery group members etc. require technical, operational and managerial capacity building to be able to manage operation and maintenance of tanks systems, WUA activities and also take-up various livelihood options.
- **Emphasis on Conflict Resolution Systems:** Stress would be laid on conflict resolution activities and this would include steps such as ensuring equitable distribution of water through effective water management and distribution systems, avoiding unauthorized lifting and breaching of water in the head reaches and organising regular WUA meetings.
- **Convergence across Departments:** The Departments directly associated with tank projects are MI, Fishery, Agriculture, Revenue, Panchayati Raj and SC&ST Development. There is need for development of inter-departmental convergence in terms of setting up of a common agenda and action plan; common execution strategy; joint monitoring and supervision, etc. for management of tank systems and improving tank based livelihoods.

Social Management Framework

5.72. Based on the issues to be addressed and impacts likely to occur, appropriate management measures have been drawn for implementation to mitigate the possible impacts due to proposed project interventions. While for positive impacts, enhancement measures are suggested; for negative impacts suitable mitigation measures has been included.

5.73. The basic principles that guide this Social Management Framework (SMF) are:

- Minimisation of impacts when project activities occur in socially sensitive areas;
- Mitigation of any unavoidable negative impacts arising out of its projects;
- Optimization of land requirement; and
- Greater transparency through involvement of community and other stakeholder

Social Management Framework

5.74. Management measures to address potential social issues are summarized in the following table.

Table 60: Management Measures to Address Potential Social Issues

Potential Issues	Management Measures
Impact on Tribal Population	The ST population in the state is around 2.6 million accounting for 5.3% of the total state population In compliance with Bank's Operational Policy and special provision of RFCTLARRA, 2013, a Tribal Peoples Planning Framework (TPPF) has been prepared.
Participation by Women	Women's active inclusion and participation in the project will be ensured through a range of strategies including sensitisation, training and provision of specific facilities that enable women to engage effectively. A Gender Action Plan (GAP) has been developed for ensuring greater participation and contribution by women in the course of the project **(Annexure I).**
Issues in Securing Land	The project interventions chiefly relate to repairs and rehabilitation works of the existing tanks and supplemented/complemented by effecting forward and backward linkages. While civil works are envisaged, no new construction is planned. However there could be some circumstances wherein land related impacts may occur. These include cases where some kind of encroachment has taken place in the tank bed/vicinity. In an extremely unlikely situation, technical remedial measures too may have land related impacts. It must also be noted that in some cases it may so happen that land may have to be obtained from public sources and in such cases also certain procedures (do's and don'ts) have to be followed. In compliance with Bank's Operational Policy, a Resettlement Policy Framework has been prepared (RPF)
Inter Agency Coordination	Exclusive bodies will be set up at state/ district levels for over-seeing, reviewing and guiding the project

Conclusion

5.75. This chapter discussed the overall socio-economic status of Andhra Pradesh based on secondary findings as well as field visits undertaken to sample tanks as part of the study. The social assessment helped throw light on the key issues and challenges that exist in the tank eco-system and that would need to be considered while planning and implementing project interventions. The key stage specific social management activities that would need to be undertaken were also discussed as part of this chapter. The following chapter discusses the institutional arrangements and capacity building measures relevant for the project.

Chapter Six: Institutional Arrangements and Capacity Building Measures

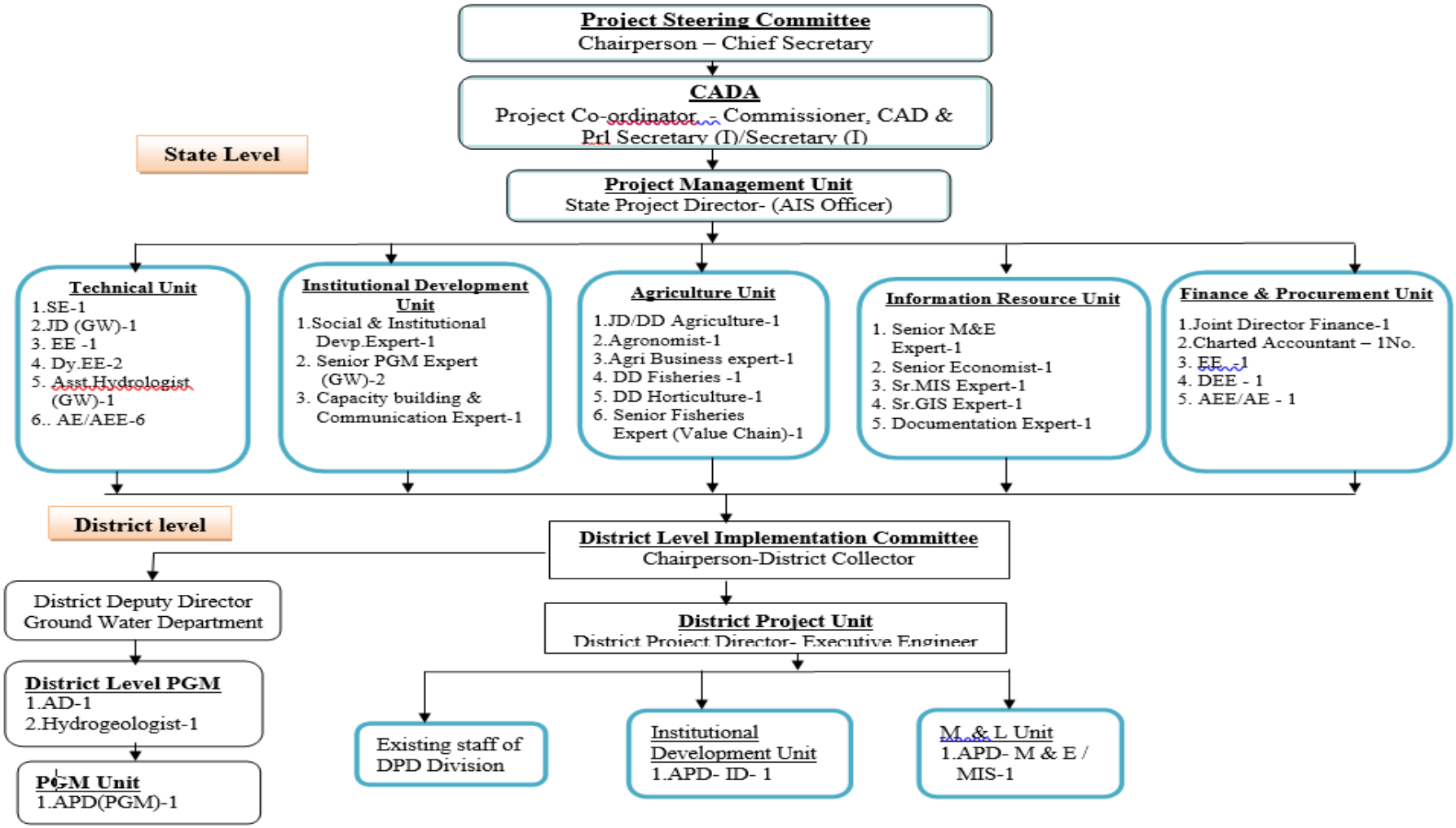
Institutional Arrangements at State, District and Tank Levels

6.1. The overall responsibility for project implementation and coordination rests with the Command Area Development Authority (CADA) in the Water Resources Department of GoAP. Implementation support is provided by the Departments of Agriculture, Horticulture, Animal Husbandry, Fisheries, Forestry, Rural Development, Ground Water, APSAC and various support organizations and other private service providers.

6.2. The Commissioner CADA and Secretary Water Resources Department is the overall Project Coordinator. Project implementation is coordinated through a Project Management Unit (PMU) established in CADA. The PMU, headed by the State Project Director of the rank of Special Commissioner, comprises of a compact multi-disciplinary team dedicated to the project. Corresponding District Project Management Units (DPUs) have been established at the district level with smaller multi-disciplinary dedicated teams.

6.3. The PMU reports to a Project Steering Committee (PSC) chaired by the Chief Secretary and comprises the Secretaries of Water Resources, Finance, Agriculture, Horticulture, Animal Husbandry, Fisheries, and Rural Development, etc., with Commissioner CADA as Convener. The PSC reviews progress of the project every six months and provides strategic directions, guidance on policy matters and resolve conflicts, if any, amongst the implementing agencies.

Andhra Pradesh Integrated Irrigation & Agriculture Transformation Project Organogram



Overall Institutional Arrangements

6.4. The key roles and responsibilities of some of the critical stakeholders involved in implementation are summarized in the following table.

Table 61: Key Roles and Responsibilities of Major Stakeholders of Implementation Process

Stakeholder	Role
State Level	
Project Steering Committee (PSC)	Responsible for review and strategic guidance of project at state level. Chief Secretary is the Chairperson and Project Coordinator (Commissioner CADA and Principal Secretary/Secretary, Water Resources Department) is the Convener of the PSC. Other members are drawn from Departments of Agriculture, Rural Development, Animal Husbandry and Fisheries, Minor Irrigation, Groundwater and Finance and ICRISAT.
Project Management Unit (PMU)	Responsible for coordinating operations of executive agencies under the project. It consists of five technical units namely; Institutional Development, Information Resource, Agriculture, Finance and Procurement and General Administration and Support
District Level	
District Level Implementation Committee (DLIC)	Responsible for review of project at district level with District Collector as Chairperson at least once in three months. District Project Director (Executive Engineer) is Member Secretary of DLIC and other members are drawn from Zilla Parishad, Departments of Agriculture and Fisheries, District Water Management Agency, District Rural Development Agency and Water User Associations
District Project Unit (DPU)	DPUs are headed by District Project Director of the rank of an Executive Engineer from Water Resource Department. DPUs comprise of Technical Unit, Institutional Development Unit, M&L Unit and Finance & Procurement Unit
Tank Level	
SO	DPU will be responsible for identification and selection of Support Organization (SO) in a district. SOs will facilitate community mobilization and participation. Each SO will be assigned at least one cluster of tanks consisting of 5 to 10 tanks
Tank / WUA level implementation arrangement	At the tank level the project implementation will be the responsibility of the Water Users Association
Lead farmer	Person selected from the community and trained in relevant areas. Should be a practicing farmer, having own land, member of WUA and willing to learn and disseminate new technologies/practices. All the agriculture related activities will be implemented through the lead farmer.
Water User Associations	Project aims at promoting a more proactive role of WUAs in improving agricultural livelihoods of its members. WUAs will be involved in organizing village / WUA level camps and melas, exposure visits, monitoring demonstrations, maintaining community assets, motivating the members for adoption of improved technology etc.
Support Organizations	Responsible for micro plan, coordination with resource persons, farmers and line departments for organizing demonstrations, organizing exposure visits, conducting field level awareness campaigns, organizing service camps, undertaking regular meetings for planning and implementation, monitoring and reporting of progress on a regular basis

6.5. The overall responsibility for project implementation and coordination rests with the Command Area Development Authority (CADA) in the Water Resources Department of GoAP. Implementation support is provided by the Departments of Agriculture, Horticulture,

Animal Husbandry, Fisheries, Forestry, Rural Development, Ground Water, APSAC and various support organizations and other private service providers.

6.6. The Commissioner CADA and Secretary Water Resources Department is the overall Project Coordinator. Project implementation is coordinated through a Project Management Unit (PMU) established in CADA. The PMU, headed by the State Project Director of the rank of Special Commissioner, comprises of a compact multi-disciplinary team dedicated to the project. Corresponding District Project Management Units (DPUs) have been established at the district level with smaller multi-disciplinary dedicated teams.

6.7. The PMU reports to a Project Steering Committee (PSC) chaired by the Chief Secretary and comprises the Secretaries of Water Resources, Finance, Agriculture, Horticulture, Animal Husbandry, Fisheries, and Rural Development, etc., with Commissioner CADA as Convener. The PSC reviews progress of the project every six months and provides strategic directions, guidance on policy matters and resolve conflicts, if any, amongst the implementing agencies.

Institutional Arrangements for Environmental and Social Management

6.8. The project proposes to adopt a community-based approach in tank improvement and management. Hence it is essential that right from the beginning community participation in addressing social and environment concerns is planned and integrated in the overall project framework and plan.

6.9. Social and environmental issues and concerns identified definitely affect the performance and utility of tank system. Hence, due importance needs to be given to address these concerns in the planning and implementation process. Essentially, appropriate institutional arrangements, including adequate staffing with specialization in social and environmental management, need to be ensured at the different levels of project institutional structure. Accordingly, the following institutional arrangement is proposed. Proposed institutional arrangements for ESM are provided in the following table.

Table 62: Institutional Arrangements for Environmental and Social Management

	Role
Tank Level	
WUA	WUAs will assume responsibility for tank system improvement and management, within the defined tank / cascade in a holistic manner, including implementation of sector specific activities that will help to bring in more climate resilience in agriculture and allied sectors
SO (Support Organization)	SOs will act as an intermediary between WUA and the external world. They will be engaged at the cascade level and in each cascade they will be involved in facilitating and implementing activities in more than one tank systems. SOs will be associated in all project implementation activities including awareness generation, community mobilization and submission of project completion report specific to the assigned cascade
Cascade Level	
SO (Support Organization) and Cascade Coordination and Management Committee	CCMCs will be formed to coordinate among water user associations of identified tanks in cascades and would be responsible for developing other institutional mechanisms for water management and tank system maintenance

	Role
(CCMC)	
District Level	
District Project Unit	DPU will have primary responsibility of planning and implementation of cascade / tank based agricultural / horticultural interventions. This includes design / development of district level strategy, identification of opportunities and areas of capacity building, identification of resource persons, facilitating demonstrations, monitoring and reviewing progress of interventions etc
State Level: Project Management Unit (PMU)	
Environment Safeguard Expert	Environment Safeguard Expert- PMU will ensure implementation of Environmental Management Framework, coordination with Dam Safety Panel for Dam Safety Plan, guide DPUs in formulation of environment component to be integrated in the Detailed Project Report (DPR), monitor implementation of environment management framework
Social and Institutional Development Expert	Social and Institutional Development Expert- PMU will ensure implementation of Social Management Framework and guide DPUs in formulation of social components and monitor implementation of social management framework
Capacity Building and Communication Expert	Capacity Building and Communication Expert will identify stakeholders and ensuring their participation, identify training needs of key stakeholders and ensure timely implementation of capacity building measures of social and environmental management components
Agronomist	Agronomist will provide capacity building inputs that would lead to increased productivity
Agri-Business Expert	Agri Business Expert will develop sector plans and oversee implementation
Fisheries Expert	Fisheries Expert will ensure implementation of components related to fisheries in the EMF and SMF

Capacity Building Needs at State, District and Tank Levels

6.10. Training and development of stakeholders is an integral part for implementation of the EMF and SMF. Based on the activities to be carried out as part of environmental and social safeguard measures, possible areas of capacity building at various levels have been identified in the following table.

Table 63: List of Various Participants and Training Needs for APIIATP

Participants	Training Needs	Resource Organization
Primary Stakeholders		
WUA Managing Committee Members, Tribal Members, Women's Group Leaders, GP Members, Para-workers and Progressive Farmers	▪ Social and environmental issues and their impacts	▪ NGOs, Agriculture Research Stations, DRPs
	▪ Addressing environmental and social issues and mitigating measures	▪ Line Department Staff
	▪ Sustainable use of natural resources ▪ Importance of soil and water conservation	
	▪ Improved farm practices, water use, crop diversification, organic farming, balanced nutrient application, IPM and INM techniques etc.	
	▪ Management, leadership and communication	
	▪ Record keeping and basic maintenance of financial accounts	
	▪ Monitoring of environmental and social	

Participants	Training Needs	Resource Organization
	parameters	
Secondary Stakeholders		
Water Resource Department	▪ Purpose and components of ESMF for APIIATP	▪ External Institutions and Agencies/ Line Department Staff
	▪ Identification of environmental and social issues and mitigating measures	▪ External Institutions and Agencies/ Line Department Staff
	▪ Environmental appraisal process-Screening and environmental appraisal	▪ External Institutions and Agencies/ Line Department Staff
	▪ Implementation of Environmental Management Framework and Social Management Framework	▪ External Institutions and Agencies/ Line Department Staff
	▪ Institutional arrangement of Environmental Management Framework and Social Management Framework	▪ External Institutions and Agencies/ Line Department Staff
	▪ Key aspects for monitoring of Environmental Management Framework and Social Management Framework	▪ External Institutions and Agencies/ Line Department Staff
	▪ Dam Safety Measures	▪ SDSO, Vijayawada
Agriculture Department	▪ Modernization of agriculture	▪ Shall be identified based on specific requirements
	▪ Eco-friendly farm practices	▪ Shall be identified based on specific requirements
	▪ Impact of Climate variability on crops, importance of adaptation measures, contingency plans etc	▪ Acharya Ranga Agricultural University, AP
Agricultural Marketing Staff	▪ Updating skills and knowledge on IPM and INM	▪ Agriculture Department, GoAP
	▪ Organic farming practices	▪ Agriculture Department, GoAP
	▪ Direct marketing and Farmers Producer Organizations	▪ Agriculture Department, GoAP
	▪ Management of cold storage and other infrastructures	▪ NGOs and other institutions
	▪ Organic certification and Green business opportunities	▪ Seed Certification Agency, Guntur, AP
	▪ Packaging and Branding	▪ Home Science College, Basalt, AP
Horticultural Department	▪ Impact of Climate variability on crops, importance of adaptation measures, contingency plan etc	▪ Acharya Ranga Agricultural University, AP
	▪ Updating skills and knowledge on IPM and INM	▪ Horticulture Department, GoAP
	▪ Organic farming practices	▪ Horticulture Department, GoAP
Fisheries Department	▪ Fish farming in farm ponds and value addition of fishery products	▪ Fisheries Institute, Kakinada, GoAP ▪ Fisheries Department, GoAP
	▪ Fish farming in farm ponds and value addition of fishery products	▪ Fisheries Institute, Kakinada, GoAP ▪ Fisheries Department, GoAP
All Departments, SOs Staff	▪ Community mobilization and grass root institution building such as WUAs	▪ Shall be identified based on specific requirements
	▪ Mainstreaming gender in irrigation and agriculture	▪ Shall be identified based on specific requirements
	▪ Tribal development legislations, policies and programmes	▪ Shall be identified based on specific requirements
	▪ Participatory Irrigation Management	▪ Shall be identified based on specific requirements
	▪ Awareness about social and environmental	▪ Shall be identified based on

Participants	Training Needs	Resource Organization
	issues and their impacts	specific requirements
	▪ Awareness about social and environmental issues and their impacts	▪ Shall be identified based on specific requirements
	▪ Role, responsibility and accountability of the WUA heads, ▪ Management, leadership and communication	▪ Shall be identified based on specific requirements
	▪ Impact assessment, mitigation and monitoring measures	▪ Shall be identified based on specific requirements

Conclusion

6.11. This chapter discussed the overall institutional structures and mechanisms that would be in place for project implementation. The specific units/entities that would be responsible for undertaking environmental and social management activities have also been delineated. Key capacity building needs that have to be met in order to implement the project effectively were also identified. The following chapter discusses the monitoring and evaluation system that would be adopted for the project along with the grievance redressal mechanism.

Chapter Seven: Monitoring and Evaluation and Grievance Redressal Mechanism

Need for Monitoring and Evaluation and Grievance Redressal Mechanisms

7.1. Monitoring and evaluation (M&E) system arrangement have been developed for measuring and assessing project activities, developing corrective measures and evaluating impact. The project stakeholders involved in implementation would have a key role to play in operationalizing and adopting the M&E system. Inter-institutional reporting, coordination and programmatic relationships have a strong bearing on information and data flow for M&E and the system needs to be embedded in the institutional setup. An external agency would be brought on board to undertake project M&E. Aspects of monitoring will include processes, outputs, outcomes and impacts as well as environmental and social management audits.

7.2. Grievance Redressal mechanisms would assume importance in light of providing a system for direct and indirect stakeholders to record their complaints and for ensuring that these are addressed within a definite time frame.

Key Aspects to be Monitored and Evaluated

7.3. The important monitoring parameters for the proposed components in the tanks include water and soil quality, agriculture related issues, socio-economic aspects and project implementation monitoring aspects. The state level APIIATP and MI Department will prepare an annual action plan with year wise inputs and expected project outputs to facilitate performance tracking. Tracking of environmental degradation parameters during construction activities like soil deposits, water stagnation pockets etc. will be rested on project level organizations. Quality control activities during construction / renovation works will follow standard quality control manuals and will be scrupulously monitored by designated staff.

7.4. The designated Environment and Social Specialists shall be responsible for overseeing compliance of the sub-projects to Bank safeguards, GoI/GoAP regulations and applicable EMF and SMF guidelines. They shall also regularly review timely implementation of environment and social provisions as applicable. Corrective actions shall be initiated in a planned manner as appropriate to ensure compliance to the EMF/SMF measures. Broad types of monitoring and evaluation and the activities which they would entail are indicated in the following table.

Table 64: Types of Monitoring along with Specific Details for APIIATP

Type of Monitoring	Description	By Whom	Frequency
Progress Monitoring	Physical progress monitoring will be carried out with a view to identify activity progress, highlight constraints and good practices	Internal: At the WUA level, as a part of participatory monitoring, the Representative of WUAs, and SO would monitor progress of implementation and report to WUA and DPU. At the District level, DPU will monitor the implementation of Resettlement Action Plans, Tribal Development Plans, and Environmental Management Plan. The DPU will submit quarterly progress reports to PMU. At the state level, the PMU will monitor implementation of SEMF. Both at DPU and PMU levels the respective Social Environmental Units will be overall responsible for monitoring of implementation of the ESMF	Monthly/ Quarterly/ Annual
Impact/Outcome Assessments (Mid-Term and Final)	These would be undertaken at critical stages of the project and would aim at assessing the extent to which project has been able to achieve targeted indicators. This would be undertaken by en external agency	The monitoring of ESMF will be an integral part of the overall monitoring and learning system. The external agency will be given specific tasks for monitoring of EMF/SMF based on the indicators identified. The external agency would be responsible for impact/outcome assessment and environmental and social management audits	Mid Term/ End Term
Environmental Management Audits	Environmental management audits would be conducted at mid-term and end-term stages and would identify significant issues and impacts associated with the interventions such as strengthening and up gradation of tanks, dam safety, improving irrigation efficiency, crop diversification, productivity enhancement through climate resilient/adaptive sustainable agriculture production, technology promotion in fisheries etc. Mid-term Environmental Management Audit shall assess to what extent the expected results have been achieved and if any mitigation measures are needed. The final environmental management audit shall assess whether expected outcomes at baseline and mid-term have been achieved and mitigation measures proposed have been implemented	The monitoring of ESMF will be an integral part of the overall monitoring and learning system. The external agency will be given specific tasks for monitoring of EMF/SMF based on the indicators identified. The external agency would be responsible for impact/outcome assessment and environmental and social management audits	Mid Term/End Term
Social	Social management audits would		

Type of Monitoring	Description	By Whom	Frequency
Management Audits	be conducted at mid-term and end-term stages and would include beneficiary assessment, stakeholder analysis, social impacts, institutional assessments and risks analysis. The mid-term social management audit shall assess to what extent expected results have been achieved and mitigation measures if any. The final social management audit shall assess whether results expected at baseline and mid-term have been achieved and whether mitigation measures have been complied with		

7.5. Illustrative indicators that would be considered while undertaking monitoring of environmental and social aspects are suggested in the following table.

Table 65: Indicators for Monitoring

Desired Environmental and Social Outcomes	Illustrative Indicators	Frequency	Agency
Improved farmer incomes (especially for tribals and women)	▪ Increase in incomes for command area farmers (% increase based on stratified survey)	▪ Mid Term/End Term	▪ External Agency
Improved O&M of tanks	▪ MI Department Budget devoted to O&M (Rs/yr) ▪ Money collected by WUA for O&M (Rs/yr) ▪ Money used for O&M work (Rs/yr) ▪ Farmers aware of system O&M plans (% of survey ▪ respondents) ▪ Disputes settled by WUA (No.)	▪ Six monthly	▪ External Agency ▪ MI Department ▪ WUAs
WUAs/farmers are aware of water entitlements	▪ Farmers aware of water entitlements (% of survey respondents)	▪ Annual	▪ External Agency
Land acquisition/R&R issues addressed adequately (project affected families livelihood restored /improved)	▪ No. of families affected (No.) ▪ Average estimated income increase (Rs/yr) ▪ Interview feedback	▪ Six monthly	▪ External Agency ▪ MI Department ▪ Revenue Department
Tribal population are involved in tank management	▪ Number and percentage of tribal tanks covered under project	▪ Annual	▪ External Agency
Dam safety concerns addressed effectively	▪ Dam safety panel setup and operational ▪ Dam safety budget (Rs/yr) ▪ Dam safety activities completed (% completion by activity)	▪ Annual	▪ External Agency ▪ MI Department

Desired Environmental and Social Outcomes	Illustrative Indicators	Frequency	Agency
Meaningful consultation with and involvement of WUAs/farmers during project planning, implementation and evaluation	▪ No. of consultations with WUAs (No.) ▪ Gender and socio-economic break up of participants	▪ Six monthly	▪ External Agency ▪ MI Department WUAs
Sustainable agriculture and fisheries practices effectively promoted e.g., awareness building, IPM, INM, organic farming, water conservation, conjunctive use etc.	▪ Farmers trained on sustainable agriculture techniques (No.) ▪ Area under IPM (ha.) ▪ Area under INM (ha.) ▪ Area under Organic Cultivation (ha.) ▪ Pesticide residue for common pesticides (in representative ▪ IPM/other areas) by crop (levels and comparison with standards /guidelines) ▪ Area under drip/sprinkler (ha.) ▪ Land productivity estimate (Rs/ha) ▪ Water productivity estimate (Rs/cubic meter) ▪ Sustainable fishery value (Rs/yr) ▪ Problems with exotic species introduction (No.)	▪ Six monthly	▪ External Agency ▪ Agriculture Department ▪ Horticulture Department ▪ Fisheries Department ▪ MI Department ▪ WUAs
Silt and weeds effectively managed	▪ Silt safely disposed (tons and % of total silt excavated) ▪ Weeds safely disposed (tons)	▪ Six monthly	▪ External Agency ▪ MI Department
Cultural property, wherever affected, are restored in consultation with the stakeholders	▪ Cultural property restored (number) ▪ Complaints on cultural property adversely impacted by project (number)	▪ Six monthly	▪ External Agency ▪ MI Department
Natural habitat, wherever affected, are restored in consultation with the stakeholders	▪ Natural habitat restored (number) ▪ Complaints on natural habitat adversely impacted by project (number)	▪ Six monthly	▪ External Agency ▪ MI Department
Special issues relating to tribals and other vulnerable groups (including women) effectively addressed and they have access to project benefits Tribal/women and other vulnerable groups are actively involved in WUA activities	▪ Benefits to tribal groups (Rs.) ▪ Benefits to landless (Rs.) ▪ Benefits to women-headed households (Rs.) ▪ Representation of women in WUA Managing Committees (%)	▪ Six monthly	▪ External Agency ▪ MI Department ▪ Women and Child Development Department ▪ Tribal Welfare Department

7.6. These indicators will be collected and reported at appropriate intervals as indicated above as part of the regular project reporting. Project authorities will use this information to aid adaptive management to ensure that targeted environmental and social outcomes are achieved.

Environmental and Social Framework Budget

7.7. The budget for ESMF has been proposed in Table 65. These are reflected in the cost tables of APIIATP.

Table 66: APIIATP: Environmental and Social Framework Budget

Head	Duration	Monthly Rate (Rs/lakh)	Total Cost in Rs/lakh
A. Human Resource			
Senior M&E Expert	6 years (or project period)	12.00	72.00
Environmental Safe Guard Expert	6 years (or project period)	9.60	57.60
Social and Institutional Development Expert	6 years (or project period)	9.60	57.60
Capacity Building and Communication Expert	6 years (or project period)	9.60	57.60
Agronomist	6 years (or project period)	9.60	57.60
Agri-Business Expert	6 years (or project period)	9.60	57.60
Senior Fisheries Expert	6 years (or project period)	9.60	57.60
Sub-total A			***417.60***
B. Capacity Building – Staff & Beneficiaries			
State level capacity building for nodal officers in line departments on safeguards	2 main training in first year		2.00
	2 refresher training every year from second year onwards		8.00
Beneficiary training (covering all line department's activities, excluding cost of inputs)	Lump sum		20.00
Outreach Action & Materials for PMP, Agri-markets, agriculture, horticulture, fisheries, livestock, posters and handbooks, films etc. – designing and printing	Lump sum		30.00
Sub-total B			***60.00***
3. Special Support to Activities and Programmes under ESMF (Eg. Support to Common Interest Groups by Women, Tribals etc)	Lump sum		**150.00**
Sub-total C			***150.00***
D. Monitoring			
Monitoring of environmental parameters (during implementation phase – after construction phase)	Lump sum		20.00
Monitoring visits by nodal officers of line department, etc (only local travel)	Lump sum		20.00
Sub-total D			***40.00***
Grand-Total			**667.6**

Grievance Redressal Mechanism

7.8. Grievance Redressal Mechanism (GRM) is one of the important tools for project management where major stakeholders are public community having diverse socio-economic status. The grievance redress process will be a continuous, transparent and participatory process that would be an integral part of the project's accountability and governance agenda. The institutional arrangement proposed in the project needs to ensure that the concerns of all the project beneficiaries and stakeholders are addressed and accommodated in a comprehensive manner.

GRM at Project Implementation Unit, AIIATP

7.9. A GRM will be in place for addressing social, environmental and project related grievances. The GRM will have multi-level structures and processes. An Executive Committee for Grievance Redressal would be set up at the state level and would be chaired by the Principal Secretary, DoWR. This Committee would meet once in every six months and be in charge of overall appeals and supervision of grievance redress.

7.10. A Project level Grievance Redressal Committee (GRC) would be up at the state level and will be housed within the PMU. It would be headed by the Project Coordinator and would convene monthly meetings. This Committee would prepare six monthly reports and submit to the Executive Committee.

7.11. A District level Grievance Redressal Committee headed by the District Project Directors would supervise addressal of grievances and would meet once every month. The Committee would submit quarterly reports to the District Collector.

7.12. Efforts would be made to create awareness about GRC mechanism to the beneficiaries through use of flyers and pamphlets at the village, clock and district levels. The GRC will receive and redress all complaints and grievances that relate to project implementation that are formally brought to the GRC by individuals and groups of individuals.

Scope of GRC

7.13. The GRC will receive and redress grievances and complaints that are formally brought to the GRC in writing by the persons and/or group of persons who have a grievance because of the project's adverse impact on him/her and them. The grievance would, among others, relate to payment of compensation and involuntary resettlement assistance to all project affected persons in accordance with the eligibility criteria as set out in this RPF.

Process of GRC

- The GRC will receive all grievances/complaints and enter them in the Grievance Register;
- The GRC will work out a timeframe to redress grievances/complaints if such grievances/complaints are not redressed during the first meeting;
- The GRC will acknowledge receipt of all grievances/complaints, by registered post,
- The GRC will consider and redress grievances/complaints through public and transparent process in which all those who have lodged their grievances and complaints in order to facilitate transparency and accountability;

- The GRC will communicate its decisions/redress in writing to the complainants within a time limit depending on the nature of complaints and
- The GRC decisions are not the final and the grieved and complainants have the right to seek judicial redress if they are not happy with the decisions of GRC. But it should not the paraphrase the constitution fundamental rights.

7.14. Names and contact details of all District Project Directors would be communicated to the community along with the process of registering grievances which would include the following steps:

- Open House at the Mandal/ Division and District levels
- By ordinary/registered/speed post addressed to concerned DPD of their area
- Through the Online portal

7.15. Complaints/Grievances Register will contain (a) Serial Number; (b) Case Number; (c) Name of the Grieved/Complainant; (d) Name of Father/Husband; (e) Gender (f) Age; (g) Full Address; (h) Brief details of grievance/complaint; (i) List of documents, if any, attached; (j) Details of previous grievance/complaint, if any; (k) Date of receipt of grievance/complaint and (l) Date of acknowledgement of grievance/complaint.

7.16. When closing the complaint, agreement should be made with the complainant on remedy, and both parties should sign their approval of the case being closed and outcome accepted. Copies would be kept in both hard copy and electronic by both parties.

Right to Seek Legal Redress

7.17. The grieved/complainant will have the right to seek legal redress through the judicial system if he/she or they are not satisfied with the decisions of the GRC. The option of seeking redress through the GRC or through the judicial system will be explained to project affected persons during the process of public consultation and participation. But it should not paraphrase the constitutional fundamental rights.

7.18. The GRM will also be backed up legislatively by Right to Information (RTI) Act as well as other provisions such as recently launched women's helpline and Vishakha guidelines.

- The Sexual Harassment at workplace Bill was passed by the Lok Sabha on 2 September 2012 and is now known as The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013. It defines sexual harassment as laid down by the Supreme Court in the Vishakha and others v State of Rajasthan (1997) case.
- Government of AP has launched the toll free helpline 181 for women in distress. Calls received on the toll free number 181 will be connected to a call centre manned by the 'One Stop Crisis Centre' and from there, it will be transferred to the Police Control Room helpline (100) and emergency medical ambulance service (108), depending on the nature of the complaints
- Right to Information (RTI) is an Act of the Parliament of India to provide for setting out the practical regime of right to information for citizens and replaces the erstwhile Freedom of information Act, 2002

Conclusion

7.19. This chapter discussed the M&E system that would be adopted by the project and would allow for timely corrective action. The specific levels of monitoring and possible indicators were laid down. The structure and processes of the proposed grievance redressal mechanisms were also discussed.

Chapter Eight: Consultation and Disclosure

Introduction

8.1 The disclosure workshop aims at sensitising the village people about the major findings of the ESMF study along with the possible planned intervention. The workshop provides a healthy platform where the villagers who are the primary beneficiary of the project get to interact with the project management unit and discuss regarding their expectations, queries and suggestions.

8.2 For this project of Andhra Pradesh Integrated Agriculture Irrigation Transformation Project, two disclosure workshops were conducted i.e. one at the district level and the other at the state level. The district level disclosure workshop was organised on 28th November 2017 in Similiguda Tank of Visakhapatnam district. The people from Project Management Unit, ESMF Agency, people from various departments (Agriculture, Horticulture, Fisheries etc.) and the village people were the major participants in this workshop.

8.3 Further the State Level Disclosure Workshop was conducted in the Office of the State Project Director, CADA, Water Resource Department, Vijayawada on 21st December 2017. The workshop was attended by Village people from adjacent districts, officials from line department, Superintendent Engineer, State Project Director and other officials of CADA.

District Level ESMF Disclosure Workshop

Background

A district level ESMF Disclosure Workshop was organised to share the findings of the ESMF Draft Report prepared by Sutra Consulting at Similiguda, Araku Valley, Visakhapatnam district.

Similiguda tank located is located on near the Visakhapatnam to Araku Valley road. Similiguda tank has 180 ha ayacut. The Ayacutdars live in three habitations – Basebeda, Gadyaguda, and Similiguda – and all the 55 tribal families have land in the ayacut.

Despite being the peak paddy harvesting season, 42 farmers, including 10 women farmers participated in the meeting after a morning session in their fields. There were also 28 secondary stakeholders including representatives of all the departments participating in the implementation of APIIATP, PMU experts and Consultants (See Annexure XIII for list of workshop participants).An executive summary of the draft ESMF study report (in Telugu) was distributed to all the participants.

The Executive Engineer/DPD, APIIATP welcomed all the participants to the disclosure workshop. He explained the broad objectives and components of the APIIAT Project.

After self -introduction by the participants, the proceedings began with the objectives and schedule of the Workshop being explained. Farmers were encouraged to ask questions, seek clarifications and clear doubts, and give suggestions. PMU Expert broadly summarised the objectives and components of the APIIATP.

Agenda for Disclosure Workshop

The table below shows the agenda for conducting the district level disclosure workshop.

Time	Details	Responsibility
9.30-10.00	Registration of participants	Sutra
10.00-10.10	Welcome address	DPD, Visakhapatnam
10.10-10.20	Introduction and Workshop Objectives	PMU
10.20–10.30	About APIIATP and overview of the study	PMU
10.30-11.00	Study findings on Environmental concerns and activities proposed	Sutra
11.00 -11.15	Brief discussion on the presentation	PMU
11.15-11.30	Tea & Snacks	
11.30-12.00	Study findings on Social concerns and activities proposed	Sutra
12-00 -12.15	Brief discussion on the presentation	PMU
12.15 -12.30	Gender & Tribal concerns and activities proposed	Sutra
12.30-12.45	Brief discussion on the presentation	PMU
12.45 -13.00	Feedback from farmers and participants on ESMF	PMU/Sutra
13.00-13.20	Summarizing the workshop proceedings	PMU/Sutra
13.20-13.25	Vote of thanks	PMU
13.30-14.00	Lunch	

Overview of Sessions

After the arrival of the DPD and other officials from different department, the discussion began by welcoming the village people and all other stakeholders of the project by one of the PMU members. Further the village people were told about the purpose and objectives of the workshop.

Session 1. Summary of the APIIATP ESMF Study

Consultants from Sutra Consulting presented an overview of the APIIAT project and the ESMF study which was conducted during May-November 2017.

The major objective of the ESMF study of 18 sample project tank villages is the development of an Environmental Management Framework (EMF) and a Social Management Framework (SMF) that would ensure that environmental and social considerations are fully mainstreamed in project planning, implementation and monitoring; and Potential adverse impacts are adequately mitigated and potential benefits are enhanced to improve effectiveness and sustainability.

The main purpose of study is to identify concerns and address measures to avoid and minimize environmental and social impacts; and where they cannot be avoided, ensure that the impacts are adequately identified/ assessed; and necessary mitigation measures are designed and implemented following relevant environmental and social legislations of Government of India (GoI), GoAP and the World Bank's safeguards policies.

Session 2: Environmental concerns and activities proposed

Further the discussions included the major environmental findings in the respective tanks which included:

- Surface water quality,
- Tank bed sediment quality and use
- Forest and biodiversity,
- Floristic diversity,
- Fish diversity,
- Water logging,
- Water quality – implications for irrigation and consumption
- Plant nutrient management
- Fertilizer use – chemical and bio-fertiliser use
- Pest management – chemical and bio-pesticide use

Major mitigation measures proposed to address Environmental Concerns and Challenges explained were:

- Dam Safety Plans,
- Siltation and Sedimentation,
- Integrated Nutrient Management – Chemical and bio-fertiliser use
- Integrated Pest Management – Chemical and bio-pesticide use

Key Points of Discussion

After the presentations by the Consultants, participants provided feedback and suggestions. Department Representatives further explained specific aspects of the relevant sub-components during the discussions.

Villagers actively participated and raised their queries and also provided suggestions on various aspects. The major points raised and suggestions given during the interactive session are summarised below:

Environmental aspects:

- ***Waste disposal into tank system:*** The farmers and villagers need awareness generation program on the hazardous implications of dumping non-degradable waste into the tank, tank bund and into the water body and how it will adversely affect the environment and their health.

- ***Waste disposal from tourist traffic:*** Being a tourist area, awareness creation is needed among tourists not to throw away the used plastic plates, glass bottles etc. on the road side fields. Participants and farmers opined that there is urgent need to focus on awareness creation among the tourists to stop throwing all kinds of waste material on the road which create environmental pollution and hazards.

- ***Support/awareness to farmers on management of the plastic waste****:* Participants opined that farmers needs awareness on maintenance of tank bund and bed cleanly for protection of environment.

- ***Protection of Cultural property in the process of development of tank systems****:* Participants and farmers suggested to create awareness to avoid damages of cultural property in tank systems.

Tank Systems Improvement

- It was opined that the unit cost for taking up tank system improvement works in agency areas may be higher compared to works in plain areas due to different terrain.

Ground Water Management

Similiguda farmers already use borewells for supplementary irrigation. Several suggestions were made by participants.

- ***Providing bore wells:*** Due to insufficient water flow to tail end farmers, farmers suggested to provide borewells so that they can cultivate horticultural crops, which need less water. This would improve their financial condition.
- ***Provision for providing solar diesel motors for upper lands:*** To reduce power consumption participants suggested providing solar powered motors for borewells.
- ***Community Borewells specially to grow second crops:*** Participants suggested to study feasibility of providing community borewells for a second crop cultivation.
- ***Infra structure for conjunctive use:*** Participants suggested to provide infrastructure facilities for conjunctive use by introducing participatory groundwater monitoring (Measure borewell yield, water level measuring equipment etc. Introduce crop water budgeting

Agriculture

- ***Promotion of Green manures***: Farmers suggested making farmers aware about the importance of green manure and facilitating them to use instead of chemical fertilizers.
- ***Promotion of water saving technologies:*** Farmers and other participants suggested to initiate water saving technologies among the farmers for effective utilization of water and increase water use efficiency, which is the goal of national water policy.
- ***Controlling of water through mechanization:*** Participants suggested to facilitate the farmers to go for mechanization to control water, i.e. installation of gauges and water regulating system.
- ***Conjunctive use of water:*** An important suggestion came from the farmers and other participants for conjunctive use of water as essential to improve the ground water table.
- ***Promotion of SRI:*** Participants suggested to promote SRI paddy cultivation which needs less water and more yield (more crop per drop concept)

- ***Introduction of new crops like Sweet corn, potato:*** Farmers are interested to know more about the cultivation of new commercial crops such as sweet corn and potato. They requested for getting more knowledge on commercial crops.
- ***Agriculture marketing is important and need to be strengthened :*** Farmers told that they are facing problems to market their produce and suggested to make marketing arrangements and tie ups to increase their income. Also suggested to provide storage facility to keep their produce
- ***Promotion of IPM and INM practices:*** During the discussions, farmers informed that they are using chemical fertilizers and pesticides in good quantities. To reduce the fertilizer and pesticide applications, there is need for awareness program on INM and IMP practices.

Horticulture

- ***Promotion of floriculture:*** Farmers told that they will get good returns from floriculture. So, they would like floriculture to be promoted. It gives value addition also (for bouquets, flower arrangements for functions etc.)
- ***Promotion of vegetables/fruits (Tissue culture banana, Sapota, Custard apple, Pineapple, ginger, turmeric):*** Participants suggested the farmers to increase vegetables/fruit crops cultivation for increased financial benefits.
- ***Cold Storage units:*** Farmers informed that they are not having cold storage facility. If it is available they can store their produce until they get the good price. So farmers suggested establishing a cold storage facility under the project.
- ***Marketing Kiosks for display of their produce as Araku area is a tourist place:*** Participants suggested that Araku is a tourist place. So many people visited this place. If marketing kiosks established in this place farmers can display their products and will get good income
- ***Market tie ups*** is crucial for farmers. To get good value for their produce there is a need to arrange market tie ups. So, participants and farmers suggested for marketing tie ups.
- ***Promotion of drip technology for fruits, vegetables and floriculture as required:*** Participants suggested promoting drip technology for vegetables, floriculture, fruits etc., to save water.

Fisheries

- ***Kiosks to sell fish periodically, get additional income:*** Participants suggested to establish Kiosks for selling fish for additional income.
- ***Fish culture in tanks as source of income generation:*** Fish rearing is also a major income source from the tanks. So, participants suggested initiating fish culture in the tanks as an income generation activity.
- ***Promotion of efficient production technologies like construction of captive fish seed nurseries:*** Participants suggested to provide awareness on production technologies on fishery activity like construction of captive fish seed nurseries to get huge amount from this activity.

Session 3: Social concerns and activities proposed

The Consultant explained the current status and future role of the direct and indirect stake holders at various levels of project implementation: village/tank level, panchayat level, subdivision level, district level, and state level.

The major social issues and concerns found in the SMF study were explained:

- Dominance by Economically and Socially Better-off Groups
- Vulnerability of ST Groups
- Inadequate Representation of and Participation by Women
- Composition of WUAs and its Committees
- Functioning of WUAs and its Committees
- Inadequate Capacity Building Efforts for WUAs and Members
- Limited Financial Capacity of WUAs
- Conflict Resolution
- Political Influence over Project Activities

The important mitigation measures proposed are:

- Inclusion and Equity
- Participation and Cohesion
- Transparency and Accountability
- Focus on Tribal Development
- Focus on Gender
- Capacity Building
- Emphasis on conflict resolution systems
- Convergence across departments
- Sense of ownership and sustainability

Suggestions by Participants

The major suggestions by the participants are:

- Need for awareness campaigns, trainings and exposure visits on Agriculture and Horticulture aspects for farmers
- Need to develop marketing linkages for obtaining good price for farm produce
- Support required in WUA book keeping
- Also, suggestions focused on awareness programmes, trainings to the newly elected MC members and farmers about their roles and responsibilities, book keeping and record maintenance and improved practices of Agriculture and Horticulture crops.

- Another major point raised during the discussion was on assuring representation of women in WUA executive committees. Participants pointed out that traditionally women play major role in all aspects of agriculture, but they are limited to work in the fields and can use their voting rights. They are not allowed to participate in the meetings and no decision making powers observed in any tank and they are also not elected to represent in MCs. Even the very few women, who are elected as MC members, are not allowed to express their views. Therefore, participants suggested that women should be represented in the MC as either as President or as Vice President and

should have decision making power. Women representatives' presence should be ensured in regular WUA meetings.

The workshop closed with a vote of thanks by a PMU Expert followed by lunch for all participants.

State Level ESMF Disclosure Workshop

Background

The State Level Disclosure Workshop was conducted in the Office of the State Project Director, CADA, Water Resource Department, Vijayawada on 21st December 2017. The workshop was attended by 35 stakeholders including WUA representatives from adjacent districts, officials from line departments, APIIATP DPU/PMU Members, and other officials of CADA. The workshop sessions were chaired by the Superintendent Engineer, APIIATP. The State Project Director facilitated the session on "Feedback from farmers and participants on ESMF".

The State Project Director interacting with a WUA Representative

The Workshop began with a welcome note for WUA Representatives and all other participants by a PMU member. Participants then introduced themselves. The Superintendent Engineer, PMU, APIIATP made a brief presentation on the purpose of the workshop and provided an overview of the objectives and the four main components of the project. She explained the significance of the Environmental and Social Management Framework in the planning and design of the project and the role of disclosure of the draft findings of the Study conducted by the Consultants appointed for the purpose. She asked the participants to give their considered views and suggestions on the key findings of the ESMF Baseline study to be presented in the following sessions of the workshop.

Superintending Engineer explaining the objectives and expected outputs of the Workshop

Agenda for the State level ESMF Disclosure Workshop

Time	Details	Responsibility
9.30-10.00	Registration of participants	PMU
10.00-10.10	Welcome address	SPD, APIIATP
10.10-10.30	Introduction and Workshop Objectives, About APIIATP and overview of the study	PMU
10.30-11.00	Study findings on Environmental concerns and activities proposed	Sutra
11.00 -11.15	Brief discussion on the presentation	PMU
11.15-11.30	Tea & Snacks	
11.30-12.15	Study findings on Social concerns and activities proposed	Sutra
12-15 -12.30	Brief discussion on the presentation	PMU
12.30 -1.15	Gender & Tribal concerns and activities proposed	Sutra
1.15 – 1.30	Brief discussion on the presentation	PMU
1.30 – 2.30	Lunch	
2.30 – 3.30	Feedback from farmers and participants on ESMF	PMU/Sutra
3.30 – 3.50	Summarizing the workshop proceedings	PMU/Sutra
3.50 – 4.00	Vote of thanks	PMU

Overview of Sessions

Session 1. Summary of the APIIATP ESMF Study

Consultants from Sutra Consulting presented an overview of the draft findings of the ESMF study which was conducted during May-November 2017. An executive summary of the draft report (in English and Telugu) was distributed to the participants.

The major objective of the ESMF study of 18 sample project tanks is the development of an Environmental Management Framework (EMF) and a Social Management Framework (SMF) which would ensure that environmental and social considerations are fully mainstreamed in project planning, implementation and monitoring. EMF, SMF and associated plans provide the basis for adequately

mitigating the anticipated adverse effects and for enhancing the potential benefits to assure effectiveness and sustainability of project interventions.

The main purpose of study is to identify concerns and address measures to avoid or minimize adverse environmental and social impacts; and where they cannot be avoided, ensure that the impacts are adequately identified/ assessed; and necessary mitigation measures are designed and implemented following the relevant environmental and social legislations of the Government of India (GoI), GoAP and the World Bank's safeguards policies.

Session 2: Environmental Concerns and Activities Proposed

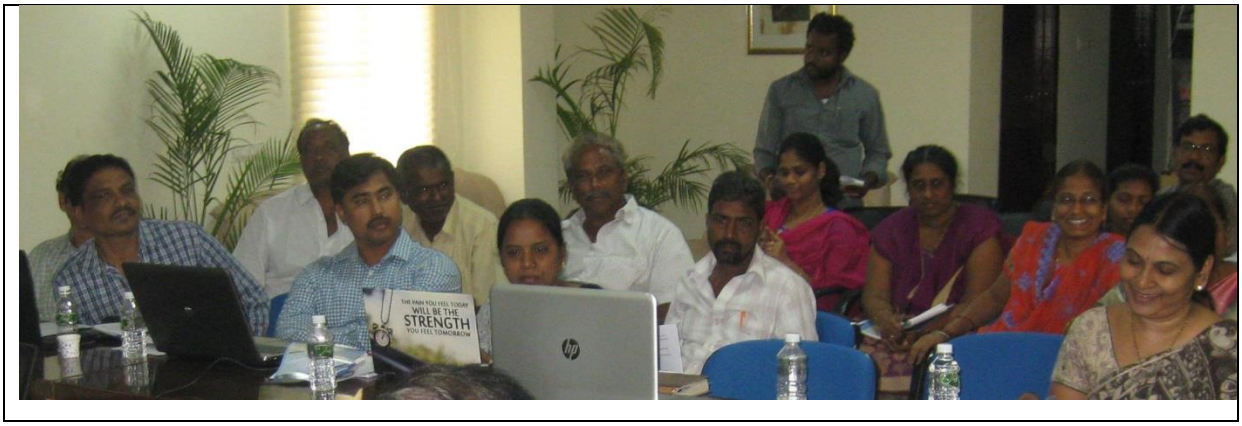
The major findings on environmental aspects of the 18 sample tanks were explained and the mitigation measures proposed were briefly presented:

Environmental aspects	Mitigation measures proposed
▪ Water quality - Implications for irrigation and consumption; Plant nutrient management ▪ Tank bed sediment quality and use ▪ Forest and biodiversity ▪ Fish diversity, ▪ Water logging, ▪ Fertilizer use – chemical and bio-fertiliser use ▪ Pest management – chemical and bio-pesticide use	▪ Dam Safety Plans ▪ Siltation and Sedimentation ▪ Integrated Nutrient Management – Chemical and bio-fertiliser use ▪ Integrated Pest Management – Chemical and bio-pesticide use

Session 3: Social Concerns and Activities Proposed

The discussion went on about the Social Assessment where the experts from external agency spoke about the direct and indirect stake holders in village/tank level, panchayat level, subdivision level, district level, and state level. The major social issues of concerns discussed are:

Social aspects	Mitigation measures proposed
▪ Dominance by Economically and Socially Better-off Groups ▪ Vulnerability of ST Groups ▪ Inadequate Representation of and Participation by Women ▪ Composition of WUAs and its Committees ▪ Functioning of WUAs and its Committees ▪ Inadequate Capacity Building Efforts for WUAs and Members ▪ Limited Financial Capacity of WUAs ▪ Conflict Resolution ▪ Political Influence over Project Activities	▪ Inclusion and Equity ▪ Participation and Cohesion ▪ Transparency and Accountability ▪ Focus on Tribal Development ▪ Focus on Gender ▪ Capacity Building ▪ Emphasis on conflict resolution systems ▪ Convergence across departments ▪ Sense of ownership and sustainability



Session 4: Key Points of Discussion

The State Project Director joined the workshop and interacted with the WUA representatives, and other participants in the workshop. He invited suggestions from all the participants to improve and finalise the ESMF Study Report.

The WUA representatives and department staff raised a number of queries and gave several suggestions. The major points raised are summarised below sector wise:

Department/Sector-wise Suggestions
Agriculture
▪ Standard charts shall be used for calculating the baseline values on technical issues ▪ Make the issues identified and mentioned in the report tank specific. Mention the name of the tank and other details for Mid-term and End of Project ESM Audit. ▪ It is informed that "GIS environment for effective dissemination " is not possible in INM ▪ IPM and INM practices mentioned need to be clearly specified in the report ▪ It is suggested that women involved in agriculture labour may be provided with tools/ mini-machines and protective clothes to lessen the workload and drudgery and to safeguard them from exposure to pesticides. ▪ Agriculture Department may consider promoting WUAs as Farmer Producing Organizations (FPOs) and nurture them to take-up collective marketing ▪ In a majority of the tanks agriculture season is only for 6 months. Hence, WUA members meet only during that agriculture season to discuss various issues related to tank and water management. The Water Resource Department in coordination with Agriculture and Allied departments can conduct various capacity building and tank management exercises during the slack period so that members can meet regularly.
Fisheries
▪ The Fisher Community need to adopt cage culture wherein they need to grow fish up to one kg and later shift to tank so as to get better production and incomes. The Water Resources Department need to consider providing necessary support to the farmers to adopt cage culture ▪ Women involved in fish marketing may be provided with protective clothes and tools to safeguard their health from infection and to maintain hygiene and to reduce drudgery. ▪ Farmer representatives requested that they be permitted to and to assist them in converting water logged areas to fish ponds

Department/Sector-wise Suggestions
Water User Association - Representation
▪ It was suggested that in order to increase the representation of women in WUA Committees, family as a unit may be taken into account for representation instead of only ayacutdars. ▪ Women farmers may be encouraged to get elected to the sub-committees. Among the two co-opted members, one may be a woman. ▪ The Managing Committee members are asked to take up many tank rehabilitation works such as desilting, jungle clearance, sluice repairs etc. The members who take up the works require to work with Water Resource Department Staff. As works execution requires huge investments, the poorer sections are reluctant to come forward to take up works. The Water Resource Department should see that Managing Committee members are involved not only in planning, monitoring and evaluation of tank management activities but also in execution of certain works within fiscal thresholds.
Water User Association - Capacity Building
▪ The Water Resource Department can emulate the Rural Department models with regard to institution and capacity building where adequate support mechanism is provided at village, sub-division and district levels to support village level women groups and federations (Book keepers and Trainers at different levels) . ▪ Training material for tribal communities shall be prepared in local dialect. ▪ Project shall ensure that SO staff recruited in tribal areas shall be well versed with the tribal culture and language. ▪ Along with Awareness Campaigns, Exposure Visits are also necessary in order to encourage sustainable farming methods.
Gender
▪ It is suggested that the proposal to have 30% of women paraworkers may be re-looked at. ▪ Based on the percentage of the women ayacutdars, appropriate achievable target may be fixed. ▪ Exclusive trainings and exposure visits for women farmers in tribal and gender tanks shall be planned
Environmental
▪ The terminology used in the Environmental chapter in the ESMF report need to be accurate. A ▪ Sutra Consulting should consult with the technical staff of the project to use appropriate terms. ▪ Sutra Consulting is also asked to present the detailed tankwise findings in the Report and its annexures.
Tank Systems Improvement
▪ There is insufficient treatment of land in tank catchment area. ▪ Water harvesting structures are constructed in catchment areas of the tanks by Rural Development or Forest Department on a large scale. ▪ The Water Resource Department needs to examine the need for further treatment of catchment areas to avoid soil erosion and tank sedimentation. Works may be carried out in conjunction with the line departments.
Capacity Building of Farmers
▪ Awareness campaigns, trainings and exposure visits on Agriculture and Horticulture aspects ▪ Marketing linkages

Department/Sector-wise Suggestions
▪ Support in WUA book keeping ▪ Encourage higher representation of women in WUA Managing Committee of WUAs. ▪ Farmers are not willing to cultivate alternative crops instead of paddy in the Kharif season as soils are not suitable due to water logging ▪ Farmers expressed their willingness for alternative crops in rabi season.
General
▪ The Grievance redressal mechanism suggested at state level shall be modified by replacing the Principal Secretary, DoWR, as chairman for the Grievance Committee with the State Project Director, APIIATP ▪ PMU team to define the selection criteria for the Tribal and Gender tanks based on the APCBTMP guidelines where in > 10 -50 % of women ayacutdars shall be considered as gender and tribal tanks. ▪ It is further requested to furnish the possible reasons in the report for each of the issues identified. E.g., – Reasons for not attending the meetings, not maintaining the records etc. ▪ SUTRA Team is asked to submit revised EMP/EMF immediately for incorporation in the DPR/BID document.

ANNEXURE I

A. Gender Action Plan

Need for a Gender Action Plan

Women play a critical role in rural economies and in most parts of the developing world participate in crop production and livestock care, provide food, water and fuel to their families and engage in off-farm activities to diversify their families' livelihoods. In addition, they carry out vital care giving functions for children, older persons and the sick. Rural women however do not form a homogeneous group; there are important differences based on class, age, marital status, ethnic background and religion. To understand the situation of rural women, it is necessary to examine the full diversity of their experiences in the context of the changes in the economy, social structure, patterns of livelihood and division of labour.

Gender Action Plan (GAP) acts as a key tool and mechanism for ensuring gender-inclusive design and implementation of projects. It provides a road map for project implementation, monitoring and evaluation in a gender balanced manner. The major objectives of the Gender Action Plan include increased participation by women in project activities; equitable access to project resources including trainings, technology and other services; improved practical benefits such as increased income, greater financial security and more livelihood opportunities; and progress towards gender equality, including changing household decision making patterns, membership or leadership in community based organisations and increased mobility. It is in this context that a Gender Action Plan has been developed for the APIIAT project.

Overview of Status of Women in Andhra Pradesh

This section discusses the status of women in Andhra Pradesh based on secondary data available on key indicators. Traditionally southern states of the country have demonstrated better performance with regard to gender based indicators and parameters compared to states in others parts. This holds true in case of Andhra Pradesh with the state recording indicators most of which are better than the national averages.

The sex ratio in Andhra Pradesh stood at 996 females per 1000 males as per Census 2011; higher than the national average of 926 females per 1000 males. The districts of Visakhapatnam, East Godavari, West Godavari and Guntur recorded a progressive trend moving from the below 1000 category to above 1000 between 2001 and 2011. The SC and ST population in the state recorded sex ratios higher than the state average at 1007 and 1009 respectively. The Child Sex Ratio (CSR) in the state stood at 944, higher than the national average of 919. However a comparison of the CSR in 2011 and 2001 indicates a worrying trend with the ratio declining from 964 in 2001 to 944 in 2011.

The Maternal Mortality Ratio (MMR) in the state has consistently improved in the period 2004-06 to 2011-13 with a decline from 154 to 92. In the same period the national MMR declined from 254 to 167 (Source: SRS Time Series). Infant Mortality Rate in the state has also registered a consistent improvement between 2001 and 2013 from 66 to 39. Urban IMR stood at 29 in 2013 and rural IMR stood at 44 (Source: SRS Time Series).

The literacy rate in Andhra Pradesh stood at 67.4 percent as per 2011 Census. Male literacy stood at 74.8 percent while female literacy was lower at 59.2 percent. It must be noted that female literacy rate for the state in 2011 was lower than the national average female literacy of 65.46 in the same period.

Gender Related Legislations, Policies and Schemes

Empowerment is a multi-faceted, multi-dimensional and multi-layered concept. Women's empowerment is a process through which women gain greater share of control over resources-material, human and intellectual. According to a Report of the Government of India, "Empowerment means moving from a position of enforced powerlessness to one of power"[4]. In this process, women should be enabled socially, economically, educationally and politically which would help them take decisions regarding their health, education, mobility, economic independency, political participation and other such aspects.

India has passed several women sensitive legislations and implemented a number of programmes and schemes for women's well-being and emancipation. Article 15(1) of Fundamental Rights specifically prohibits any kind of discrimination on the basis of sex. Article 51 (A) (e) of Fundamental Duties asks that the citizens of the country to promote harmony and the spirit of common brotherhood amongst all the people of India and renounce practices derogatory to the dignity of women. The Government has given greater focus to issues relating to women through creation of an independent Ministry of Women and Child Development, initiation of legislations, gender budgeting and implementation of programmes for greater inclusion of women in all walks of life. The following table lists key gender related schemes and policies of the Government of India.

Andhra Pradesh is one of the few States in the Country, where a separate Department in the Secretariat is functioning to look after the Welfare of Women, Children, Disabled and Senior Citizens. One of the important objectives of the Department is to reduce malnutrition especially among women and children by implementing the flagship programme of ICDS (Integrated Child Development Services). The other important objective is to ensure protection of women and children through empowerment and legal and institutional support. The main functions of the Women Development, Child Welfare and Disabled Welfare Department are:

i. Encourage enrolment of girls in schools and Reduce school dropouts among girl
ii. Support Non-Governmental Organizations (NGOs) under a variety of programmes in order to facilitate and strengthen their role in empowering women through education and training
iii. Enable women to realize their hidden and unexplored strengths, build their self-esteem and improve their living conditions
iv. Help women attain financial freedom and economic independence
v. Implement Supplementary Nutrition Programmes to provide nutrition to pregnant women, lactating mothers and children
vi. Promote adoption of family planning norms

[4]Government of India, "Fourth World Conference on Women", Beijing 1995 Country Report, Department of Women and Child Development, Ministry of Human Resource Development, 1995, P. 116

Table 1: Relevant Acts, Policies and Schemes: Government of India

Sl.	Policy / Scheme	Policy / Scheme Description
1.	National Policy for Women (Draft), 2016	This policy aims to create an effective framework to enable the process of developing policies, programmes and practices which will ensure equal rights and opportunities for women in the family, community, and workplace and in governance. Mainstreaming gender in all-round development processes/programmes/projects/ actions is an objective. A holistic and life-cycle approach to women's health for appropriate, affordable and quality health care is adopted. Stress is laid on improving and incentivizing access of women/ girls to universal and quality education and increasing and incentivising work force participation of women in the economy.
2.	Rashtriya Mahila Kosh	The aims and objectives of the Kosh are to undertake activities for the promotion of credit as an instrument of socio-economic change and development. This would happen through: – provision of package of financial and social development services – demonstration and replication of participatory approaches in the organization of women's groups for effective utilization of credit resources leading to self-reliance – promotion and support experiments in the voluntary and formal sector using innovative methodologies, – promotion of research, study, documentation and analysis – promotion of the federation and networking of women's organisations for shaping and exchange of experience and information – development of skills in response management & social mobilization – promotion and support of expansion of entrepreneurship skills among women – Promotion and support of grass-root level societies and organisations and other participatory structures for providing for women effective access to decision making.
3.	Mission for Protection and Empowerment for Women (Beti Bachao- Beti Padhao, one-stop center, women helpline, hostels, Swadhar Greh, gender budgeting etc.)	• The revised NMEW Scheme aims to achieve holistic empowerment of women through convergence of schemes/programmes of different Ministries/Department of Government of India as well as State Governments. Under the revised Scheme, technical support to Ministry of Women and Child Development is being provided by domain experts who are involved in the implementation and monitoring of new initiatives of the Ministry such as: • Beti Bachao Beti Padhao (BBBP Scheme) • One Stop Centre • Women Helpline • UJJAWALA: A Comprehensive Scheme for Prevention of trafficking and Rescue, Rehabilitation and Re-integration of Victims of Trafficking and Commercial Sexual Exploitation • Working Women Hostel • SWADHAR Greh (A Scheme for Women in Difficult Circumstances) • Support to Training and Employment Programme for Women (STEP) • Nari Shakti Puraskar • Rajya Mahila Samman & Zila Mahila Samman • Mahila police Volunteers • Mahila E-Haat • Mahila Shakti Kendras (MSK) • Mission for Protection and Empowerment for Women also facilitates convergence of schemes/programmes of different Ministries/Departments with focus on women. Some of the above mentioned initiatives have been

Sl.	Policy / Scheme	Policy / Scheme Description
		summarised as follows:
9A.	One Stop Centre	• This scheme is implemented under the larger Mission for Protection and Empowerment for Women in 12th Plan. The One Stop Centre will provide support and assistance to women affected by violence, both in private and public spaces. In case girls under 18 year of age are referred to the Centre, they will also be served in coordination with authorities/institutions established under the Juvenile Justice (Care and Protection of Children) Act, 2000 and Protection of Children from Sexual Offence Act, 2012. The centres will be integrated with the Women Help Line scheme to provide the range of services. Andhra Pradesh has been provided with funds in order to set up the one stop centre in Sk. Raja Sahib Municipal Maternity Home in Vijayawada during the financial year of 2015-16. • Making a special statement in the Legislative Assembly, Chief Minister N Chandrababu Naidu said, "non-combat training for girls would be made compulsory while 'Kanya Sakthi' teams would be set up in all junior and degree colleges in the state."
9B.	Women help Line	The Scheme of Universalisation of Women Helpline is intended to provide 24 hours immediate and emergency response to women affected by violence through referral (linking with appropriate authority such as police, One Stop Centre, hospital) and information about women related government schemes programs across the country through a single uniform number. On the occasion of International Women's Day in 2016, Government of Andhra Pradesh announced a number of schemes aimed at their empowerment, including opening an exclusive toll-free helpline '181' for women in distress.
9C.	STEP	MWCD, through its STEP Programme, has been addressing special situation of poor women and women in remote areas who are not in a position to move out of their immediate surroundings and go to a formal skill centre to acquire training. The STEP Programme a100% Central Sector Scheme is under implementation since 1986-87. Training is provided to poor and marginalized women in traditional trades which are largely in the informal sector. The programme strives to build upon the traditional knowledge of women and convert it into sustainable livelihood capacitation. The scheme has two fold objectives: o To provide skills that give employability to women. o To provide competencies and skills that enable women to become self-employed/entrepreneurs. STEP Guidelines 2014 are revised on the basis of learning of the rigorous process of scrutiny of thousands of proposals that were received in response to the 2014 Guidelines as well as the Gazette notification issued by the Ministry of Skill Development &Entrepreneurship and NITI Aayog's Guidelines for implementation of Centrally Sponsored Schemes/Central Sector Schemes through NGOs.
9D.	Mahila E Haat	The Ministry of Women & Child Development launched "Mahila E-Haat" a bilingual portal on 7th March, 2016. This is a unique direct online marketing platform leveraging technology for supporting women entrepreneurs/SHGs/ NGOs for showcasing the products / services which are made/manufactured/ undertaken by them. This start up at Rashtriya Mahila Kosh website leverages technology for showcasing products made/manufactured/sold by women entrepreneurs. They can even showcase their services reflecting their creative potential. This unique e-platform will strengthen the socio-economic empowerment of women.
9E.	Mahila Shakti Kendras	Government of India has approved a new scheme namely, Mahila Shakti Kendra for implementation during 2017-18 up to 2019-20 to empower rural women through community participation and to create an environment in which they

Sl.	Policy / Scheme	Policy / Scheme Description
		realize their full potential. It will provide an interface for rural women to approach the government for availing their entitlements also empowering them through training and capacity building.
4.	Gender Budgeting Scheme	Gender Budgeting (GB) is a powerful tool for achieving gender mainstreaming so as to ensure that benefits of development reach women as much as men. It is not an accounting exercise but an ongoing process of keeping a gender perspective in policy/ programme formulation, its implementation and review. GB entails dissection of the Government budgets to establish its gender differential impacts and to ensure that gender commitments are translated in to budgetary commitments. The rationale for gender budgeting arises from recognition of the fact that national budgets impact men and women differently through the pattern of resource allocation. Women, constitute 48% of India's population, but they lag behind men on many social indicators like health, education, economic opportunities, etc. Hence, they warrant special attention due to their vulnerability and lack of access to resources. The way Government budgets allocate resources, has the potential to transform these gender inequalities.
5.	Grant in Aid Scheme	Government's commitment to the promotion of voluntary efforts is reflected in the creation of Central Social Welfare Board in 1953 and the enlistment of Voluntary organisations for implementing programmes for a number of schemes such as working women's hostel, crèches, supplementary nutrition, etc. There are, however, a number of unchartered areas not currently covered by any of the existing schemes in which Voluntary organisations have evinced keen interest but it has not been possible for the Department of Women and Child Development to provide support for Such programmes because they are not covered by one of the approved schemes. Hence Government of India has initiated the Grant in Aid Scheme for the organisation who are interested in working for the welfare of women and children.
6.	The Sexual Harassment of Women at Work Place (Prevention and Protection) Act, 2013	The Sexual Harassment of Women at Work Place Act of 2013 (Vishakha Guidelines) makes it illegal to sexually harass women in the workplace. It talks about the different ways in which someone can be sexually harassed and how they can complain against this kind of behaviour. It is an Act to provide protection against sexual harassment of women at workplace and for the prevention and redressal of complaints of sexual harassment and for matters connected therewith or incidental thereto. Whereas sexual harassment results in violation of the fundamental rights of a woman to equality under articles 14 and 15 of the Constitution of India and her right to life and to live with dignity under article 21 of the Constitution and right to practice any profession or to carry on any occupation, trade or business with includes a right to a safe environment free from sexual harassment.
7.	Mahatma Gandhi National Rural Employment Guaranty Scheme, 2005	The Act was initiated with the objective of "enhancing livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year, to every household whose adult members volunteer to do unskilled manual work". It provides a legal guarantee of 100 days of employment in unskilled work to each household at scheduled minimum wages. Any member of the household, irrespective of gender, has the right to work under the scheme. Moreover, it reserves one-third of total employment to females. Further, it provides work within a radius of five kilometres from the place of residence and also provides child care facilities at the work site, making it especially attractive to females who may be may be averse to travelling long distances for work.Along with providing certain days of employment MGNREGA aims to create durable assets (such as roads, canals, ponds, wells). Employment is to be provided within 5 km of an applicant's residence, and minimum wages are to be paid. If work is not provided within 15

Sl.	Policy / Scheme	Policy / Scheme Description
		days of applying, applicants are entitled to an unemployment allowance. MGNREGA is to be implemented mainly by gram panchayats (GPs). The involvement of contractors is banned. Labour-intensive tasks like creating infrastructure for water harvesting, drought relief and flood control are preferred. MGNREGA has several provisions that address gender differences in wages in the casual labour market (GoI 2005).
8.	Domestic Violence Act, 2005	The Act provides for effective protection of the rights of women guaranteed under the Constitution who are victims of violence of any kind occurring within the family and formatters connected therewith or incidental thereto.
9.	National Policy for Empowerment of Women, 2001	The goal of the National Policy for Women Empowerment (2001) is to bring about the advancement, development and empowerment of women. Specifically, the objectives of this policy include -creating an environment through positive economic and social policies for full development of women to enable them to realize their full potential; The de-jure and de-facto enjoyment of all human rights and fundamental freedom by women on equal basis with men in all spheres – political, economic, social, cultural and civil; equal access to participation and decision making of women in social, political and economic life of the nation; equal access to women to health care, quality education at all levels, career and vocational guidance, employment, equal remuneration, occupational health and safety, social security and public office etc.; strengthening legal systems aimed at elimination of all forms of discrimination against women; changing societal attitudes and community practices by active participation and involvement of both men and women; mainstreaming a gender perspective in the development process; elimination of discrimination and all forms of violence against women and the girl child; and building and strengthening partnerships with civil society, particularly women's organizations.
10.	Gender Sub Plan	Under Eighth Five Year Plan (1992-97), for the first time in India, Planning Commission high-lighted for the need to ensure a definite flow of funds from the general developmental sectors to that of women. "The benefits of development from different sectors should not bypass women and special programmes on women should complement the general development programmes. The latter, in turn, should reflect greater gender sensitivity" as not much progress was made in terms of ensuring adequate flow of funds and benefits to women.
11.	Andhra Pradesh State Commission for Women, 1998	AP Women′s Commission is an autonomous body constituted to improve the status of women in the State of AP and to inquire into unfair practices affecting women and for matters connecting therewith or incidental there to & quot;. The AP Women's Commission Act was enacted by the Legislative Assembly of the State of AP and it was first published on 19.03.1999 in the AP Gazette for general information. Women′s Commission is headed by a Chairperson and has 5 Members. The Commission works as per the AP Women′s Commission Act 1998 and obtains 100% funds from AP State Government under Department of Women, Children, Disabled and Senior Citizen. Activities: • To study the laws in force for equality and fair treatment to the women • To monitor the working of laws pertaining to the women • To monitor the recruitment and promotions made in state and public sector duly giving equal opportunities to the women • To inspect women jails, Hostels, Homes, Shelter homes etc • To report to the Govt. about unfair practices towards women/girls duly action • To study and recommend to the Govt. about welfare measures to be adopted and implemented by the Govt

Sl.	Policy / Scheme	Policy / Scheme Description
12.	National Commission for Women Act, 1990	The National Commission for Women was set up as statutory body in January 1992 under the National Commission for Women Act, 1990 (Act No. 20 of 1990 of Govt. of India) to: • review the Constitutional and Legal safeguards for women; • recommend remedial legislative measures; • facilitate redressal of grievances and • advise the Government on all policy matters affecting women. In keeping with its mandate, the Commission initiated various steps to improve the status of women and worked for their economic empowerment during the year under report. It took up the issue of child marriage, sponsored legal awareness programmes, Parivarik Mahila Lok Adalats and reviewed laws such as Dowry Prohibition Act, 1961, PNDT Act 1994, Indian Penal Code 1860 and the National Commission for Women Act, 1990 to make them more stringent and effective.
13.	The Equal Remuneration Act, 1976	The equal remuneration act of 1976 (Act 25) amended by Act 49 of 1987 directs for payment of remuneration at equal rates to men and women workers and other matters. It further describes that it is the duty of the employer to pay equal remuneration to men and women workers for same work or work of similar nature. The law makes it mandatory to have no discrimination to be made while recruiting men and women workers.

The Government of Andhra Pradesh has identified women as potential drivers of double digit economic growth. Strategies and focus areas have been identified with emphasis on women empowerment and mainstreaming of various disadvantaged social groups who have historically been at the margin of the development agenda. The Government is actively supporting women's empowerment and encouraging equality. A major aspect of achieving the GoAP's Vision 2020 will be through empowerment of women by building awareness and provision of education, health and employment opportunities that they need to realise their full potential. The Government has identified approaches such as gender sensitisation through education and employment, health programmes and trainings as important means for empowering women. The AP Sunrise Vision 2029 has identified a large gender gap in labour force participation. The state witnessed a female participation rate of 375 in rural areas in 2014-15, as against a male participation rate of 584 in the same category.[5] Gaps were also found in urban areas with female participation rate of 166 in, as against a male participation rate of 567 in the same category.

The State Government has conceptualised and implemented various schemes and programmes that are aimed at empowering women and these are summarized in Table 2.

Table 2: Relevant Acts, Policies and Schemes: Government of Andhra Pradesh

Sl	Scheme	Scheme Description
1.	Bangarutalli - Maa Inti Mahalakshmi	This scheme is meant to take care of the girl child in every household from her birth till she completes her graduation.
2.	Sthreenidhi credit cooperative Federation Ltd.	This scheme provides timely and affordable credit to poor SHG members
3.	Community Managed Sustainable Agriculture-CMSA	This initiative has also taken place under the Society for Elimination of Rural Poverty which comes under the umbrella of NRLM. The CMSA aims at:

[5]Government of Andhra Pradesh. URL: http://apvision.ap.gov.in/sectorpapers.php

Sl	Scheme	Scheme Description
		• developing new tools and equipment for reducing drudgery to women farmers • establishing village level infrastructure for supply of these tools • upgrading women farmer's knowledge in eco-friendly farming technologies • organizing capacity building programs with new training content and improved methods • managing revolving fund for decentralized extension system leading to multiple livelihood options models to be managed communities on their own.
4.	Unnathi	Towards the end of the first decade of Indira Kranthi Patham (IKP) in the year 2009, it was observed that 20% of poor were still untouched, majority of whom belonged to socially vulnerable groups (SC/ST) and thus needed intensive handholding support. To address this critical gap, SERP evolved a more targeted and focused approach under IKP, to fight the poverty of the poorest known as Unnathi.
5.	Andhra Pradesh Farmers. Management of Irrigation Systems (APFMIS) Act	APFMIS Act has a number of provisions including a provision introduced in 2003 by which one woman is to be nominated by Gram Panchayats as a member of the Managing Committee of the WUA of minor irrigation, without voting rights. The intention of these provisions is to facilitate and encourage inclusion of women in key planning, decision making and management forums. However, despite these provisions, representation of women was not found in many of the WUA committees as well as with negligible presence in the MC meetings.
6.	Velugu	The Government of Andhra Pradesh has been implementing since June 2000 a special project called "Velugu" to address poverty through empowerment of rural poor women, especially the poorest of the poor.
7.	AP Women's Cooperative Finance Corporation Ltd.	AP Women's Cooperative Development Corporation Ltd. (APWCDC) is among the front –runners in promotion of economic activities among the rural women in Andhra Pradesh. It selects poor rural women in the districts of Andhra Pradesh through their Mahila Vikasa Kendrams (Women Training Centres) and provides skill development training in marketable trades with the support of A P State Govt., NABARD, SIDBI, and Govt. of India through the Women & Child Development Department under different schemes, for promotion of different traditional and non-traditional economic activities among the poor and deprived women.
8.	AP- Minimum Wage Rule	After the establishment of the Minimum Wages Act in 1948, Andhra Pradesh established the Minimum Wages Rules in 1960. Minimum wages has been defined for several of the occupations including agricultural works. The minimum wages were last revised in 2015 and are defined for various occupations and various zones in which the

Sl	Scheme	Scheme Description
		labour department of Government of Andhra Pradesh has divided the districts and blocks in it.[6] But at the same place the wages paid to the agricultural labour is different specifically on the basis of gender.[7]

Status of Women in Sample Tank Systems

As part of the study visits were undertaken to sample tank locations and field level consultations were conducted by a multidisciplinary team comprising of experienced social scientists and agriculture and environmental experts. Focus group discussions were conducted with men and women farmers, members of women's self-help groups in the jurisdiction of sample tanks etc. Interviews were also conducted with officials from Irrigation, Revenue, Agriculture and Fisheries Departments and with members of WUAs.

Of the total sample of 1530 household respondents who were covered as part of the baseline survey in 102 tanks, 5% respondents (76) were females. Of the 76 female respondents a majority 43 respondents (57%) were illiterate, 17 (22%) had completed primary school, 7 (9%) had completed middle school and 3 (4%) had completed SSC level education. In case of the sample tribal tanks all respondents were illiterates. Nearly 15% Ayacutdars covered during the survey were females. The highest percentage of female Ayacutdars were found in Dummangi Cheruvu in Vizianagaram which is a tribal tank followed by Y T Cheruvu in Anantapur.

The following section discusses the key findings from the field visits to sample tank sites with respect to the gender dimension. While some of the observations are directly linked to tank management and WUAs, others are broader concerns.

Role and Condition of Women in Agriculture

Women have traditionally assumed most of the workload involved in producing seedlings, sowing, weeding, transplanting, threshing and harvesting[8]. The trend that sees a growing number of men shifting to better paid non-farm rural employment or migrating to cities, increases women's role in the sector. Today, 75 percent of the full-time female rural workforce is in the agricultural sector, against 59 percent for men[9]. About one third of female cultivators are unpaid workers on a family farm; those who labour someone else's land receive wages that are at the bottom of India's depressed wage scale, and at least 30 percent lower than those of their male counterparts[10]. Furthermore, while men have diversified activities and typically ally some agricultural work with other employments, the female workforce has remained primarily dependent on agriculture: in rural areas, 62.8 percent of working

[6]Government of Andhra Pradesh, (2016) URL: http://labour.ap.gov.in/documents/VDA_01102017_31032018/1Agriculture.pdf (Last Accessed: 15.14, 17-01-18

[7]NABARD, (2016) URL: https://www.nabard.org/auth/writereaddata/RuralEconomy/2203172223Rural%20Wage%20Sep%2016.pdf (Last Accessed: 15.16, 17-01-18

[8] N. C. Saxena (2012), 'Women Land and Agriculture in Rural India', Delhi: UN Women, p. 7, at: www.unwomensouthasia.org/assets/UN_Women_Land_ Agriculture_in_Rural_India.pdf (accessed October 2013). As well as literature cited there.

[9] Government of India (2012), 'Press Note: Key Indicators of Employment and Unemployment 2011-2012', Delhi: Press Information Bureau, at: http://pib.nic. in/newsite/ erelease.aspx?relid=96641 (accessed October 2013).

[10] N. C. Saxena (2012), 'Women Land and Agriculture in Rural India', op. cit., p. 11

women quote agriculture as their primary occupation; in contrast, the share is 43.6 percent among men[11].

A significant proportion of women respondents interacted with during the field visits are working as agricultural labour and most of them work on their family land in order to support their livelihood. The activities they are usually engaged in include sowing, transplanting, weeding, harvesting, threshing and agro-processing. Other non-mechanised functions like nursery raising, tree planting, pruning, potato planting, digging, fruit and vegetable harvesting and transport, animal feeding, care and cleaning of animals' shelter, milking, dairy product preparation, fish-fry rearing, cage culture, net making, fish processing, spices collection processing etc. are mostly performed by women. Women who work on family owned lands as well as those working on other's lands are mainly involved in activities which are typically not mechanised and involve long hours of work and drudgery. Women working on farms unlike men have to also discharge several household responsibilities such as fetching water, cooking, cleaning and care giving functions for children and other family members. Apart from the agriculture the other activities and functions that women are engaged in include livestock rearing, fish vending, vegetable and fruit vending and running petty businesses.

Role and Condition of Women in Fisheries

Fisheries are another key sector in which women in sample tanks are engaged. The quality of life for women is typically poor across different fishing groups and communities; characterised by long working hours, poor wages as compared to men and the additional burden of household maintenance. Studies reveal that fisher women in AP have a limited role in seed collection, clam collection and handpicking of fish. Women's active participation is found mainly in allied activities such as sorting, grading, fish salting and drying, fish loading and unloading, net mending, retail marketing and fish processing. Hand braiding of fishing nets is also an important activity in many fishing villages. In recent years, with the establishment of shrimp processing plants in Visakhapatnam and East Godavari districts, women are obtaining jobs in the shrimp processing industry in increasing numbers. In the East Godavari district women get employment in shrimp farms for 4 to 5 months in a year for activities like pond construction, seed collection and segregation, de-weeding of pond and hand picking of shrimp during harvest. In a few places along the coast, women are seasonally engaged in collecting molluscs and shells along with drying/selling the same in the local markets[12].

Women who are involved in marketing of fish face many problems such as unhygienic market places, lack of basic amenities in the market place and fluctuating market prices. In markets women usually sell low value products in a remote corner with women wholesalers being very few. Lack of alternate employment in off-seasons is another difficulty faced by women and this leads them to borrow money usually from private moneylenders at very high interest rate that catapults them into a vicious circle of indebtedness. Low literacy among most women decreases their bargaining capacity in the trader dominant market thus divesting them of their reasonable price compensation for the risky endeavours in the marine environment. They also remain unaware of new technologies and innovations which could help bring in some amount of ease in their activities. Women working in the fisheries sector are also subject to health risks due to their tasks. Many fisherwomen carry loads of fish from the shore or ports to the nearest markets every day and this puts tremendous pressure on their body, especially

[11] Government of India (2011), 'Key Indicators of Employment and Unemployment in India, 69th Round', Delhi: National Sample Survey Organisation, p. 20

[12] International Journal of Gender and Women's Studies June 2014, Vol. 2, No. 2, pp. 297-308

back. Subsistence fisherwomen are prone to health hazards like diarrhoea, cholera and fever. Fisherwomen in India also generally suffer from malnutrition and dietary imbalances[13].

Vulnerability of Women Headed Households

It has been traditionally found that women headed households are highly vulnerable and more susceptible to shocks. This is not only due to lack of adequate financial resources but also due to lack of adequate support mechanisms to withstand sudden shocks. Such households require greater focus and efforts need to be made more to ensure that their needs are accounted for and they are able to benefit from the various interventions under the project.

Lack of Access to Support for Income Generation

There are two dimensions to the lack of adequate financial resources among women. Firstly discussions in tank areas revealed that there are differences in wages for men and women. While there is no differential in case of programmes such as the MGNREGS, wide differences are found in case of agricultural labour in activities such as sowing, weeding and harvesting. There is lack of awareness of precepts such as equal pay for equal work. Secondly, women also do not have adequate access to financial services and institutional credit. Such services are yet to reach a large proportion of the population and women are disproportionately represented among those without access.

Limited Participation in Decision making and Governance

During the field visits it was observed that the major decision makers in agricultural activities were men even though women shouldered a large part of the work burden. Despite this they were not consulted at the time of crucial decision making. Even at the community level as there is limited participation of women; their voices are left unheard.

Inadequate Scope for Capacity Building and Technology Adoption

Women across several tanks visited expressed concern over the lack of opportunities for building their capacities. Some of the areas in which they felt they could benefit from training and skill building included tank based agricultural activities and operations, cattle management and issues relating to production and productivity and awareness on livelihood development programs.

Another key factor that affects use of machinery and equipment by women is the fact that equipment for agriculture production processing and value addition are developed keeping in mind the agronomic design factors of male operators. Research institutions are yet to appoint female researchers and technicians for evaluation of women specific technology.[14] Training facilities available for women, in selected trades, are largely located in cities and rural women are constrained in availing these opportunities.

Low Representation and Participation of Women in Decision Making Committees such as WUA MCs

As per APFMIS Act 1997, each minor irrigation tank WUA is required to have six members in its Managing Committee (MC). The MC of each WUA is supposed to meet once in a month and discuss

[13] International Journal of Gender and Women's Studies June 2014, Vol. 2, No. 2, pp. 297-308

14 Ministry of Rural Development. (Sept, 2011), Empowering Rural Women- Women Empowerment: Milestones and Challenges, Vol 59, pp 10-15, *Government of India*

on issues like area of irrigation in their jurisdiction for tax demand, water management, identification of O&M works, plough back amounts and innovative techniques for cultivation and water distribution etc. The distribution of MC members in the baseline sample indicates a predominance of male members. Out of a total of 1530 female Ayacutdars, only 20 (4%) females were a part of the Managing Committee, indicating an extremely low representation of women. Female representation was found in Anantapur, East Godavari, Kadapa, Krishna, Prakasam, Visakhapatnam, West Godavari and Vizianagaram districts. No women MC representation was observed in the tribal tanks covered as part of the survey.

The APFMIS Act states that- '*Provided that two members nominated by the Gram Panchayat (GP) of whom one shall be a woman, shall be the members of the Managing Committees of Minor Irrigation Water Users Associations, without voting rights, in the manner prescribed'*. The intention of this provision is to facilitate and encourage inclusion of women in key planning, decision making and management forum. However, nomination of a woman member by the GP was not found in any of the sample tanks that were covered as part of the baseline survey.

WUAs are supposed to conduct at least two General Body meetings once in a year. However, the survey indicated that General Body meetings had been conducted in only 17% of the sample tanks. Participation details of the meetings revealed that only 4% of participants were females. It is important to note that the female participants were spread across only three tanks in Anantapur, Prakasam and Vizianagaram.

Absence or Limited Role in Tank Operation and Maintenance

Women have no or a highly limited role in tank rehabilitation, repairs and maintenance. Their level of knowledge regarding operation and maintenance of tanks is low with most of the women farmers being involved only in jungle clearance and silt removal under MGNREGS. Women are typically not appointed as supervisors for tank rehabilitation work.

Expectations of Women

The primary survey helped identify the key expectations that women had with respect to the proposed project. These are summarized as follows:

- Women expressed their interest in being involved in capacity building opportunities and activities. Such capacity building efforts could be undertaken in a host of areas including technical, supervisory and leadership.
- Women have conventionally had a limited role to play in tank development activities. This can be attributed to factors such as cultural norms, lack of time to take up such activities and lack of adequate knowledge. Women revealed that they would like to play a more active role in tank management and would like to obtain trainings which would allow them to do so.
- Women have specifically indicated that would like to be involved in supervision and monitoring activities and instead of engaging other resources could themselves be responsible for these functions.
- Women have a major role to play with regard to livelihood generation activities especially in rural areas. Several women indicated that they expect stronger convergence between the proposed project and programmes such as NREGA which would allow them increased access to income-generating activities.

Gender Action Plan

The project will focus on addressing concerns that have emerged from the field study. Measures for this purpose will be taken up not only at tank level but also at the District Project Unit (DPU) and Project Management Unit (PMU) levels. The following section present the action plan for gender mainstreaming across the entire project cycle, viz., identification, pre-planning, planning, implementation and post-implementation stages.

Objectives

The Gender Action Plan aims at promoting women's socio-economic advancement and empowerment through interventions at both policy and agency levels. The ultimate objective of the plan is to ensure that the project is able to serve women's strategic and practical needs. The plan aims to ensure that women are given an opportunity to participate in the project and are represented in key planning and management structures. It also strives to minimize social vulnerability of women arising due to project activities like construction.

Approach

The project will aim at creating a gender sensitive environment in minor irrigation and will take up measures to promote the interests of women and ensure gender equity in governance and decision-making processes. Women's capacities will be used in tank management with a focus on their participation as well as on productivity enhancement for tank based livelihoods.

A major thrust will be laid on fulfilling practical needs as most of women's time is spent on household and labour intensive activities leadings to a reduction in their potential to contribute to expanded economic activity. Simultaneously, actions will be planned to increase the capacity of women by providing opportunities for empowerment, thus bringing in equity in access to and control of resources and benefits and increased self-confidence among women. All actions will encompass a gender perspective on recognition of women's status, rights, access and control over natural resources. Women headed households will receive priority in services provided through the project and stipulations will be made for ensuring that women receive equal pay for equal work as part of contractual obligations.

Measures to Address Issues and Concerns

The major issues identified as a part of the study are:

- Lack of inclusion and equity
- Lack of exposure to activities and technologies
- Limited role in governance and decision making
- Lack of opportunities for capacity building
- Unequal distribution of resources

Table 3 summarizes the key measures that would be undertaken as part of the project to address the various issues and concerns identified.

Table 3: Gender Action Plan

Baseline Status	Measures	Agency Responsible	Resource
Women agriculture labor takes up a large part of the un-mechanised 'drudgery' elements of the agricultural operations. Women are found to be involved in activities such as: ▪ Land Preparation ▪ Sowing/Transplanting ▪ Inter cultivation and weeding ▪ Fertilizer Application ▪ Pesticides Application ▪ Harvesting ▪ Threshing and Cleaning ▪ Handling and Transportation ▪ Post Harvest Operations ▪ Storage ▪ Marketing Women usually do not have access to proper clothes that they can wear while working on farms or during fishing operations. They also lack access to suitable safety equipment, and shade facilities. They are many a time left out of project interventions such as demonstrations and trainings.	▪ Provision of: o Cost efficient toolkits comprising of Sickles, Secateurs, Hand Hoes, Small Weeders, Gloves, Gum Boots Protective Shirts etc. o Protective hats like those used by tribal workers and farmers o Multipurpose shelter for shade, lunch breaks and childcare etc. o Training and safety equipment (protective masks while spraying pesticide and fertilizer applications) o Modern harvesting implements/machines o Cost effective machinery to reduce the drudgery ▪ Exploration of opportunities in handling and transportation ▪ Formation of Women Common Interest Groups for marketing and trainings on marketing models and market linkages for FPOs/Women CIGs ▪ Allocation of at least 30 demonstration plots for women	PMU/ DPU/ Agriculture Department/ WUA	PMU/Agriculture Department/ Fisheries Department
Women are engaged in shifting of fish from harvesting point to packing place and usually do this by hand without any gloves or containers	▪ Provision of gloves and trays for carrying fish	PMU/ DPU/ WUA	PMU / Concerned Fisheries Department
Fish are usually placed on the floor at the packing place which leads to greater chances of spoiling and wastage	▪ Provision of thermocol sheets for placing fish	PMU/ DPU/ WUA	PMU / Concerned Fisheries Department
Fish is usually sold by women at road sides and these are placed on plastic sheets leading to deterioration of quality	▪ Provision of thermo boxes to control the temperature and preserve the fish	PMU/ DPU/ WUA	PMU / Concerned Fisheries Department
There is lack of adequate storage facilities for women to	▪ Provision of storage facilities in the premises of same works area	PMU/ DPU/ WUA	PMU / Concerned Fisheries

Baseline Status	Measures	Agency Responsible	Resource
store feed			Department
Women have indicated that they do not have access to training and other livelihood improvement measures which would help improve their socio-economic conditions	▪ Provision of: o Trainings on agriculture productivity enhancement with each tank having one demonstration for women farmers o Training on preparation of organic manure, on-farm water management and modern agricultural practices o Training on cattle management ▪ Exclusive involvement of women in activities such as: o Nursery raising, foreshore plantation, plantation of field bunds etc. o Fodder development ▪ Provision of support to women fish retail sellers for procurement of chilling boxes	PMU/ DPU/ SO/ WUA	DPU and SO with concerned line departments
A large number of staff would be involved in the project including members of DPUs, SOs etc. Such staff have to be adequately gender sensitive in their approach while undertaking activities so that women are included and suitably supported.	▪ Provision of orientation to project staff and other related functionaries on adopting gender sensitive approaches	PMU	PMU/DPU/SO
The baseline data reveals that 57% women are illiterates. This is a major constraint in women participating effectively and adequately in decision making and participation.	▪ Coordination with education and literacy programmes targeting women ▪ Customized training programmes to meet the needs of illiterate and neo-literate women groups. This could include audio-visual aids and participatory learning methods in farm extension programmes so that illiterate participants can understand concepts	PMU/ DPU/ WUA/ SO	DPU/SO
Provisions of APFMIS Act with respect to women's representation in WUAs are not found to be adequately followed	▪ Encourage and facilitate co-option of GP members including one woman member in WUA Managing Committee ▪ Encourage women to contest WUA elections ▪ Provision of leadership development trainings and orientation on WUA roles and responsibilities to women	DPU/ SO	DPU/SO
Inadequate representation by women in MCs, Sub Committees and other CBOs	▪ Family as a unit (one women and one male member of the family) to be considered for membership while forming Sub Committees ▪ Provision of leadership development trainings for women Sub Committees members ▪ Special trainings for women Sub	PMU/ SO/ DPU/ WUA	DPU/SO

Baseline Status	Measures	Agency Responsible	Resource
	Committees members on their roles and responsibilities ▪ Gender sensitivity workshops for MC members ▪ Large scale awareness campaigns on roles and responsibilities of women in irrigation		
Low level of participation of women in irrigation management	▪ 10 % of para workers under project to be women ▪ Minimum of 30% representation of women in training programmes ▪ Gender audit/gender analysis at the midterm and end project ▪ Continuous motivation besides education, information and communication (IEC) and emphasis on the role of women farmers ▪ Sensitization of men and women farmers, WUA and project functionaries on need for involvement of women in institutional decision-making processes	PMU/ SO/ DPU/ WUA	SO/DPU/WUA
Representation of women is very low (4%) among committees though they have land registered in their names	▪ Inclusion of women landholders including those from vulnerable sections as members of committees	PMU/ DPU/ SO/ WUA	
Wage disparity among men and women was observed in almost all tanks	▪ Sensitize contractors and project staff on equal wages for equal work ▪ Ensure employment for women in project rehabilitation activities	Contractor, Farmers	
Low level of knowledge in agriculture technologies and development	▪ Ensure intensive agriculture extension and support services targeting women	PMU/ DPU/ SO/ WUA	PMU/Extension Agencies
Lack of knowledge among women on marketing tie ups	▪ Make market information available to women ▪ Identify and select women with basic level of education who after undergoing training on marketing aspects can help other local women in marketing activities	PMU/ DPU/ WUA/ Local Marketing organizations	PMU/MARKFED and other local marketing institutes
Lack of access to institutional credit to initiate income-generating activities	▪ Provide information on various formal credit- lending institutions available in the area ▪ Help eligible families to complete formalities to access institutional credit ▪ Ensure that the credits received are productively used	DPU/WUA/SO	Local financial Institutions
Low economic empowerment of women involved in fisheries	▪ Up to 50 % of beneficiary selection for supply of mobile vending units, tricycle push carts, kiosks under fisheries to women in general and specifically single women/women headed households ▪ Where ever the women Ayacutdars are ranging from 10 -50 percent Gender CIGs/FPOs to be formed and agribusiness	Line departments, PMU, DPU	DPU/SO/Line departments

Baseline Status	Measures	Agency Responsible	Resource
	and marketing activities will be linked to these CIGs ▪ Single women/women headed households will be formed into CIGs ▪ Introduction of women to marketing aspects		
Lack of gender disaggregated database	▪ Ensure that all MIS data being collected under project is gender disaggregated at all levels ▪ Gender audit to be conducted at midterm and end of project stage ▪ Gender disaggregated data base to be maintained	SO, Contractor, DPU, PMU	PMU
Lack of gender sensitivity and perception at all levels	▪ Gender sensitization trainings to WUAs and Project Staff ▪ Create Gender Help line number and inform to all the women ▪ Establishing GRM at WUA and Project level ▪ Use of gendered language instead of gender neutral language to enhance the role of women	PMU/ DPU	PMU, Training institutes
Abuse in worksites reported by few women during FGDs	▪ Provide awareness on laws which were applicable to women ▪ Awareness on Help line number and Grievance Redressal procedures ▪ Establishment of Grievance Cell at all levels	PMU/ DPU/ SO	PMU/DPU/WUA Legal Practitioners
Monitoring and learning for gender differentiated impact	▪ Special studies on gender during project implementation	PMU/ DPU/ SO/ WUA	DPU/SO

Implementation Arrangements

The major stakeholders who would be involved in implementation of the Gender Action Plan include:

- State Project Management Unit (PMU)
- District Project Management Unit (DPU)
- Support Organisations
- Para Workers
- Gram Panchayats
- Water User Associations
- Managing Committee of the WUAs

The designated Social or Gender Specialist shall be responsible for overseeing compliance of the sub-projects to Bank safeguards, GoI/GoAP regulations and applicable GAP guidelines. She/he shall regularly review timely implementation of GAP provisions as applicable. Corrective actions shall be initiated in a planned manner as appropriate to ensure compliance to the GAP measures. The Support Organisations would have a holistic approach for encouraging women participation for the WUA and other administrative functions of the village and tank. SOs and Para-workers would have a key role to

plan in ensuring that the district and tank level stakeholders are adequately sensitized towards gender related aspects and would monitor implementation of activities as per the plan. Further the DPU and SPMU would guide and support various activities undertaken by the SOs and monitor the activities undertaken and the results.

Indicators for Monitoring and Evaluation

Monitoring and evaluation activities assume a high level of importance in light of the stress on timely achievement of project objectives and an emphasis on quality outputs and processes. The M&E system would act as a tool for measuring and assessing the extent to which women's empowerment and participation have been undertaken within the project framework. A proposed set of indicators that could be used for monitoring progress of gender related dimensions are as follows:

- Number of gender sensitisation awareness campaigns undertaken
- Number of women trained on improved methods technologies in agriculture, irrigation, fishery and other key livelihood areas
- Percentage membership of women in Managing Committees of WUAs
- Percentage membership of women in Sub Committees of WUAs
- Percentage attendance of women in WUA meetings

Piloting and Budget Requirements

The project has approved the piloting of gender development interventions across 15 project tanks (including 3 tribal tanks) with a proposed budget of Rs. 1.2 Lakh per tank and an additional Rs. 1 Lakh for tribal tanks. This amounts to a piloting budget of Rs. 1.5 Crore. The pilots would involve implementation of key intervention with a view of testing their effectiveness and suitability for inclusion or full scale roll out in 75 gender pilots and 60 tribal pilot tanks.

ANNEXURE II

B. Summary of Consultations

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
29.6.2017	Anantapur (D) Singanamala (V) Rangaraya Cheruvu	Dr. Yamini Bala, MLA	▪ Tank status and works taken up for bund repair	▪ Agricultural lands are covered with Prosopis ▪ Prosopis cover in agricultural lands restricts cattle grazing ▪ Strengthening of tank bund ▪ De-silting of tank bed to increase storage capacity. ▪ Repairing of existing 4 sluices. ▪ Alternate water source for the lake can be diverted by constructing sluice in the HLC canal. ▪ Fisheries society in village engages in fish culturing when tank is filled. ▪ Lack of fisheries infrastructure and awareness on fisheries subsidies.
		WUA members- Saifulla, Narasimhulu	▪ Functioning of the committee, records maintenance, works taken up ▪ No fishing activity undertaken in tank due to bushes ▪ Water is not sufficient to irrigate total ayacut	
		Farmers- Venkateswarlu, Satyanarayana	▪ Functioning of committee, records maintenance, works taken up, fishing activity etc. ▪ Tank bund seepage is an issue ▪ Approach road required for other ayacut villages ▪ Distribution system needs to be repaired ▪ Waste water from nearby camphor factory is polluting tank water ▪ Fishermen migrate to other villages for their livelihood ▪ Cattle rearers migrate to other villages nearly Karnataka state due to lack of water	
		Irrigation Engineers	▪ Tank details, ayacutdars details	
	Anantapur (D) Singanamala Y. T Cheruvu	WUA members	▪ Functioning of the committee, records maintenance, works taken up and fishing activity ▪ Income from fishing activity is nominal ▪ Recently repaired tank bund and the road to the village	• Agricultural lands are covered with Prosopis. • Prosopis cover in agricultural lands restricts cattle grazing. • Deposition of silt up to 2 m depth; De-silting of tank bed to increase store capacity. • Fisheries society in the village engages in fish culturing when tank is filled. • Lack of fisheries infrastructure and awareness on fisheries subsidies.
		Farmers- Nagaraju, Sumlatha, Nagappa, Venkata Ramudu, Narsimhulu, Yadayya, Eeshwaraiyya	▪ Distribution of water and water problems etc. ▪ Issues such as approach roads to the middle of the ayacut for transport of fertilizers and seed availability ▪ Water distribution system need some repairs	
		Irrigation Engineers	▪ Tank details, ayacutdars details	

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
		Fishermen	▪ Details of fishing activity ▪ Credit facility is to be improved and enhanced. ▪ Fingerlings transport is very costly and need vehicles for transport	• Repairing of the existing sluices. • Lack of fodder for cattle
3.7.2017	Chittoor (D), Veerakanellore (V) Veerkanellore tank	President WUA	▪ Tank improvement activities and maintenance issues ▪ Taken up bush clearance with own money ▪ Govt funds not received for WUA	▪ Agricultural lands are covered with Prosopis. ▪ Prosopis cover in agricultural lands restricts cattle grazing. ▪ Deposition of silt up to 2 m depth; De-silting of tank bed to increase store capacity. ▪ Fishing society is the village engages in fish culturing when tank is filled. ▪ Lack of fisheries infrastructure and awareness on fisheries subsidies. ▪ Repairing of the existing sluices. ▪ Lack of fodder for cattle.
		Sarpanch	▪ Tank usage, encroachments ▪ No revenue generation due to lack of water and fishing activity	
		Farmers- Somaiah, Chanaiah, Subba Reddy, Yellaiah, Krishnaiah, Singaram	▪ Crops and water distribution ▪ Groundwater levels dropped drastically ▪ Drinking water quality has got affected ▪ Dairy activity and labour are the main source of income	
4.7.2017	Kadapa (D), Badvel (V), Badvel big tank	President WUA Banti Veerayya, Subbareddy and others	▪ Functioning of the committee, records maintenance, works taken up and fishing activity ▪ Tank condition is good, fishing activity is nominal due to shortage of water ▪ Records are maintained by the MI Dept	• Agricultural lands are covered with Prosopis. • *Prosopis* cover in agricultural lands restricts cattle grazing. • De-silting of tank bed to increase store capacity. • Repair of irrigation channels • Strengthening of bund to arrest seepage • Fisheries society in Badvel engages in fish culturing when tank is filled. • Lack of fisheries infrastructure and awareness on fisheries subsidies. • Repairing of the existing sluices.
		Farmers- Venkatasubba Reddy, Obul Reddy, Sanjiva Reddy, Venkata Shiva Reddy, Hari Krishna Reddy	▪ Distribution of water, water problems etc. ▪ Distribution channels to be repaired	
		Women SHG members	▪ Gender integration and participation in development activities including tank activities ▪ No income generation activities	
	Kadapa (D), Badvel (V), Chennampalli tank	President WUA	▪ Tank bund to be replaced with concrete ▪ Bund breached once and even	▪ Removal of Prosopis juliflora from the bund and tank water spread

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
			after minor repair no improvement	area. ▪ Removal of Ipomea carnea aquatic weed. ▪ Agricultural lands are covered with Prosopis. ▪ Prosopis cover in agricultural lands restricts cattle grazing. ▪ De-silting of tank bed to increase store capacity. ▪ Clearing of Prosopis along the irrigation channels ▪ Repair of irrigation channels and existing sluices ▪ Strengthening of bund to arrest seepage
		Farmers- Venkata Subba Reddy, Chinna Reddy, Obul Reddy, Sanjiva Reddy, Venkataramanaiah, Jairam Reddy, Ramanna Reddy, Dasarathrami Reddy, Mungala	▪ Crops, water distribution ▪ Due to lack of laskar system lot of irregularities in water distribution system	
5.7.2017	Nellore (D) Kakullavaripally (V); Nakklagandi reservoir	Farmers- Ankaiah, Saroja, Malakondaiah, Swathi, Basavaiah, Gopichand, Adilaxmi, Venkataraman, Bharat	▪ Functioning of the committee, records maintenance, works taken up, fishing activity etc. ▪ Revitalization of tank and lining of canal is urgent need ▪ Due to damage of distribution channel the little water that is available is also being wasted ▪ Size of the outlets is not according to the requirement ▪ Borewells drilled beyond 600 ft but there is insufficient water. ▪ Due to lack of water in the tank the groundwater levels are affected	▪ Removal of Prosopis juliflora from the bund and tank water spread area. ▪ Removal of aquatic weed from the irrigation channels near the spillover weir ▪ Agricultural lands are covered with Prosopis. ▪ Prosopis cover in agricultural lands restricts cattle grazing. ▪ De-silting of tank bed to increase store capacity. ▪ Clearing of Prosopis along the irrigation channels ▪ Engineering intervention to improve gravitational flow in the irrigation channel. ▪ Lack of ground water for tube well irrigation ▪ Lack of fodder availability
6.7.2017	Nellore (D); Sangasanipally (V); Ura tank	Ex Sarpanch	▪ Functioning of the committee, records maintenance, works taken up, fishing activity etc. ▪ Tank breached in 1996. Yadavas migrated to other villages.	• Removal of *Prosopis juliflora* from the bund and tank water spread area. • Lack of water for irrigation due to blocked

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
		Farmers- Venkata Subbama, Balakumaraiah, Ramakrishna, Lacchumma, Buram, Adilaxamma, Alikha, Panchalaiah	▪ Crops, water distribution, groundwater influence etc. ▪ People are scared to take loans ▪ Except a few bore-wells in the tank influence zone are hardly giving 1- 2 inch water if at all the rains are reasonable. ▪ Due to total dying of the tanks there is a shortage of groundwater and drinking water in the village. ▪ The inflow channels are damaged by the vehicular traffic of the Electricity Dept. ▪ If the tank is linked to Brahmasagar it will be very useful.	outlet sluice. • *Prosopis* cover in agricultural lands restricts cattle grazing. • De-silting of tank bed to increase store capacity. • Engineering intervention to bring water from nearby reservoir. • Lowering of ground water table for tube well irrigation • Lack of fodder availability
7.7.2017	Nellore (D); Anantasagaram (V); Anantasagaram tank	Fishermen- Sudhakar Reddy, Drutesh, Dayakar Reddy, Mahbub Pasha, Pavani, Yashodamma, Rama Reddy, Prasuna	▪ Details of the fishing activity ▪ Fisherman are controlled by the society. They do not know about the functioning modalities	▪ Removal of Prosopis juliflora from the bund. ▪ De-silting of the tank to improve storage capacity. ▪ Strengthening of the tank bund. ▪ Repairing of sluices. ▪ Fisheries society involved in fishing activity. ▪ Lack of fisheries infrastructures. ▪ African cat fish (Clarias gariepinus) is a predatory fish feeds on native fishes results in reduced fish catch. Whenever the cat fish is caught in the fishermen net, it is thrown out of water. Several dead cat fish were spotted during the survey. ▪ De-silting of tank bed to increase store capacity. ▪ The tank was built during Vijayanagar Rule (1552 AD).
		WUA President	▪ Did not respond	
		Farmers	▪ Did not respond	
11.7.2017	West Godavari (D); Tirumalampalem (V); Gollavanikunta	WUA President Kondala Rayudu - President,	▪ WUA functioning, records, activities taken up by WUA ▪ No records ▪ Sluice gates damaged by the	▪ De-silting of tank to improve storage capacity. ▪ Strengthening of tank

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
			inflow channel	bund. ▪ Repairing of sluices and shutters. ▪ Restoration of inlet and field channels ▪ Removal of *Prosopis juliflora* from tank ▪ Dumping of solid waste in tank ▪ Removal of aquatic weed *Ipomea carnea* from tank
		Farmer- Kondaplli Seetaramarao, Pothu Raju, P Krishna, Y Pradeep, M Purnareddy, S Kartikeya	▪ Tank problems water usage, fishing activity. ▪ Supply channels damaged ▪ All non ayacut area is under borewell irrigation and mostly commercial crops are grown ▪ Farmers voluntarily doing some repairs	
		VRO- Veeraju	▪ About the different types of crops seasonal crops , Ayacutdar list ▪ Gave information that is useful for understanding the overall cropping and cropping pattern.	
12.7.2017	East Godavari (D); Yerravaram (V); Nalla timmaiah tank	WUA President Jilkara Bhadram, Members- Gangireddy Kasaiah, Karri Arjuna Murthy	▪ WUA functioning, records, activities taken up by WUA ▪ Reported catchment encroachments ▪ Tank bund, overflow weir to be concreted. ▪ Every year the farmers are using sand bags to stop the wastage of water flow into the overflow drain from the tank	▪ Tank was deepened below the sill level, thus the dead storage was increased. Engineering interventions required to utilize the dead storage water. ▪ Strengthening of tank bund. ▪ Tank is used for fish culture ▪ Repairing of sluices and shutters. ▪ Restoration of inlet and field channels ▪ Removal of Prosopis juliflora from tank bund ▪ Removal of aquatic weed Eichornia crassipes from tank
		Farmers- Srinivas Rao, Rahul Karthik, DV Subba Rao, Rammama, Achiraju, Babji, Chandra Lakshmi	▪ Tank problems water usage, fishing activity ▪ All the sluices (Tumulu) are silted and need to be replaced ▪ Feeder channels are to be repaired	
		Fishermen	▪ Functioning of the society, problems faced by the fisherman if any ▪ Gave the information on the fishing activity, the membership details the marketing problems and infrastructure	
17.7.2017	Srikakulam (D); Thotavada (V); Kumarasagaram	WUA VP- Routhu Narayana Rao, Kothakota Malleswara Rao	▪ Once the tank breached ▪ Whenever there is cyclone the tank bund is breaching ▪ Undertaken some repair works still some more to be done	▪ Desilting of tanks to improve water storage. ▪ Strengthening of tank bund. ▪ Tank is used for fish culture. ▪ Repairing of sluices and shutters. ▪ Restoration of inlet and
		Farmers- Vijay Kumar, Nagappa, Ashok, Kamakshi,	▪ Tank problems water usage, fishing activity ▪ Distribution channels to be repaired to regulate water and	

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
		Mallesihwar, Prasad	arrest wastage of water	field channels
		President- Gedela Prasad Naidu	▪ No major problems of water distribution, if there are any these are sorted out amicably ▪ Due to shortage of water fishing activity is affected ▪ Explained about the tank technical aspects and distribution systems ▪ State highway is proposed which is going along the tank bund if the road is laid the inlet and outlet channels will be closed and therefore provision for water flow needs to be made	
18.7.2017	Vizianagaram (D); Gunkalam (V); Peddda tank	Farmers- Mohan, Khadirivel, Saroja, Rajesh Babu, Mogilishwar, Chikamani, Anjamma, Yellaiah, Kotatiah	▪ Tank problems water usage, fishing activity ▪ Link channels inlets to be repaired	• De-silting of the tank to increase storage. • Strengthening of tank bund. • Tank is used for fish culture, fisheries society is operated from Vizianagaram. • Repairing of sluices and shutters. • Restoration of inlet and field channels • Removal of *Prosopis juliflora* from tank bund • Solid waste dumped in the tank close to the road leading to Gunkalam village.
		WUA members	▪ WUA functioning, records, activities taken up by WUA ▪ Deepening of tank to be done ▪ Silt to be removed. ▪ 5 shutters to be repaired	
		Fishermen	▪ Functioning of the society, problems faced by the fisherman ▪ Fishing activity is being taken up when the tank is filled by non locals	
19.7.2017	Visakhapatnam (D); Anandapuram (V); Dattappa	Farmers- Jaganadham, Madhava, Koteswara, Bavana, Nagi Reddy, Somi Reddy	▪ Tank problems, water usage and fishing activity ▪ All field channels and canals to be repaired. Protection wall to be build to avoid submergence	▪ Acacia nilotica trees were planted on the tank few years back. ▪ Strengthening of tank bund. ▪ Tank is used for fish culture. ▪ Repairing of sluices and shutters. ▪ Restoration of inlet and field channels ▪ Removal of Prosopis juliflora from tank bund ▪ Removal of aquatic weed
		WUA members	▪ WUA functioning , records, activities taken up by WUA ▪ No fishing activity due to non filling of tank. The width of the road on the channel to be widened for moving of transport vehicles to take up any activity related to tank	

Date	District, Village & Tank Name	Participants	Summary Discussions Points	Major Issues Raised
			like de-silting	Ipomea carnea from tank ▪ Solid waste was dumped on the tank fringe area

Additionally, consultations were held with the following senior Project officials and PMU Experts:

- Dr P. S. Raghavaiah, State Project Director
- Smt. Y. V. Raja Rajeswari, Superintendent Engineer
- Dr. Joseph Plakkoottam, Monitoring and Evaluation Specialist
- Mr. Ratnama Chary, Fisheries Expert
- Dr. Gopalakrishna Karanam, Institutional Development Expert
- Mr. M, Masthan Rao, Agri-Business Expert
- Smt. Shashi Kiran, Capacity Building and Communication Expert
- Dr. N. Bhaskara Rao, GIS Expert

ANNEXURE III

C. List of Dams above 10mt Height

Sl	District	Mandal	Village	Tank Name	Bund Height (m)
1	Nellore	Varikuntapadu	Nakkalagandi Reservoir	Nakkalagandi Reservoir	15.00
2	Nellore	Anantha Sagaram	Anantha Sagaram	Anantha Sagaram Tank	14.21
3	Nellore	Seetharamapuram	Seetharamapuram	Ura Tank	14.00
4	Kadapa	Badvel	Badvel	Badvel Big Tank	13.70
5	Prakasam	Markapur	Markapur	Markapur Tank	12.00
6	Anantapur	Singanamala	Singanamala	Singanamala Tank	11.60
7	Anantapur	Guntakal	Y T Cheruvu	Y T Cheruvu	10.06

ANNEXURE IV

D. Hydraulic Particulars of Sample Tanks

Tank Name	Capacity at FTL (M.Cft)	Tank FTL (Mts)	Tank MWL (Mts)	Registered Ayacut under the Tank (Acres)	Catchment area (SqKMs)	Tank Spread Area at FTL (SqKMs)	No of Sluices (No's)	Sill Level of the Deepest sluice (Mts)	Depth of water in the Tank (Mts)	No of Weirs (No's)	Bund Length (Mts)	No of Fillings (No's)	Present Capacity of the tank (M.Cft)	Irrigated Area-	
														Kharif (Acres)	Rabi (Acres)
Singanamala tank	1066.61	304.72	306.25	2524	243.54	104.8	4	0	304.72	2	2168	2	266.653	2524	0
Yerra thimmaraju cheruvu	331.5	366.83	367.43	903	448.78	5.434	4	0	366.83	2	1943	2	165.75	0	903
Veeranellore peddacheruvu	33.79	280.15	280.61	214	18.59	0.89	2	0	280.15	2	1260	1.5	3.379	15	5
Nallatammayya tank	10.63	44.12	44.72	553.48	11.46	0.15	2	41.83	2.29	1	550	1	5.315	443.3	0
Badvel pedda tank		100	100.6	3670.27	173.28	9.29	2	96		3		3	1364	4200	
Chennampalli tank		100	100.6	1065.4	50.55	1.77		96		3		3	145.5	1100	
Borragudem tank	16.358	7400	74.6	226.01	6.32	0.074	4	0	7400	1	1300	1	12.269	226.01	226.01
Anantha sagaram		74.67	76.19	300	347.06					4		2	746.31	3500	
Ura tank	40	225.5	226.1	545	55.68	5.17	1	215.14	10.36	1	869	0	0	0	100
Nakkalagandi reservoir	167	113.39	114.8	1200	53	1.632	2	0	113.39	1	174	2	125.25	1	1000
Markapur tank	217.92	153.6	154.2	1005.99	31.25	2.337	3	0	153.6	2	1092	2	163.44	850	700
Kurma sagaram	41.25	39	39.6	330.69	0.52	6.54	2	0	39	1	705	2	10.313	330	0
Pedda tank	29.35	60	60.6	587.18	10.156	0.587	2	0	60	1	1	780	22.013	537.18	0
Dattappa tank	31.81	30.48	31.38	216.32	3.24	0.012	4	0	30.48	2	700	3	23.858	183.87	0
Similiguda tank															
Dummangi reservoir	0	100	100.9	112.08	0.78	0	1	0	100	1	250	3	0	0	0
Gunkalam pedda tank	10.86	29.96	30.88	173.83	2.06	0.8	4	0	29.96	1	1030	2	5.43	173.83	0
Gollavani gunta	6.9	45	45.6	137.98	1.27	0.17	2	0	45	1	630	3	3.45	80	30

ANNEXURE V

E. Environmental Analysis Results (Surface Water Quality)

Tank	Sample	Transparency	Colour	Odour	Temp	pH	EC	TDS	DO
		(Inches)	(no unit)	(no unit)	(°C)	(no unit)	(µs/cm)	(mg/l)	(mg/l)
Singanamala tank	-	NA	NA	NA	NA	NA	NA	NA	NA
Y.T Cheruvu	-	NA	NA	NA	NA	NA	NA	NA	NA
Veerakanellore	Veerakanellore S1	14	Light brown	No odour	31.4	5.8	865	335	5
Nallatamaiah tank	Nallatamaiah S1	33	Colourless	No odour	30.2	6.7	674	272	6
Nallatamaiah tank	Nallatamaiah S2	31	Colourless	No odour	30.2	6.8	649	264	6
Badvel pedda tank	Badvel S1	2	Brownish	No odour	30.1	12.1	160	67	5.6
Badvel pedda tank	Badvel S2	2	Brownish	No odour	29.1	10	157	66	5.8
Chennampalli tank	Chennampalli S1	7	Light brown	No odour	30	13.1	348	145	5.7
Chennampalli tank	Chennampalli S2	7	Light brown	No odour	29.8	13	346	142	5.9
Borragudem tank	Borragudem S1	6	Brownish	No odour	31.6	8.3	327	132	7.1
Borragudem tank	Borragudem S2	5	Brownish	No odour	32.0	8.0	329	134	7.3
Nakkalagandi reservoir	Nakkalagandi S1	6.3	Brownish	No odour	30.2	11.8	435	182	6.3
Nakkalagandi reservoir	Nakkalagandi S2	5.8	Brownish	No odour	32.4	11.2	469	191	5.8
Ura tank	-	NA	NA	NA	NA	NA	NA	NA	NA
Ananthasagaram tank	Ananthasagaram S1	12	Light brown	No odour	28.1	8.3	973	380	6.3
Ananthasagaram tank	Ananthasagaram S2	12	Light brown	No odour	28	10.8	947	364	6.5
Markapuram tank	Markapuram S1	5	Yellowish brown	No odour	30	8.8	2504	862	5.8
Markapuram tank	Markapuram S2	4	Greenish yellow	No odour	31	10.8	2252	910	5.6
Kurmasagaram tank	Kurmasagaram S1	7	Light brown	No odour	27.5	8.5	201	81	6.9
Kurmasagaram tank	Kurmasagaram S2	11	Light brown	No odour	27.9	8.4	225	90	6.8
Dattapatta tank	Dattapatta S1	5	Light brown	No odour	32.3	8.3	563	230	7.3
Gunkalam tank	Gunkalam S1	3	Light brown	No odour	27.8	10.4	590	239	6.8
Gunkalam tank	Gunkalam S2	5	Light brown	No odour	27.5	10.6	623	252	7.2
Gollavani gunta	Gollavani gunta S1	4	Brownish	No odour	29.6	13	328	132	6.2
Gollavani gunta	Gollavani gunta S2	3	Yellowish brown	No odour	29.6	13.1	276	113	6.1

ANNEXURE V

F. Environmental Analysis Results (Tank Bed Sediment Quality)

Tank	Texture	pH (1:5 suspension)	Electrical conductivity, uS/cm (1:5 suspension)	Total Nitrogen, mg/kg	Total Phosphorous, mg/kg	Available Potassium, mg/kg	Iron as Fe, mg/kg	Organic Carbon,%	Copper as Cu, mg/kg	Manganese as Mn, mg/kg	Zinc as Zn, mg/kg
Chennampalli Tank-I	Clay	8.73	128.8	84	36.2	2188.8	703.4	0.33	<5	14.7	80.3
Chennampalli Tank-II	Clay	8.92	207	647.3	460.8	3427.5	1700	0.17	<5	19.7	77.3
Ura Tank – I	Clay	8.19	122	126.4	1203.9	6688	720.3	4.07	<5	9.6	63.7
Ura Tank – II	Clay	8.28	1525	940.7	1677.6	5864	3316.7	0.48	<5	27.6	48.3
Ananthasagaram-I	Silt	8.06	204	455	262	248	216.2	0.40	<5	16.3	71.3
Ananthasagaram-II	Sand	7.77	375	506	739.9	594.2	2924	0.11	<5	41.7	61.7
Badvel-I	Clay	8.03	87.9	1099	524	2700	612.7	0.73	<5	32.1	48.2
Badvel-II	Clay	8.07	251	1675.3	134.9	2758.6	3028.6	1.27	<5	16.1	72.6
Nagalagandi Reservoir-I	Sand	8.62	111.3	521	215	455	517.1	0.35	<5	22.6	72.8
Nagalagandi Reservoir-II	Clay	8.37	173.2	1514.2	103.4	2709.8	86.7	1.01	<5	11.8	52.3
Golavanigunta – I	Clay	8.18	99.6	575.8	1126	3222	584.7	0.22	<5	7.7	97.3
Golavanigunta – II	Clay	7.2	91.3	603.6	2318.2	892.7	3487.7	0.20	<5	18	71.7
Daddapatta Tank – I	Clay	7.74	354	1072.8	1857.2	4085	2463.2	0.52	<5	16.6	112
Daddapatta Tank – II	Clay	8.01	333	746.2	335.5	3937	10678.7	0.23	<5	25.4	93.7
Kurmasagaram-I	Clay	8.48	100.7	638	350	594	2512.4	0.36	<5	38.6	40.5
Kurmasagaram-II	Clay	7.75	262	770	649.4	3623	290.7	0.45	<5	33.5	65.5
Markapur-I	Clay	8.42	502	947.4	700.7	5792.4	3429.8	2.51	<5	14.5	77.3
Markapur-II	Clay	8.01	704	1860	603.6	3658.4	9.6	1.50	<5	36.9	58.2
Gunkalam Pedda Tank-I	Clay	8.19	134.3	550.4	222	2431	1729.7	0.18	<5	22.8	62.8
Gunkalam Pedda Tank-II	Clay	8.71	153.6	524	1007.3	2071.8	8.8	0.13	<5	31.7	73.6
Nallatamaian Tank-I	Clay	7.5	257	2120	1413	2418	1537.6	1.72	<5	15.6	55.1
Nallatamaian Tank-II	Clay	7.63	253	2110	1403	2408	1507.6	1.70	<5	21.4	71.8
Borragudem-I	Clay	8.29	62	2150	42.8	353	6767	0.87	<5	16.4	47.1
Borragudem-II	Clay	8.37	54	452	30.6	327	6572	0.22	<5	17	36.9

ANNEXURE V

G. Environmental Analysis Results (List of Birds Identified in the Sample Tanks)

Common Name	Scientific Name	Telugu Name
Little egret	*Egretta garzetta*	Chinna tella konga
Cattle egret	*Bubulcus ibis*	Samti konga
Pond heron	*Ardeola grayii*	Guddi konga
Kingfisher	*Halcyon smyrnensis*	Neela buchigadu
Pied kingfisher	*Ceryle rudis*	Neella buchigadu
Cormorant	*Phalacrocorax fuscicollis*	Bontakaki
Little grebe	*Tachybaptus ruficollis*	Munugudi-kodi
River tern	*Sterna aurantia*	Ramadasu
Pheasant tailed jacana	*Hydrophasianus chirurgus*	Jamudutoka jacana
Common myna	*Acridotheres tristis*	Goranka
Wabbler	*Sylvia sp*	-
House crow	*Corvus splendens*	Manchi kaki
Jungle crow	*Corvus macrorhynchos*	Mala kaki
Indian roller	*Coracias benghalensis*	Pala pitta
Greater caucal	*Centropus sinensis*	Jemudu kaki
Rock pigeon	*Columba livia*	Gudi pavrai
Baya weaver	*Ploceus philippinus*	Pasupu pitta
Little green bee eater	*Merops orientalis*	Chinna passeriki
Common Tailor bird	*Orthotomus sutorius*	Likka jitta
House sparrow	*Passer domesticus*	Oora pichchuka
Black drongo	*Edolius macrocercus*	Passala poli gadu
Grey francolin	*Francolinus pondicerianus*	Budidarangu kamsu
White wagtail	*Motacilla alba*	Wellakampa jitta
Shikra	*Accipiter badius*	Jail dega
Pariah kite	*Milvus migrans*	Malla gadda
Red wattled lapwing	*Vanellus indicus*	Yennappa chitawa
Asian Pied Starling	*Gracupica contra*	Venda gorinka
Asian Koel	*Eudynamys scolopaceus*	Kokila
Common moorhen	*Gallinula chloropus*	Jumbu kodi

ANNEXURE V

H. Environmental Analysis Results (List of Flora Identified in the ESMF Sample Tanks)

Botanical Name	Family	Habit	Common Name
Abrus precatorius	Fabaceae	Climber	Crab's eye
Acacia nilotica	Fabaceae	Tree	Gum arabic tree
Acalypha indica	Euphorbiaceae	Herb	Indian nettle
Achyranthes aspera	Amaranthaceae	Herb	Prickly chaff flower
Aerva lanata	Amaranthaceae	Herb	Mountain knotgrass
Alangium salviifolium	Alangiaceae	Tree	Sage Leaved Alangium
Aloe vera	Asphodelaceae	Herb	Aloe
Alternenthera sessilis	Amaranthaceae	Herb	Sessile Joyweed
Amaranthus viridis	Amaranthaceae	Herb	Slender amaranth
Annona reticulate	Annonaceae	Tree	Custard Apple
Aristida setecea	Poaceae	Grass	Broom grass
Azardiracta indica	Meliaceae	Tree	Neem
Boerhavia diffusa	Nyctaginaceae	Herb	Punarnava
Borassus flabellifer	Arecaceae	Tree	Asian palmyra palm
Butea monosperma	Fabaceace	Tree	Flame of the forest
Calotropis gigantea	Apocynaceae	Shrub	Crown flower
Calotropis procera	Apocynaceae	Shrub	Apple of sodom
Canthium dicoccum	Rubiaceae	Tree	Ceylon Boxwood
Capparis spinosa	Capparidaceae	Shrub	Caper bush
Carissa carandas	Apocynaceae	Shrub	Karanda
Carmona retusa	Boraginaceae	Shrub	Fukien Tea
Cassia auriculata	Fabaceae	Shrub	Tanner's Cassia
Cassia obtusifolia	Fabaceae	Shrub	Chinese senna
Cassia occidentalis	Fabaceae	Shrub	Coffee senna
Chamaesyce indica	Euphorbiaceae	Herb	.
Chloris barbata	Poaceae	Grass	Swollen Finger Grass
Chrozophora rottleri	Euphorbiaceae	Herb	Suryavarti
Cissus quadrangularis	Vitaceae	Creeper	Veldt Grape
Cissus vitiginea	Vitaceae	Climber	South Indian Treebine
Citrullus colocynthus	Cucurbitaceae	Creeper	Colocynth
Cleome gynandra	Capparaceae	Shrub	African Spider Flower
Cleome sp.	Capparaceae	Shrub	
Cleome viscosa	Capparaceae	Shrub	Asian spider flower
Coccinia grandis	Cucurbitaceae	Climber	Ivy gourd
Commelina benghalensis	Commelinaceae	Herb	Bengal Dayflower
Corchorus aestuans	Tiliaceae	Herb	East Indian Mallow
Croton bonplandianum	Euphorbiaceae	Herb	Ban tulsi
Cyanodon dactylon	Poaceae	Grass	Bermuda grass
Datura innoxia	Solanaceae	Shrub	Downy thorn-apple
Dichrostachys cinerea	Mimosaceae	Tree	Sickle bush

Botanical Name	Family	Habit	Common Name
Digera muricata	Amaranthaceae	Herb	False Amaranth
Dodonea viscosa	Sapindaceae	Shrub	Hop Bush
Dopatrium lobelioides	Scrophulariaceae	Herb	
Eclipta prostrata	Asteraceae	Herb	False daisy
Eichhornia crassipes	Pontederiaceae	Aquatic herb	Water hyacinth
Euphorbia tirucalli	Euphorbiaceae	Shrub	Indian tree spurge
Evolvulus nummularius	Convolvulaceae	Herb	Roundleaf Bindweed
Ficus benghalensis	Moraceae	Tree	Banyan tree
Ficus hispida	Moraceae	Tree	Hairy fig
Ficus religiosa	Moraceae	Tree	Peeple tree
Fleuggea leucopyrus	Euphorbiaceae	Shrub	Bush weed
Glinus oppositifolius	Molluginaceae	Herb	Chayuntarashi
Gomphrena serrata	Amaranthaceae	Herb	Prostrate Gomphrena
Heliotropium angiospermum	Boraginaceae	Herb	Scorpion tail
Hemidesmus indicus	Apocynaceae	Climber	Indian Sarsaparilla
Hyptis suaveolens	Lamiaceae	Herb	American Mint
Imperata cylindrical	Poaceae	Grass	Cogon grass
Indigofera astragalina	Fabaceae	Herb	Silky Indigo
Indigofera tinctoria	Fabaceae	Herb	Ture indigo
Ipomea aquatica	Convolvulaceae	Aquatic creeper	Water morning glory
Ipomea carnea	Convolvulaceae	Aquatic emergent	Bush Morning Glory
Jasminum angustifolium	Oleaceae	Climber	Wild Jasmine
Jatropha gossipifolia	Euphorbiaceae	Shrub	ellyache bush
Lantana camara	Verbenaceae	Shrub	Lantana
Lemna minor	Lemnaceae	Aquatic free floating	common duckweed
Leucaena leucocephala	Fabaceae	Tree	Wild tamarind
Lippia nodiflora	Verbenaceae	Herb	Frog fruit
Macroptilium lathyroides	Fabaceae	Herb	Wild bushbean
Malvastrum coromandelianum	Malvaceae	Herb	False mallow
Mecardonia procumbens	Plantaginaceae	Herb	Baby Jump Up
Melochia corchorifolia	Sterculiaceae	Herb	Chocolate Weed
Mikania micrantha	Asteraceae	Climber	bitter vine
Mimosa pudica	Fabaceae	Herb	Touch Me Not
Morinda tinctoria	Rubiaceae	Tree	Indian Mulberry
Nymphaea alba	Nymphaeaceae	Aquatic attached floating	Nilofar
Ocimum americanum	Lamiaceae	Herb	Hoary Basil
Opuntia stricta	Cactaceae	Shrub	Common Prickly Pear
Parkinsonia aculeata	Fabaceae	Tree	Jerusalem Thorn
Parthenium hysteroporus	Asteraceae	Herb	Pathenium weed
Passiflora foetida	Passifloraceae	Climber	Red fruit passion flower
Pedalium murex	Pedaliaceae	Herb	Large Caltrops
Pentatropis capensis	Apocynaceae	Climber	Ambarvel
Pergularia daemia	Apocynaceae	Climber	Pergularia
Pheonix dactylifera	Arecacea	Tree	Date palm

Botanical Name	Family	Habit	Common Name
Phyllanthus maderaspatensis	Phyllanthaceae	Herb	Madras Leaf-Flower
Phyllanthus reticulate	Euphorbiaceae	Shrub	Blach honey shrub
Physalis angulate	Solanaceae	Herb	cutleaf groundcherry
Pongamia pinnata	Fabaceae	Tree	Indian Beech
Portulaca oleracea	Portulacaceae	Herb	Common Purslane
Prosopis juliflora	Fabaceae	Tree	Prosopis
Riccinus communis	Euphorbiaceae	Shrub	Castor bean plant
Sapindus trifoliatus	Sapindaceae	Tree	Soap nut tree
Sarcostemma secamone	Apocynaceae	Climber	
Sesbania procumbens	Fabaceae	Herb	Trailing sesban
Sida acuta	Malvaceae	Herb	Common wireweed
Sida cordifolia	Malvaceae	Herb	Heart-leaf sida
Solanum trilobatum	Solanaceae	Creeper	Purple Fruited Pea Eggplant
Solanum virginianum	Solanaceae	Herb	Yellow-fruit nightshade
Spermacoce hispida	Rubiaceae	Herb	Shaggy button weed
Spirodella polyrizha	Lemnaceae	Aquatic free floating	Greater Duckweed
Stachytarpheta jamaicensis	Verbenaceae	Herb	Blue Porterweed
Streblus asper	Moraceae	Tree	Sand paper tree
Strychnous nuxvomica	Loganiaceae	Tree	Nux vomica
Tamarindus indica	Fabaceae	Tree	Tamarind
Tarrena asiatica	Rubiaceae	Shrub	Asiatic Tarenna
Todalia asiatica	Rutaceae	Climber	Orange climber
Tribulus terrestris	Zygophyllaceae	Herb	Puncture Vine
Tridax procumbens	Asteraceae	Herb	Coat Buttons
Typha angusta	Typhaceae	Grass	Lesser Indian Reed Mace
Wattakaka volubilis	Apocynaceae	Climber	Green Milkweed Climber
Wrightia tinctoria	Apocynaceae	Tree	Sweet Indrajao
Ziziphus mauritiana	Rhamanaceae	Tree	Jujube
Ziziphus oenoplia	Rhamanaceae	Shrub	Jackal jujube

ANNEXURE VI

I. Project Cycle in a Cascade System

Sl.	Activity	Responsibility		
		Primary	*Secondary*	*Tertiary*
Cascade/Tank Identification Stage				
1	Hydrological & technical assessment of cascade and tanks	SPMU	DPU	
2	Delimitation of water spread Area up to FTL, feeder channels and command area of tank	DPU		
3	Selection of cascade/tank	DPU		
4	Assessment of groundwater recharge potential of selected cascade/tank	DPU		
5	Selection of tank for groundwater interventions	DPU		
6	Identification of groundwater unit / influence zone of the selected tank	DPU		
7	Identification of encroachment in tank	DPU	WUA	
8	Selection of Support Organization	DPU		
Pre- Planning Stage				
9	Social Mapping & identify all tank stakeholders / groundwater users in tank system area and influence zone	SO	WUA	DPU
10	Project sensitization and awareness among the tank stakeholders	SO	WUA	
11	Involve village level functionaries of line departments / PRI department	SO	WUA	DPU
12	Organize tank based consultation with all stakeholders (Including fishermen, catchment farmers, groundwater users in influence zone, etc.)	SO	WUA	
13	Assessment of WUA readiness for contribution towards restoration & rehabilitation of tank	SO	WUA	DPU
14	Preparation of Encroachment Rehabilitation Plan (ERP)	DPU	WUA	SO
15	Agreeing on draft MoU between WUA & DPU	DPU	WUA	SO
16	Signing of MoU between WUA & DPU	DPU / WUA		
17	Maintenance of documents, books and accounts by WUA	WUA	SO	
Planning Stage				
18	Implementation ERP	DPU	WUA	SO
19a	Data collection: 1. Participatory Rural Appraisal on: Socio-economic profile of tank stakeholders Resource profile of tank system Trend analysis of groundwater based irrigation Tank based production system analysis Problem identification (tank system	SO	WUA	DPU

Sl.	Activity	Responsibility		
		Primary	*Secondary*	*Tertiary*
	deterioration) Needs identification (Related to WUA institutional development / tank restoration / livelihood) Identification of resources with WUA Identification of interventions (WUA institutional development / tank restoration including groundwater / livelihood / trainings) Identification of expected outputs from proposed interventions			
19b	Technical aspects of tank, catchments area & command area / tank influence zone	DPU	WUA	SO
20	Provide initial training to WUA members on Cascade Development Plan (CDP) and Sector Specific Plans (SSP) preparation (Particularly on micro-planning, preparation of estimation, procurement, etc)	SO		
21	Form the four sub committees on Works, Finance, Monitoring, Evaluation & Training and Water Management	SO	WUA	DPU
22	Provide training to all sub committee members on their roles and functions	SO	WUA	DPU
23	Mobilize groundwater users in tank influence zone into groundwater user groups and affiliate them to the WUA	SO	WUA	
24	Awareness generation among groundwater user groups about project groundwater interventions	SO	WUA	
25	Prepare Cascade Development Plan (CDP)	WUA	SO	DPU
25a	Design, estimate of Civil works	DPU	WUA - WSC	
25b	Training Plan	SO	WUA - WSC	
25c	Livelihoods Plan	SO	WUA - WSC	
25d	Compilation of CDP Document	SO		
26	Ratify CDP in WUA General Body meeting	WUA	SO	DPU
27	Identification of activities for Gram Panchayat implementation and submit the list to the GP	WUA	SO	DPU
28	Open WUA bank account for contribution (separate from WUA account)	WUA	DPU	
29	Mobilization of cash contributions	WUA	SO	
30	Appraisal of CDP by DPU	DPU		
31	Inclusion of CDP in District Action Plan for DLIC Approval	DPU		
32	Sign Agreement on CDP implementation between WUA and DPU	WUA / DPU		
33	Prepare procurement plan for materials & manpower for works by WUA	WUA / DPU	SO	
34	Preparation of tender documents for works to be tendered	DPU	WUA	

Sl.	Activity	Responsibility		
		Primary	*Secondary*	*Tertiary*
35	Maintenance of documents, books and accounts	WUA	SO	DPU
Implementation				
36	Public display of project information on wall / notice board	WUA		
37	Implementation of civil works by WUA, and other CDP activities	WUA	SO	DPU
38	Implementation of civil works by contractors	Contractor	DPU	WUA
39	Supervision of both type of works	WUA	SO	DPU
40	Quality assurances through agreed mechanism and reporting	NCCBM	DPU	WUA
41	Work completion report	DPU	WUA	
42	Carry out trainings (WUA management / livelihood / financial management / O&M / M&E / water management / groundwater management, etc)	SO / Resource Persons	WUA	
43	Implementation of participatory hydrological monitoring	WUA	SO	DPU
44	Crop-water budgeting and crop planning for groundwater based irrigation in tank influence zone	WUA	SO	DPU
45	Promotion of water efficient technologies in groundwater based irrigation	WUA	SO	DPU
46	Institutional strengthening of groundwater user groups	SO	WUA	DPU
47	Mobilization and formation of common interest groups for agri-business promotion	SO	WUA	DPU
48	Implementation of livelihoods & agri-business plans etc.	SO	WUA	DPU
49	Strengthen linkages with departments, commercial banks and private sector	SO	WUA	DPU
50	Maintenance of documents, books and accounts	WUA	SO	DPU
51	Participatory monitoring at village level	WUA	SO	DPU
Post Implementation				
52	Assessment of WUA for refresher trainings	SO	WUA	
53	Refresher Training for WUA	SO / Resource Persons	WUA	
54	Update seasonal O&M strategy, plans and estimates	DPU	WUA	SO
55	Operationalize O&M plan	WUA	DPU	SO
56	Maintenance of O&M fund	WUA	DPU	SO
57	Maintenance of documents, books and accounts	WUA	DPU	SO
58	Preparation of project completion report on agreed format	DPU	WUA	SO
59	Monitoring at WUA performance every 6 months	WUA	DPU	

ANNEXURE VII

J. Environmental Screening Tool for Rehabilitation of Tanks

<table>
<tr><td colspan="2">1. GENERAL</td></tr>
<tr><td colspan="2">1.1. Tank type: Cascade / Independent</td></tr>
<tr><td colspan="2">1.2. No. of Tanks :</td></tr>
<tr><td colspan="2">1.3. List of Tanks :</td></tr>
<tr><td colspan="2">1.4. Package no.:</td></tr>
<tr><td colspan="2">1.5. Minor Basin:</td></tr>
<tr><td colspan="2">1.6. Major Basin:</td></tr>
<tr><td colspan="2">1.7. Length of Bund (m) (min to max):</td></tr>
<tr><td colspan="2">1.8. Height Bund (m) (min to max):</td></tr>
<tr><td colspan="2">1.9. No. of Sluices:</td></tr>
<tr><td colspan="2">1.10. No. of Irrigation Channels :</td></tr>
<tr><td colspan="2">1.11. No. of Feeder Channels :</td></tr>
<tr><td colspan="2">1.12. Total Present Ayacut (Ha):</td></tr>
<tr><td colspan="2">1.13. Total Designed Ayacut (Ha):</td></tr>
<tr><td colspan="2">1.14. Total Storage capacity (Mcft):</td></tr>
<tr><td>1.15. Average annual rainfall in command area (mm)</td><td></td></tr>
<tr><td>1.16. Soil type in command area</td><td></td></tr>
<tr><td>1.17. Total Ayacut (ha)</td><td></td></tr>
<tr><td>1.18. Present Ayacut (ha)</td><td></td></tr>
<tr><td>1.19. Gap Ayacut Area (ha)</td><td></td></tr>
<tr><td>1.20. Depth of ground water table in Ayacut (m)</td><td>☐Shallow (0-5m)
☐Moderate (5-10m)
☐Deep aquifer (10-20m)
☐Very Deep aquifer (below 20m)</td></tr>
<tr><td>1.21. Ground water zone classification as per CGWB</td><td>☐Over-exploited, ☐Saline
☐Semi-critical, ☐Critical
☐Safe</td></tr>
<tr><td>1.22. Ayacut under the tanks (list name of villages)</td><td>
<table>
<tr><th>Sl</th><th>Name of Tank</th><th>Name of village</th><th>Ayacut (ha)</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>1.23. Existing Water User Associations (WUAs)</td><td>Yes/ No</td></tr>
<tr><td>1.24. No. of WUAs and Members</td><td>
<table>
<tr><th>Sl</th><th>Name of Tank</th><th>No. of WUAs</th><th>Women WUA members</th><th>Total Members</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>1.25. Is the proposed project likely to contaminate water due to use of heavy</td><td>☐ Yes</td></tr>
</table>

machinery, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, pesticides etc?) 1.26. If yes, whether appropriate safeguards are proposed? (write a note)	☐ No
1.27. Works to be undertaken	☐Tank bund strengthening ☐Rehabilitation of tank surplus Weir/sluices ☐Rehabilitation of Irrigation/ Feeder channels
1.28. Is the proposed project likely to affect any natural habitats/conversion of natural habitats/ cultural properties/ wetlands/ wildlife/ migratory routes? 1.29. If yes, identify potential impacts on Natural Habitat. Accordingly use mitigation actions given in ESMF NHMP plan.	☐ Yes ☐No
2. Tank –Bund strengthening and rehabilitation of sluices/weirs	
2.1. Is tank in an eco-sensitive area?	☐ Yes ☐ No
2.2. Identified disposal site for waste from tanks	
2.3. Earthwork: (i) Volume of silt to be dredged (cum) (ii) Volume of dredged silt to be used in embankment strengthening (cum) (iii) Volume of dredged silt to be disposed (cum)	- - -
2.4. Identified borrow pits site(s) along with distance from the work site	
2.5. Identified silt testing laboratory along with distance from the work site	
2.6. Works required on Sluices/Weirs	☐ Reconstruction ☐ Repairs
2.7. Identified silt disposal site(s) along with distance from the work site	
2.8. Identified site(s) for disposal of debris along with distance from work site	
2.9. Identified site(s) for disposal of iron waste/scrap	
3. Rehabilitation of irrigation/feeder channels:	
3.1. Desilting of channels (i) Volume of silt to be dredged (cum) (ii) Volume of dredged silt to be used in embankment strengthening (cum) (iii) Volume of dredged silt to be disposed (cum)	
3.2. Rehabilitation of channels proposed? If yes, what type of works	
3.3. Identified borrow pits site(s) along with distance from the work site	
3.4. Identified silt testing laboratory along with distance from the work site	
3.5. Identified silt disposal site(s) along with distance from the work site	
4. Equipment/machinery to be deployed –NA (Contractor shall use licensed machineries only)	

ANNEXURE VIII

K. List of Participants in the Disclosure Workshops

PARTICIPANTS IN DISTRICT LEVEL WORKSHOP		
Sl	**Participant**	**Designation**
1	Dr. Joseph Plakkoottam	M & E Specialist , PMU, APIIATP
2	Sri C. Ratnama Chary	Sr. Fisheries Expert, PMU, APIIATP
3	Dr. K Gopalakrishna	IB & CB Expert, PMU APIIATP
4	Smt Ch. Shashi Kiran	CB & Communication Expert, PMU, APIIATP
5	Dr. N. Bhaskar Rao	GIS Expert, PMU, APIIATP
6	Sri P. Kiran	MIS Expert, PMU, APIIATP
7	Ms. Aiswarya Misra	Consultant, Sutra Consulting
8	Sri P. Vijaya Kumar	Consultant, Sutra Consulting
9	Sri D. A. Santhosh	Consultant, Sutra Consulting
10	Ms. Padma	Consultant, Sutra Consulting
11	Sri K. Ramana	EE, SMI, Visakhapatnam
12	Sri S. Jagadeeswararao	DEE, SMI, Visakhapatnam
13	Sri M. Ramjee	AEE, SMI, Visakhapatnam
14	Sri J. V. Sudhakar Reddy	AEE, SMI, Visakhapatnam
15	Sri N. Navaji	AEE, SMI, Visakhapatnam
20	Sri J. Ramu	TA, SMI, Araku
21	Sri K. Chandranna	TA, SMI, Araku
16	Sri D. Jagadeesh Kameswaram	DEE, Water Resource Department
17	Sri V. R. N. Tagore	DEE, Water Resource Department
18	Sri R. Rajeswara Rao	DEE, Water Resource Department
19	Sri D.Lokesh	AEE, Water Resource Department
22	Sri K.S.Sastry	DD, Groundwater & Water Audit Dept.
23	Sri G.K.M.Gandhi	Asst. Director, Ground Water Department
24	Smt K. Anuradha	AD, Horticulture Department
25	Sri K. Sailaja	AD, Horticulture Department
26	Sri J. Seetharamaraju	FDO, Fisheries Department
27	Sri M. Simhachalam	Mandal Agriculture Officer
28	Smt J. Laxmi	MPTC
29	Smt S. Rajulamma	Sarpanch, Similiguda
30	Smt S. Rajulamma	Sarpanch, Kotha Alluguda
31	Sri P. Danteswararao	Ward Member
32	Sri P. Pandu	Chairman, WUA
33	Sri S. Bangaram	Vice-President, WUA
34	Sri K. Subbarao	Farmer
35	Sri K. Ravikumar	Farmer
36	Sri Sh.Arjun	Farmer
37	Sri G. Sona	Farmer
38	Sri V.Sibo	Farmer
39	Sri P. Simhadri	Farmer

PARTICIPANTS IN DISTRICT LEVEL WORKSHOP		
Sl	**Participant**	**Designation**
40	Sri G. Ramurthy	Farmer
41	Sri S. Pandu	Farmer
42	Sri K. Gundu	Farmer
43	Sri V. Dayanidhi	Farmer
44	Smt. K. Lakshmi	Farmer
45	Sri K. Donbu	Farmer
46	Sri S.Ram Chandar	Farmer
47	Sri J. Sonu	Farmer
48	Sri R. Govindu	Farmer
49	Sri S. Chandu	Farmer
50	Sri B. B. Sundar	Farmer
51	Sri T. Pothuraju	Farmer
52	Smt B. Mangala	Farmer
53	Sri K. Simhadri	Farmer
54	Sri D .Krupa	Farmer
55	Smt S.Radha	Farmer
56	Sri K. Bhimeeli	Farmer
57	Sri S. Gopal	Farmer
58	Sri S. Qemy	Farmer
59	Sri S. Raju	Farmer
60	Smt J.	Farmer
61	Sri S. Baji Patak	Farmer
62	Smt M. Sridevi	Farmer
63	Smt J. Ramba	Farmer
64	Sri S. Balachi	Farmer
65	Smt S .Bostiyama	Farmer
66	Sri T. Dharmendra	Farmer
67	Sri B.R. Kameswar	Farmer
68	Sri K. Chinnaiah	Farmer
69	Sri G. Dharma	Farmer
70	Sri P. Pandu	Farmer

PARTICIPANTS IN STATE LEVEL WORKSHOP			
Sl	**Name of the Participant**	**UNIT**	**Designation**
1	Dr. P.S. Raghavaiah	APIIATP	State Project Director
2	T. Ananda Babu	APIIATP	JD (Finance)
3	Y.V. Raja Rajeswari	APIIATP	SE/APIIATP
4	Y. Sai Lakshmiswari	APIIATP	JDA/APIIATP
5	P. Vijayakumar	Consultant	Sr. fisheries expert, SUTRA
6	Aiswarya Mishra	Consultant	Consultant, SUTRA
7	G. Padma	Consultant	Consultant, SUTRA
8	D. A. Santhosh	Consultant	Consultant, SUTRA
9	B. Pavan Kumar	Dept	Fisheries Devt Officer
10	T. Govardan	Dept	Joint director, GW &Water Audit Dept
11	V. Vijayababu	Dept	AD, GW &Water Audit Dept, HO
12	M. John Satyaraju	Dept	DD, GW &Water Audit Dept
13	P. V. Ramana	Dept	Asst Director, Horticulture
14	P. Venkataramana	DPU	Executive Engineer, SPl Division
15	Dr Joseph Plakkoottam	PMU	M&E Specialist
16	M. Mastan Rao	PMU	Agribusiness Expert
17	Dr. K. Gopalakrishna	PMU	S&ID Expert
18	P. Kiran	PMU	MIS Expert, PMU
19	C. Ratnamachary	PMU	Sr. Fisheries Expert
20	D. Vijaya Vardanrao	PMU	Asst Hydrogeologist
21	Ch. Shashikiran	PMU	CB & Communication Expert
22	M. Maruthi Prasad	PMU	DEE/APIIATP/CADA
23	Y. K. Kanthi	PMU	AEE/APIIATP
24	Radha Madhavi	PMU	AEE(T)/APIIATP
25	A. Baburao	PMU	EE (T& Procurement)
26	T. V.Ravikumar	PMU	DEE(T)/APIIATP
27	K. Srinivasarao	PMU	DEE, APIIATP
28	G. Kajeswaramma	PMU	ADA, APIIATP
29	J. Niharika	PMU	AH, APIIATP
30	Bh. Suvarna Kumari	WUA	WUA President, Kavuluru, Krishna Dt
31	J. Lakshmi	WUA	WUA Member, Kavuluru, Krishna Dt
32	Yeruva Subba Rao	WUA	WUA President, Rudravaram, Krishna Dt
33	P. Anji Reddy	WUA	WUA President, Reddygudem, Krishna Dt
34	G. Koteswararao	WUA	WUA member, Reddygudem, Krishna Dt
35	Madala Sambasiva Rao	WUA	WUA member, Reddygudem, Krishna Dt

ANNEXURE IX

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