

Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project (P160463)
Preparation Mission: August 2-11, 2017

Aide Memoire

Introduction

1. A World Bank Preparation Mission¹ was undertaken from August, 2-11, 2017 to assess progress in the preparation of the proposed Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project (AP-IIATP). Detailed discussions were held with project authorities in Vishakhapatnam and Vijayawada, and field visits were made to two different tank command areas in the Vishakhapatnam district to assess support needed under the agriculture interventions, fishery development, agribusiness opportunities and related project interventions.
2. The mission had discussions and a wrap up meeting with Additional Chief Secretary - Agriculture (Mr. B Rajasekhar), and Special Secretary, Irrigation (Mr. Shashi Bhushan). The World Bank team would like to convey its sincere thanks and appreciation to GoI, GoAP, the Project Director and his team at the PMU, and the line department officials for their cooperation, support and active participation in the mission.

Mission Objectives

3. The purpose of the mission was to review progress in the preparation of AP-IIATP and readiness for initiating the implementation of project activities. The mission discussed the project components and sub-components with the PMU and other State representatives, with extensive discussions on likely interventions under agriculture, fishery, agribusiness, and institutional arrangements for the project. The mission also reviewed progress on pending issues, including finalisation of key manuals and Project Implementation Plan (PIP); and scheduling of Pre-Appraisal mission schedule.
4. The objectives of the present preparation mission were:
 - to collect all information for Project Appraisal Document (PAD) preparation.
 - to ascertain client's DEA readiness criteria by ensuring completion of requisite number of DPRs, and all project manuals.
 - to assist the project in developing institutional arrangement, and inter-departmental coordination for project implementation.

This aide memoire summarizes the mission's main findings and agreements reached with the GoAP project team.

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Main Findings

5. The main focus of the mission was to discuss the progress towards meeting the DEA readiness criteria with the PMU. One criteria requires that bid documents for 30 per cent of civil contracts of the project be finalized and be ready to be awarded prior to negotiations. To this effect, the project has effectively fulfilled the criteria by preparing DPRs of 150 tanks (30% of the anticipated 500 civil contracts). The mission reviewed the DPRs and provided feedback on a few of them. The PMU agreed to revise these DPRs by September 30, 2017.

6. The PMU and the DPMU are fully staffed and operational. All individual consultants have been placed in the PMU, and selection process for hiring a consultancy firm for concurrent monitoring and evaluation is in an advanced staged. Drafts of all project manuals and PIP have been prepared, and are in final stages of approval. There will be one technical mission during the month of September to finalize the finance and procurement manuals, and the ESMF (Environmental and Social Management Framework).

7. The mission discussed a proposal to to engage an external consultancy agency to initiate pilots to demonstrate an integrated agri-horti-livestock service delivery models. The pilots would be initiated at three locations in Vishakhapatnam district to achieve of convergence across line departments to deliver transformative results for small and marginal farmers in the command area. It was agreed to initiate the pilots by September 15, 2017

Project Area

8. The project will be implemented in 12 of the 13 districts in Andhra Pradesh. The modernization and rehabilitation of irrigation infrastructure will focus on improving the bulk water delivery of 1,231 tanks (Small Scale Community Based Irrigation Systems -SSCBI), and modernising existing irrigation structures that will cover 141,481 acres of land (total of around 120,000 hectares). The project will lay special emphasis on improving service delivery in both agriculture and irrigation sectors in four backward districts of the state, namely Srikakulam, Vizayanagaram, Visakhapatnam, and Nellore. These districts are among the least productive agricultural districts in the state as well as in the country. It was also reported that more than 50 per cent of the proposed SSCBIs in the new project are also located in these districts. This project would also provide a very good platform for both agriculture and irrigation departments to collaborate in their efforts to improve situation in these four backward districts. The mission had detailed discussions with the two departments and identified several common strategies, which are outlined below under different components.

Project Objective and Components

The component-wise progress and timeline for future actions is detailed below.

Component A: Improving Irrigated Agriculture Efficiency at Farm level

9. This component aims to improve SSCBI 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 four inter-related sub-components: (i) institutional strengthening and capacity building (ii) improving smallholder irrigation system performance and resilience; (iii) improving water productivity and efficiency; and (iv) building synergy with the Primary Sector Mission.

The mission members had detailed discussions with different stakeholders, and could collect adequate information under different components to finalize PAD.

Sub-component A1: Institutional Strengthening and Capacity Building

10. This sub-component relates to mobilizing water users for collective action through the vehicle of Water Users Associations (WUA) for ensuring local level participation in planning, implementing and managing the SSCBI facilities as well as establishing backward and forward farm-linkages with the external government, private sector and non-government agencies. The project would expand the scope of 'SSCBI' beyond the 'crop irrigation' into others i.e., fisheries, animal husbandry and domestic users. The spheres of intervention would include: (i) Policy and Governance - educating and enabling enactment of the existing legislative provisions, and exploring new vistas for establishing relation between different sets of water users; (ii) Physical and Engineering - creation of assets, including capacity building support for designing and implementing construction, as well as managing procurement, finance and quality control; (iii) Operation and Maintenance (O&M) - involving physical sustainability, and improved irrigation performance leading to enhanced production/productivity, incomes and food security; (iv) Social mobilisation - local level organizational development including leadership building and problem solving approaches, empowerment of poor and vulnerable sections such as women, scheduled castes, scheduled tribes etc., and provision of capacity support and capacity building including observation and study tours; and (v) Economic - fixing and collection of water tariff and building of a corpus to enable further modernization and diversification, market penetration to enable establishing backward and forward linkages; and the related book keeping.

11. WUA shall play a pivotal role at the grassroots level and hence the project's Human and Institutional Development (HID) efforts are planned around them, major elements of which include: (i) technical, institutional and financial capacity building of the tank based residents; (ii) updating and upgradation of skills of the state government departments; (iii) providing social intermediation services through NGOs and/ or other experts; (iv) information, education and communication (IEC) campaigns; and (v) women development.

Sub-component A2. Improving Smallholder Irrigation System Performance and Resilience

12. This sub-component will modernize irrigation infrastructure, including SSCBI systems and irrigation canals within a defined catchment, and also use a cascade management approach for improving the bulk water delivery to irrigation systems through rehabilitation and modernization. A total of 1,231 tank systems including irrigation canals off-taking from the sluices of these tanks are proposed to be rehabilitated and modernized. The 315 cascades account for 1,029 tanks, and the remaining 202 are independent tanks. WRD has proposed to rehabilitate about 500 tanks in the first phase.

13. Implementation readiness of the project requires that bids for contracts worth 30 per cent of the project cost (or the first phase) are received and finalized prior to negotiations. WRD has outsourced the preparation of DPRs of 150 tanks (30 % of 500 tanks) covered in 64 DPRs comprising 37 cascades and 27 independent tanks to M/s PSR Constructions. DPRs of 6 cascade

system comprising 19 tanks prepared by the agency were reviewed by the World Bank, and detailed comments including design inputs to be obtained from the Central Designs Organization were furnished to PMU for compliance, and appropriate revision of these DPRs as well as for the preparation of other DPRs based on these comments, and the suggested design inputs.

14. The mission comprehensively reviewed the DPRs of 7 cascade systems (covering 19 tanks) and 6 independent tanks in joint meetings with the agency, and the concerned project engineers of 11 districts. It was noted that full compliance of review comments had not been made, and the DPRs suffered significant shortcomings.

15. The observed shortcomings and deficiencies have been duly highlighted and explained by the mission in detail to both the outsourced agency, and the concerned project engineers for compliance and revision of DPRs. Getting soil classification tests of borrow area soils conducted on priority was again impressed upon the agency. The mission emphasized that preparation of proper DPRs conforming to sound design principles and specifications, correct construction procedures, and acceptable construction quality requirements was of paramount importance and was pre-requisite for preparation of correct Bid Documents by the concerned WRD engineers. Compliance of mission review comments and the design inputs in DPRs was, thus, essential.

16. *Dam Safety:* There are reportedly 3 tank bunds of height more than 15 m proposed for rehabilitation in the first phase, namely Singamala tank and Y T Cheruvu tank in Anantapuram district, and the Badvel tank in Kadapa district. These tank bunds qualify as large dams in terms of ICOLD (International Commission on Large Dams) classification. The Dam Safety Panel constituted by GoAP should promptly inspect these dams, and recommend dam safety measures so that the costs of such measures are duly and timely included in respective DPRs.

17. *Monitoring Mechanism:* It is suggested that the progress of DPRs preparation by the agency is strictly monitored by Chief Engineer, Minor Irrigation. State Project Director, PMU should also put in place a result-oriented monitoring mechanism to expedite progress. In this context, weekly meetings with the outsourced agency (PSR Constructions) should be held.

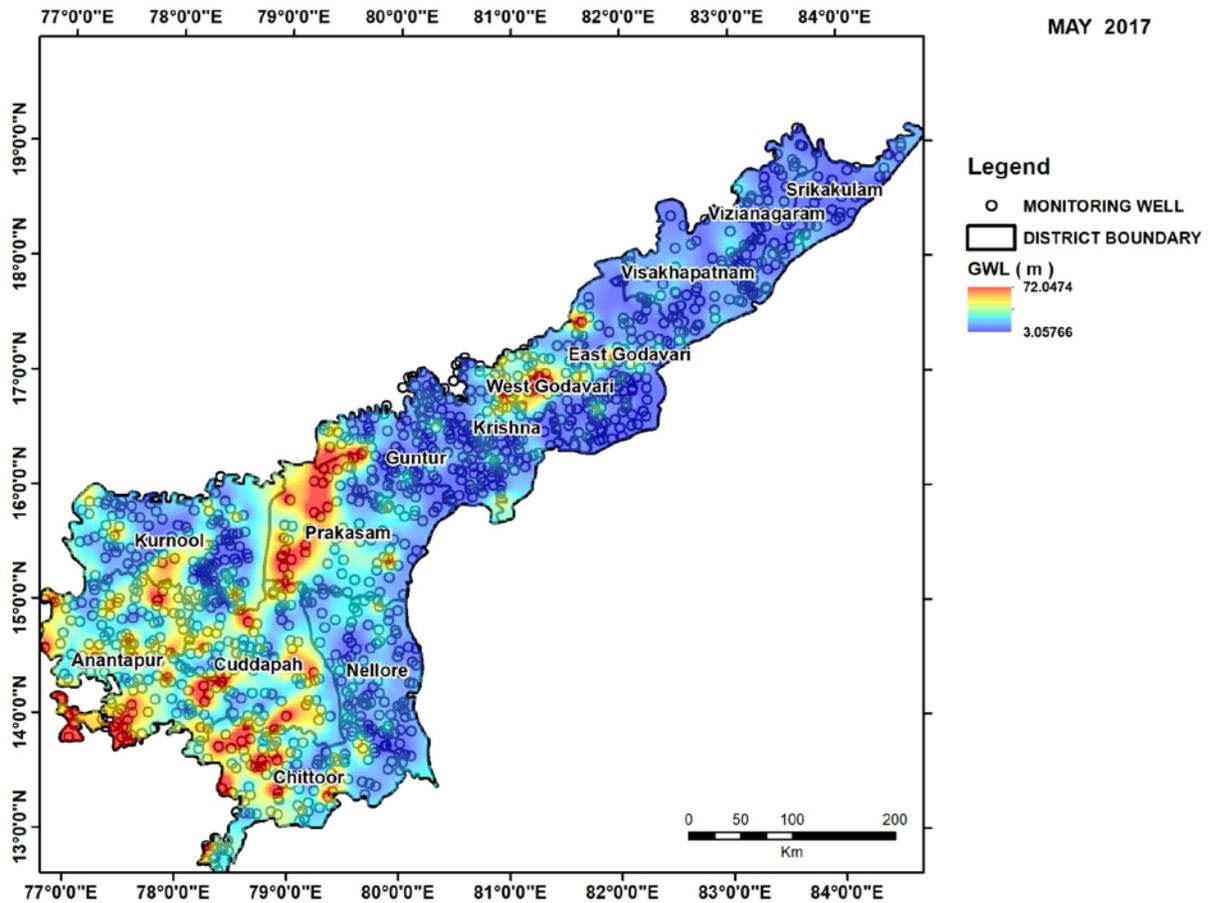
Sub-component A3: Improving On-Farm Water Productivity and Efficiency

18. One of the guiding principles of the project is to improve the resilience of agriculture system to deal with increasing threats of climate change and recurring droughts by investing in tank cascades, and improving water use efficiency. An analysis of the SSCBI system presented in the agriculture workshop during the mission, and ensuing discussions with the agricultural and water resources officers proposed the following perspectives for interventions in the tank systems from the hydrology view point.

a) Due to frequent occurrence of droughts and changes in the rainfall distribution within the monsoon season, the tank systems and the tank cascades are affected by water limiting conditions, which has resulted in substantially lower crop production in the ayacut of the tank systems than their potential. The evapotranspiration (ET) analysis for the state indicates that, in 2010 the crop growth was significantly affected due to excessive rainfall of about 1400 mm (as against a normal rainfall of approx. 960 mm) and flood conditions while from 2011 onwards it shows trends of declining ET due to relatively poor crop growth. Based on hydrological analysis,

due to climate risks, the available water in the tank systems is not adequate to provide protective irrigation during kharif season, which means crops in the tail end of the tank ayacut are experiencing water stress even in kharif season. Furthermore, in the rabi season, the crops have much more water limiting conditions, and hence relatively lower cropping intensities. Rehabilitation and modernization of the tank infrastructure would help in alleviating a part of this problem by enhancing water generation to the tank and its cascades, reduced leakage from the tank sluices thereby improving the available water storage conditions. However, based on hydrological analysis, it was observed that at least in 2/3rd of the state (i.e. in a good number of tanks especially in the coastal regions) the groundwater development is relatively less developed.

b) A groundwater map (see below) of the entire state for the month of May 2017 (pre monsoon) supports this view point. Clearly in areas with relatively very shallow groundwater levels, planned and sustainable development of groundwater in parts of the lowland tank ayacut areas can provide subsistence irrigation in kharif season, and protective irrigation during rabi season. This would result in lowering of the groundwater levels, which are currently high (??) resulting in water logging and poor drainage observed in the field; it will also help buffer against flood years while providing opportunity for diversifying from traditional paddy.



The figure depicts the depth to groundwater level from surface during pre-monsoon (May 2017). Darker blue represents relatively shallow groundwater levels (~ 3 m), and dark red deeper groundwater levels (~ 70 m).

Some groundwater development has already happened and is happening in the upland parts beyond the ayacut in these shallow groundwater districts. Similarly, extensive development of groundwater has taken place in one-third of the state especially in the dryer or lower rainfall areas away from the coast both in the tank ayacut as well as in the upland parts of the tank catchments. In these districts, enhancing/augmenting the groundwater recharge through rehabilitation of the tank systems and tank cascades in addition to proper conjunctive use, improved water use efficiency and suitable crop diversification, is envisaged to increase current cropping intensity, and crop productivity.

c) The focus in the project would be on ICT tools & sensors for better water management, crop-water budgets & water productivity assessments for improved water use efficiency, and also participatory groundwater management for sustainable development of groundwater and /or for reducing the depletion of groundwater in regions of concern.

19. Based on the workshop and ensuing discussions with the agricultural and water resources officers held in Visakhapatnam, the project is recommended to conduct a rapid appraisal on hydrology for each project district so that effective intervention can be taken up. These details are given in the annexure including the key actions to be taken up in the preparatory stage.

Sub-component A.4: Building Synergy with Primary Sector Mission

20. The Government AP has launched the Primary Sector Mission to address farm related issues like enhancing value addition from horticulture, livestock and fisheries and shortages in storage space including cold storages. The focused areas under the Primary Sector are, (a) increasing productivity of the primary sector; (b) mitigating the impact of droughts through water conservation and micro-irrigation; (c) postharvest management to reduce wastage; and (d) establishment of processing, value addition capacity and supply chain of identified crops.

21. Aligning with the objectives of the GoAP Primary Sector Mission, the project will locate avenues of extending support to policy and institutional reforms for enhancing institutional capacities of relevant departments. The sub-component will provide incentives for capital investments for leveraging private sector investment in designing and implementing holistic strategy for the Primary Sector Mission. Based on the day-long workshop, it was agreed to develop a pilot initiative for integrated agri-horti-livestock development framework in three selected tank systems in Vishakhapatnam district. GoAP will engage an external consulting agency to undertake these pilots to help capitalize on inter-departmental synergies and expand the learning across stakeholders.

22. As an innovative design feature, the project is integrating information and communication technology (ICT) tools, sensors and remote sensing to capture data and information on various aspects pertaining to minor irrigation systems to contribute to developing climate-smart agriculture production systems.

23. Component B: Promoting Adaptive Sustainable Agriculture Practices

24. This is an important pillar of the project, aimed at improving the production and productivity of the small holder irrigation system to increase returns to farmers and other water users through adoption of climate smart diversified agriculture production systems. The overall objective is to promote integrated farming systems for improving farmers' income through adoption of climate-resilient agriculture technologies and practices. This component aims to increase crop productivity (Paddy, Maize, Black Gram, Green Gram and Marigold Flower) enhance diversification to high value horticulture and low-water-requiring crops (high value vegetables), and promote fisheries as an alternative livelihood income source. Smallholder producers in project tanks will be facilitated to take advantage of rapidly changing market demand for agricultural commodities to increase and diversify production and manage risks associated with climate change.

25. This component consists of two sub-components: (i) Promoting climate smart diversified agriculture production systems; and (ii) Innovation and technology transfer for fishery production. The implementing agencies are Departments of Agriculture, Horticulture and Fisheries.

Subcomponent B.1: Climate Smart Diversified Agriculture Production Systems

26. As a departure from the earlier project, this sub-component will consider the hydrological parameters within the agro-ecological zone to design and develop crop choices for diversified farm production. On-farm supply of inputs and technologies, capacity building and training activities will be customized to address location-specific ecological and hydrological concerns. Climate risk resilience will be built in agriculture production systems by reducing water footprints; promoting diversification to low water requiring crops; and building a protocol of agronomic practices to withstand biotic and abiotic stress through focused demonstrations, and demand-responsive training packages. Component interventions will focus on irrigated command areas of the project, and will also cover the rain fed areas in tank villages and cascades. The project will support adoption of soil moisture sensors for timely sowing and irrigation applications, with an aim to improve water-use efficiency and productivity, and for mainstreaming 'more crop per drop' in the project. In addition, web-based integrated real time crop advisories, including water, pest and disease stress, and implementation of mitigation measures, and contingency plans will be made operational.

27. Building on the improved water security resulting from investments under component A, this subcomponent will focus on increasing farm productivity by reducing 'input' costs and enhancing 'output' from farming systems on a sustainable basis by promoting comprehensive, crop specific sustainable agricultural package of practices. By investing in the adoption of resource conservation technologies, conjunctive use of water, integrated soil fertility and nutrient management, micro-irrigation, and organic farming, the project activities will produce a significant amount of adaptation co-benefits to climate change. Accelerated diversification from a mono crop paddy system to mixed cropping including high-value crops (vegetables, fruits and flowers) will be achieved through promotion of modern technologies, postharvest management, and value addition (under component C).

28. Under this subcomponent, the project will finance need-based small civil works, equipment, consultancies, and incremental operational costs associated with (a) upgrading and dissemination of technologies and management practices for crops and horticulture through demonstrations, training, and capacity building of producers and line department staff; and (b) matching grants to finance demand-driven micro-irrigation schemes and farm mechanization.

29. The Department of Agriculture has prepared a list of proposed activities which were discussed in detail. KPMG has drafted an integrated agri-horti-livestock framework for three locations, which will provide a base for further refining, and fine tuning sub-component design. It was agreed that the preparation team will prepare the component description and implementation arrangements clearly by bringing out truly transformative and integrative aspects in the component design, interventions and activities focusing on a small number of high payoff interventions. Interventions under different components and sub-component will be spatially and temporally linked so that these are implemented in a truly integrated manner by Irrigation, Agriculture, Horticulture and Fisheries Departments. The implementing line departments will also set up Project Implementing Units and Nodal officers at the state level, and elaborate implementation arrangements at district and tank levels. Detailed Project Implementation Plan for this component will be prepared by September 30, 2017.

Sub-component B2: Innovation and Technology Transfer for Fishery Production

30. The aim of this sub-component is to strengthen research-extension linkages in order to improve farmers' access to technology, and support participation of fish farmers in value chains. The high degree of economic opportunities and benefits are offered by the currently available and underutilized aquatic resources (minor irrigation small-scale community-based irrigation systems) consists of 25,000 hectares of effective water spread area (EWSA) in 1,231 small-scale community-based irrigation systems. The project will address fisheries developmental constraints including physical factors such as harvest from seasonal water bodies for lack of suitable quality fish seed and feed; lack of technology accessibility; paucity in the regulatory policies to ensure quality of inputs for production and consumption; and inadequate institutional capacities. Key investments areas selected to transform the inland fisheries sector are as under:

- a) *Policy reform to ensure input and product quality:* Aquaculture development activities will be aimed at providing a regulatory structure, and certification to ensure quality inputs such as fish seed and feed, and fishery products marketed to satisfy quality requirements cited in HACCP (Hazard Analysis & Critical Control Point), for export or domestic consumption.
- b) *Innovative climate resilient fish production models:* The project will aim at developing appropriate production models considering short period of water availability in accordance with the micro-climatic conditions in the project area for maximizing productivity, and for addressing climate change concerns. Appropriate production models will be designed by introducing fast growing fish species, such as *Amur Carp*, Genetically Improved Tilapia (GIFT), *Jayanthi Rohu* and *Pangasius* for seasonal MI small-scale community-based irrigation systems. Pure line breeding program will be implemented to ensure supply of improved seed quality.

c) *Improved post-harvest technology and value chain participation*: Key activities selected for investments are: promotion of value added and ready-to-cook products; improved fish transport in hygienic conditions for retail markets; wholesale vending; and establishment of fish kiosks at suitable locations.

31. The Department of Fisheries (DoF) has finalized the project design, details of project activities and budget. The Project Implementation Plan (PIP) and baseline survey for fisheries subcomponent will be completed by September 15, 2017. The results of the survey will be validated by DoF before finalizing the report. It was agreed that the DoF will prepare DPR focusing on component description including transfer of innovative and climate resilient production technologies; improved post-harvest technology & enhanced value chain participation; and policy reform to ensure quality in fish production and marketing. Project implementation cells will be established at the headquarters, and at district levels for coordination and efficient management of the project implementation. The implementing agency will sign the memorandum of understanding (MoU) with the Indian Council of Agricultural Research (ICAR) Institution, Rajiv Gandhi Centre for Aquaculture (RGCA) and Fisheries College for capacity building. The support staff will be placed according to the detailed Organogram prepared during last mission in Nov 2016.

Component C: Post-harvest Management, Market and Agribusiness Promotion

33. This component aims to enhance farmers' linkages to markets by providing alternative marketing channels and promoting farm level aggregation, post-harvest management, and value addition.

34. Given the size and nature of landholdings, the project will attempt to focus on expanding farm incomes through forward market linkages. The GoAP has launched the Primary Sector Mission to revive the agriculture sector by enhancing value addition of farm produce (pulses, oilseeds and high value grains, floriculture, horticulture, and fisheries) by developing transit storage facilities. GoAP is clear about the kind of support they need for building transitory storage system. Based on the agri-business framework an external agency will be sourced to conduct a detailed mapping exercise to determine typology of commodity clusters, and develop marketing strategies.

35. The component will adopt a tank command area based value chain approach for providing support to producers, and will closely work with components A and B to inform producers in these areas of the market demand. The objective of this component is to enable producers of the priority value chains, to take advantage of the rapidly changing market demand, and enhance resilience of agriculture production systems for increasing production and managing associated price risks.

36. Based on already existing and under Component B developed organizations like Water Usage Associations (WUAs), Self Help Groups (SHGs) and Farmers Interest Groups (FIGs), the project will support organizing cultivators into farmer producer organizations (FPOs) and companies (FPCs) wherever feasible; so as to enhance value realization at the farm level through improved cleaning, grading and packing of produce through Common Service Centers (CSCs) managed by FPOs; facilitating better input and output market linkages; and facilitating access to a broad set of financial and investment services (such as investment support to the FPOs for

establishing common service centres, and supporting operationalisation of Negotiable Warehouse Receipts through existing warehouses), to enhance bargaining power to the market and add value.

37. The project also proposes to establish an Agri-Business Promotion Facility (ABPF) to foster and promote the agribusiness ecosystem in the state, and to assist FPOs and small and medium private entrepreneurs in selecting commodities, scouting new technologies (including climate resilient technologies), and in developing business plans. The ABPF will identify growth oriented agri-entrepreneurs, who are pursuing business opportunities based on post-harvest value addition in agriculture and allied sectors, and provide these entrepreneurs with a holistic service offering that accelerates growth and improves their sustainability. It is expected that ABPF will have a catalytic effect, encouraging a new generation of entrepreneurs to enter, grow, and advance the agriculture sector in the state, in various commodities (floriculture, horticulture, processed foods, etc.). Moreover, the project will also try to identify and provide the small-scale yet high-value produce a viable service that helps to build a value-added, more profitable model for subsistence producers.

38. During the mission, it appeared that the development plan for this component needs more elaboration. Several steps must be taken and put in a roadmap with a timeline. It was agreed that the PMU and the WB agribusiness specialist would meet in September 2017 on elaboration of this component. The first year should focus on organizing cultivators in FPOs (building on already existing and under Component B developed organizations like Water Usage Associations (WUAs), Self Help Groups (SHGs) and Farmers Interest Groups (FIGs)) and establishing an ABPF, which will conduct market and value chain analyses for the most promising commodities, and capacity/skills training needs assessments for the FPOs, and inventorying retail and food processor needs and product quality requirements for commodities. In the next year, or earlier if possible, commodities should be selected for market development based on market perspective, comparative advantage, value chain analysis, etc. Thereafter, determining the right locations for common service centers or usage of existing facilities is needed, depending on distance to market, aggregation possibilities (FPOs might have to collaborate to achieve economy of scale), as well as inventorying necessary investments for facilities like storage, grading and packaging for the selected commodities, and creating linkages to high value markets, retail and food processing industry, including their product quality requirements, for enhancing direct marketing opportunities. This will provide a solid base in the first two to three years to make this component successful.

Component D: Project Management and Capacity Building

39. 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. Given the crosscutting and interconnected nature of components under the project, monitoring and evaluation (M&E) not only forms an integral part of project design but assumes added significance in contributing to tracking results indicators during project implementation. The mission had extensive discussions with the PMU on status of staffing positions for M&E, and learnt that the unit will be fully staffed and operational by the end of September 2017.

40. The project is developing a scalable web-based MIS platform, adopting both online and offline mechanisms, for reporting from block-level to PMU. An android based app is in

advanced stages of development and testing for real time monitoring and evaluation of all activities carried out under various components of the project. The mission advised the M&E unit to expand the app-based protocol to integrate sensor-based data from geographical information system that the project is planning to develop.

41. The mission had detailed discussions with the external agency hired to conduct baseline survey. Consequent upon the ToR that was developed during the previous mission, the focus on baseline data collection, considering the proposed PDO and Intermediate Results Indicators, was emphasised. The process of baseline data collection and analysis is expected to be completed by end of September 2017. PMU was advised to upgrade its hardware systems (wherever necessary) to accommodate ICT-based applications; develop a dynamic web-based documentation and dissemination across sector-partners and various stakeholders; and provide necessary transport and logistic support for effective functioning of the M&E unit.

42. PMU level individual consultants are selected and engaged. The selection of MIS consultant is underway. The ToR for concurrent monitoring by an External Agency, and for engaging NGO's as project support organizations is prepared and cleared by the Bank.

Economic and Financial Analysis

43. An Economic and Financial Analysis (EFA) of the project will be undertaken to assess the expected incremental benefits generated from five levels of project activities: (1) Expansion of irrigated areas benefiting from improving and modernizing irrigation infrastructure and water use efficiency at farm level, which increase production of paddy, maize, and pulses as well as horticulture products. (2) Improved agriculture productivity through climate smart cultivating practices as well as introducing new technologies; (3) Crop diversification from paddy to high value-added products such as fruits, vegetables, and spices; (4) Improved fish productivity and profitability through production, post-harvest handling, and primary processing; (5) Additional income from agri-business through improved post-harvest management by Farmer Producer Organizations (FPOs).

(i) *Project Cost:* The total project cost is expected to be around US\$ 238 million, of which the World Bank will finance US\$ 170 million (around 71% of the total project cost) through IBRD loan, and the Government of Andhra Pradesh will finance the remaining US\$ 68.08 million. Around US\$ 2.23 million will be allocated to institutional strengthening and capacity building of WUAs. About half of the project cost will cover the improving tank systems and improving water productivity and efficiency. The project cost for Component A will be around US\$ 121.28 (50.9% of the total project cost). Around 36.3% (US\$ 86.32 million) of the total project cost will be allocated to improving agriculture practices, of which US\$ 68.45 million will be allocated to climate-smart diversified agriculture production practices. Fishery sub-component will take around 7.5% (US\$ 17.86 million) of the total project cost. The remaining project costs will be split between activities on climate-friendly market and agribusiness promotion, and the project management and capacity building of PMU. Around US\$ 18.75 million (7.8% of the total project cost) will be allocated to the former component, and the remaining budget (US\$ 11.9 million, 5% of the total project cost) will be used for the project management and capacity building of PMU.

- (ii) *Economic Benefits*: An Economic and Financial Analysis will focus on the net economic benefits of 18 commodities, including paddy, maize, pulses (red gram, green gram, and black gram), jowar, groundnuts, and fruits (mango, banana, papaya, and sweet orange), vegetables (tomato and onion), spice (turmeric and chili), and others (coconut, cashew, and cocoa). Paddy still dominates the area with 36 per cent of the total irrigated area.
- (iii) EFA of the project will also analyze incremental benefits generated from introducing new modern technologies (agricultural intensification), and shifting from low value commodities such as paddy to high value-added commodities such as fruits and vegetables (agricultural diversification) along with new fishery activities.

44. Relevant data (prices, yields, cost of production, and others) necessary for conducting economic and financial analysis was provided by the Departments of Agriculture, Horticulture, and Fishery. These secondary data are adequate for conducting economic and financial analysis for the moment. Baseline survey was done by one of the consultancy firms; however, there is a delay in submission of the report to the project team. Therefore, the secondary data that are provided by the various departments need to be analyzed further along with the baseline data to make a thorough analysis. Also, the assumptions used in the analysis need to be aligned with the result indicators.

Monitoring and Evaluation

45. Monitoring and Evaluation (M&E) is an integral part of the Project Management component, which ensures smooth implementation of the project activities. Designed to facilitate results-based management, learning and process enhancement, and impact evaluation, M&E unit at the PMU will have overall responsibility for planning and coordinating internal and external monitoring, social and economic management, and thematic studies. A detailed strategy was discussed during this mission and a result frame work was finalised and outlined in Annex -5.

46. The project will have a MIS system installed in all divisions, which will be updated regularly, creating an excellent database on both Results Framework and Annual Action Plans. Integrated with Geo-Coding and censor based GIS mapping, the system is expected to contribute to transparency. Apart from the in-house monitoring, the project will have a third party neutral monitoring agency, which will be responsible for process monitoring, prepare six monthly progress report – based on sample survey, prepare mid-term impact assessment report and final impact assessment report. The ToR for the same was finalised during the mission, and the assignment is expected to be advertised during the month of September, 2017.

Environmental Safeguards

47. The mission reviewed the status of Environmental Assessment (EA) currently underway and interacted with a range of district and state level technical experts as well as with farmers and water users around an irrigation tank in district Vishakhapatnam. The mission was disappointed that prior to its visit, the first draft of the EA was not made available for review. During interaction with the consulting team carrying out the EA, the mission observed that there is a lot of work still required for putting together a reasonable draft. The mission provided detailed guidance to the consultants for ensuing that, at a minimum, the Environmental Management Framework (EMF) addresses the following:

- a) Triggering of the Natural Habitats (OP 4.04) safeguard policy of the World Bank.
- b) Developing a robust Pest Management Plan.
- c) Identifying potential environmental impacts, and risks of the planned activities and suggest feasible mitigation actions.
- d) Proposing a capacity building plan, including recommendations of training to be provided to different stakeholders.
- e) Developing SMART indicators to monitor the implementation of the EMF.

48. The mission also visited a minor sized tank in district Vishakhapatnam, and interacted with many farmers. Farmers did report that some of the banned pesticides are used in tank command area. There seems to be poor awareness regarding safe handling, storage, application and disposal of pesticides. The stakeholders informed the mission that they would be open to consider bio-pesticides and other safer alternatives to chemical based inputs. The mission felt that there may good potential for promoting good livestock rearing practices, which would help diversity income sources for a farmer and help increase resilience to climate induced variability. It was agreed that the Project Management Unit (PMU) will share the first draft of the EA and EMF by August 30, 2017 with the Task Team.

Social Development Safeguards

49. Safeguard issues revolve around augmenting and/or re-engineering the existing minor irrigation tanks along with water conveyance system, and other associated activities related to enhancing production, productivity and incomes in the spheres of agriculture and fisheries. The key intervention relates to bridging the gaps between designed and actual irrigable areas with participation of the local water using communities. Major challenge thus lies in mobilizing the tank-based community toward group action, and establishing linkages with other public and private sector institutions. This has been addressed successfully under the first project (APCMTP) with the help of a Social and Environmental Management Framework (SEMF). The proposed project would build upon it by considering the latest legislative developments, and expanded scope of interventions, into agriculture and fisheries. However, as the follow-on project's scope is enhanced both in terms of number of tanks and the interventions, GoAP has already initiated efforts towards re-visiting the SEMF. The learning drawn from the implementation experiences of the first project are fed into this revision.

50. Indigenous Peoples (OP 4.10): AP state has a tribal population of 2.7 million amounting to 5.5 per cent of the total population. A few pockets are predominantly inhabited by tribal, and are covered under the 5th Schedule of the Indian Constitution. So, some project tank areas are likely to have tribal inhabitation. However, investment plans are currently not fully known. Hence, to address such situations, wherein the project is likely to be taken up tribal areas, a Tribal Peoples Planning Framework (TPPF) is being prepared.

51. Involuntary Resettlement (OP 4.12): The project will not and may need not resort to involuntary acquisition of lands as the existing irrigation tanks are the focus of repair and

rehabilitation. GoAP's tank selection ensure that no tank will be selected if major works are required that warrant land acquisition. However, cases of encroachers on/within the tanks cannot be ruled out. To address this, as in the previous project, a Resettlement Policy Framework (RPF) will be prepared.

52. GoAP has deployed a consultant to undertake social assessment, and draw management measures. Mission has reviewed the initial findings and has provided comments on how to bring the same to a closure. The ESMF as well as RPF and TPPF are expected to be completed by the end of October 2017.

Finance

53. The mission assessed the adequacy of the financial management arrangements for the project under preparation during visit to Vijayawada. The mission was informed that the PMU, (Office of Commissioner, CADA) has been sanctioned an amount of Rs 125 crores for the proposed project under the budget head 4702-00-101-03 - "Capital outlay on minor irrigation for externally aided projects" which would be used for the project. The draft of the Financial Management Manual, was also discussed in detail, and it was agreed that the finalized manual, after revisions would be shared with the Bank. The funds flow system under the project was also discussed and it was noted that the practice of drawing funds through A.C. bills, as prevalent under the previous project would be completely discontinued. The mission also stressed the need for an in-house internal audit function, and it was agreed that the PMU would write to FD for sanctioning of posts for the same.

54. Visits were also made to two DPUs at two districts – West Godavari and Krishna to assess the adequacy of FM arrangements. The mission noted that the two DPUs were adequately staffed in terms of FM, and has the capacity to undertake important FM arrangements under the project. Further discussions have been detailed in the annexure.

Procurement

55. *Procurement Actions:* The contracts for procurement of consultancy services for preparation of (i) The Project Implementation Plan (PIP), (ii) Baseline Survey, (iii) Project Procurement Strategy for Development (PPSD), Procurement Manual and 18 months' procurement plans are awarded. The EoI for selection of consultancy firm for monitoring and evaluation is issued and the RFP/short listing is under process. The Detailed Project Reports (DPR) for the rehabilitation of 151 tanks identified for the first phase has been prepared by the consultant engaged by the project in April 2017. PMU level individual consultants for M&E, GIS, fisheries, agri-business, social and institutional, capacity building and communication are selected and engaged. The selection of MIS consultant is underway. All other key PMU staff, including the staff for the procurement unit is in place. The ToR for engaging NGO's as project support organizations is prepared and cleared by the World Bank and the EoI will be issued shortly. The RFPs for all the major consultancies are issued and the contract awards will be finalized by October 2017. The works contracts for at least 30% of the phase 1 civil works for tank rehabilitation will be completed before the negotiations stage.

56. *Procurement Plan and PPSD*: The consultant engaged for preparing the PPSD has started work, and will be submitting the draft PPSD report by the second week of September, 2017. The PPSD consultant has prepared the draft project procurement manual which is being reviewed by the PMU. The PPSD consultant is expected to complete the preparation of 18-months procurement plan for irrigation and agriculture components by end September, 2017.

57. *Institutional Assessment*: The procurement risk/PRAMS assessment for PMU was carried out. The initial PRAMS risk would be Moderate to Substantial. The World Bank's assessment of the AP Government's e-procurement system was carried out, and the IT Department was informed of the necessary modifications to be made for getting the World Bank's clearance. It is expected that the World Bank will soon be able to clear the AP government's e-procurement system.

Next Mission

58. The next mission is tentatively scheduled during the last week of October 2017.

Annexures

- (i) Annex 1: Agreed actions
- (ii) Annex 2. Status of previous agreed actions
- (iii) Annex 3: Note on Hydrologic Analysis
- (iv) Annex 4: Economic and financial analysis
- (v) Annex 5: Results framework and indicators
- (vi) Annex 6: Minutes of the workshop held on August 4, 2017 on agriculture component
- (vii) Annex 7: Financial management

Annex-1: Agreed actions

S No.	Agreed Actions	Responsible	Deadline
Pillar A: Improving Irrigated Agriculture Efficiency at Farm Level			
1.	(i) Finalize 'First Phase' 64 DPRs (37 cascades & 27 independent tanks) (ii) Finalize Bid Documents of all 64 DPRs (iii) Arrange Dam Safety Panel's visits to 3 "First Phase" large dams (Singamala, YT Cheruvu and Badvel) to enable finalization of dam safety measures and ensuring that the costs of such measures are included timely in the concerned DPRs (iv) Collection of groundwater level and rainfall for few mandals in each district (vi) Estimation of groundwater recharge and ET for the above and computation of runoff (vii) Hiring a third-party consultant (viii) Workshop among GWD staff members	C.E. (MI), PMU C.E. (MI), PMU C.E. (MI), PMU GWD WB hydrology consultant PMU PMU, GWD	September 30, 2017 October 31, 2017 Visits by Aug. 22, 2017 Aug 18, 2017 Oct 2017 Sep 15, 2017 Sep 25, 2017
Pillar B: Promoting Adaptive Sustainable Agriculture Practices			
3.	B.2: (i) DPRs to be completed (ii) DOF to sign MOU with RGCA, relevant ICAR institutions and College of Fisheries to be completed. (iii) The deputation of officer in the rank of Deputy Director of Fisheries under APIATP to be done	PMU DoF DoF	Oct 31, 2017 September 30, 2017 August 25, 2017
Pillar D: Project Management & Capacity Building			
5.	(i) Hiring Individual Experts for PMU (Experts on M&E, MIS, GIS, Fisheries, Agribusiness, Social & Institutional, and Capacity Building-Communication Expert) (ii) Draft Project Implementation Plan (PIP) (iii) Preparation of bid documents for 30% of the procurements to be completed (iv) The proposal for supporting staff based actual requirement to be submitted formally	PMU PMU PMU PMU	Oct 31, 2017 September 30, 2017 Oct 31, 2017 August 25, 2017
6.	Financial Management: (i) Write to FD for change in Nomenclature of Sub-Heads	PMU	At the earliest

	(ii) Write to FD for sanctioning of posts for internal audit team	PMU	August 20, 2017
	(iii) Finalization of FM manual, and to be shared with the Bank	PMU	August 20, 2017
	(iv) Finalize cost sharing pattern with line departments	PMU/Line Departments	August 31, 2017

Annex 2: Status of Previous Agreed Actions

S No.	Agreed Actions	Responsible	Deadline	Status
Pillar 1: Improving Irrigated Agriculture Efficiency at Farm Level				
1.	i) Completion of ToR by WRD/PMU ii) Approval of ToR by WB iii) Award of Contract to outsourced Agency for preparation of DPRs and Bid Documents of 146 cascades (about 500 small-scale community-based irrigation systems) based on 'Quality Cost Selection Method'. (iv) Constitute Dam Safety Review Panel	PMU WB PMU PMU	Nov 30, 2016 Dec 04, 2016 Mar 06, 2017 Mar 31, 2017	ToR prepared ToR approved by WB Agency fixed, DPR prepared for 154 tanks Panel constituted
Pillar 2: Promoting Adaptive Sustainable Agriculture Practices				
2.	Designate a senior officer in DoA, DoH and Agriculture Marketing as a Nodal Officer for coordinating component preparation. supported by technical experts from the departments	DoA, DoH, Dam, SPD CAD	Nov 30, 2016	Nodal officers designated
3.	i) Deployment of required fishery expert for the project preparation and implementation design ii) Complete survey of MI small-scale community-based irrigation systems iii) Preparation of first draft DPR iv) Consultative meeting on first draft of DPR with the various stakeholders (v) Presentation of the final draft of DPR to the Special Commissioner	PMU PMU PMU PMU PMU	Nov 30, 2016 Dec 31, 2016 Jan 31, 2017 Feb 08, 2017 Feb 28, 2017	Senior Fishery Expert recruited Under progress Draft plan prepared Meeting held on April 10, 2017 Draft action plan furnished
Pillar 4: Project Management & Capacity Building				

4.	i) Government Order on Implementation and Fund Flow Arrangements	PMU	Nov 30, 2016	Issued on Nov 30, 2016
	ii) Award of Contract for PIP Preparation	PMU	Dec 15, 2016	Awarded to M/s CITRAN
	iii) Baseline Survey (EoI issued)	PMU	Dec 31, 2016	Awarded to M/s Sutra Consulting
	iv) Hiring Individual Experts for PMU (Experts on M&E, MIS, GIS, Fisheries, Agribusiness, Social & Institutional, and Capacity Building-Communication Expert)	PMU	Dec 15, 2016	Except MIS expert all recruited
	(vi) Draft Project Implementation Plan (PIP)	PMU	Dec 31, 2016	Draft PIP and Manuals ready

Annexure 3 - Note on hydrological analysis

a) Hydrological analysis during the preparation stage

(i) Groundwater level and rainfall in time series (8-10 years) close to the tanks as much as possible need to be gathered rapidly. This enables to estimate groundwater recharge (R) and available groundwater as the first information. From R, precipitation (P) and evapotranspiration (ET) (estimated by using a model), the runoff potential for the typical tank system can be computed, following categorizing runoff potential into grades (From very good to poor). This will help to consider what issues exist with surface runoff water for tank systems across project districts and will help in identifying in assessing what activities need to be taken up for conjunctive use of water in tank ayacut. Additional necessary inputs are quick assessment of tank irrigation (soil moisture through remote sensing) and tank filling by a third-party consultant.

(ii) To realize the crop diversification from rice to other crops, improvement of drainage is important, because upland crops can't resist inundation which causes waterlogging of crops. During the field visit, it was felt that there are certain lowland areas, which get severely waterlogged during relatively higher rainfall events, and no drainage network was available. Under this situation, farmers cannot cultivate other crops than paddy rice. It is necessary to identify the frequent waterlogged areas in the ayacuts over last 5 years. Based on this information, the project needs to consider where the crops diversification is possible and places where additional improvement of drainage is necessary. This information can be captured using remote sensing by a third-party consultant.

(iii) The third-party consultant also needs to prepare 1:10,000 groundwater map around the tank system for mandals where the groundwater levels are deeper (depleted) using latest technology e.g. satellite remote sensing during the project preparation. This will help to focus on augmented recharge and future sustainable development of groundwater in near tank systems. In a mandal, where groundwater level is relatively shallow, there is a case of augmenting groundwater use in sustainable manner. This has to be assessed in both lowland of tank ayacut, and outside tank ayacut as applicable. Also, there is a need to assess the soil type and conditions. For example, if the soil is black in low land (i.e. tank ayacut), then only rice is feasible. In such a case, groundwater development, if promoted, should only be outside the tank ayacut.

(iv) Using the data of (i) above, a workshop among groundwater officers of each district should be held, to ascertain the status of groundwater development and issues in order to formulate strategies. This is recommended to be held during September.

b) Crop water budgeting (CWB) during the implementation

In the predecessor project (APCBTMP), CWB was conducted and contributed to resource conservation and risk reduction to extreme weather events. Further to improve this approach, CWB needs to be collaboratively supported by Groundwater, Agriculture and Horticulture departments to facilitate the conjunctive use of surface water and groundwater rather holding separate workshops for surface water and groundwater use to develop integrated plan of

cropping pattern using surface and ground water resources. In addition, main crops need to be identified inside and outside the tank ayacut for all tanks during the preparation stage. This is to be in line with Primary Sector Mission. Estimation of crop water requirements for different agro-ecological conditions and farming practices is necessary.

c) Irrigation manual during the implementation

The realization and the success of the above interventions depend on how farmers can engage in better irrigation. For each district (mandal), optimal irrigation strategy (irrigation schedule, irrigation amount and water resource i.e. surface water, groundwater or conjunctive use) for each crop need to be developed, and formulate into a manual for WUAs. Under Sub-component A1, the project support training of WUAs using this irrigation manual.

d) Pilot tanks during the implementation

After identifying pilot tanks in each district, detail data gathering related to water use (surface and groundwater), crop water budgeting and water productivity will be made. In these pilots, sensors at each outlet will be set to achieve these. Pilots will form as a guidance for other tanks of respective districts and can be useful for scoping at the Mid-term review. 10% of tank systems will be monitored through sensors and through a third party during the project period. The identifying the 10% is necessary and cutthroat flumes need to be set at an earlier stage in the project implementation. A third agency has to be identified to educate/train/empower WUAs for monitoring water releases through sluice (crowdsourcing of data). These activities are to be included in a series of water management (i.e. Participatory Groundwater Management).

e) Water Productivity

This composite indicator can capture the extent to which improvements in water delivery, agronomic practices, and institutional arrangements, such as the formation and strengthening of water users' associations, succeed. The project which promotes conjunctive use of water, where it is adequate, would expect to see the improving of the entire tank ayacut water productivity because the water loss from seepage in canal and distributary system would be harvested through groundwater irrigation. The mission team suggested to adopt several methods for estimating the water volume in the denominator of the water productivity (WP) to assure data and verify these data during the implementation. Efforts should be made to promote gathering of data of cutthroat flume (CTF) by WUAs and develop workshops/ education aids in order to generate reliable discharge data from CTFs.

- (i) Following are the key data sets: H (Tank water height)-V (water volume) curve
- (ii) Area (water spread area)- Volume curve
- (iii) Sensors, and (iv) CTF

Annexure 4: Economic and Financial Analysis

MINOR IRRIGATION - APII ATP (World Bank - II) ABSTRACT OF CASCADES AND MI TANKS PROPOSED UNDER APII ATP

S.No	District	Total tanks in the District	Number of Tanks proposed in APIIATP	Proportion by district	Registered Ayacut (Acre)	Average Area (Acre)	Gap Ayacut (Acre)	Irrigated Ayacut (Acre)	% of Gap Ayacut
1	Srikakulam	8,554	184	14.9%	19,856	108	9,751	10,104	49.11%
2	Vizayanagaram	9,262	215	17.5%	14,761	69	7,085	7,676	48.00%
3	Visakhapatnam	3,343	144	11.7%	44,797	311	21,505	23,292	48.01%
4	East Godavari	1,516	37	3.0%	8,446	228	4,054	4,392	48.00%
5	West Godavari	1,389	111	9.0%	20,497	185	9,839	10,658	48.00%
6	Krishna	911	69	5.6%	19,516	283	9,368	10,148	48.00%
8	Prakasam	890	89	7.2%	25,974	292	12,727	13,247	49.00%
9	SPSR Nellore	1,706	155	12.6%	58,994	381	28,317	30,677	48.00%
10	YSR Kadapa	1,776	112	9.1%	54,919	490	26,361	28,558	48.00%
11	Anantapuramu	2,502	16	1.3%	8,160	510	4,243	3,917	52.00%
12	Chittoor	8,063	89	7.2%	15,841	178	7,237	8,604	45.69%
13	Kurnool	611	10	0.8%	2,069	207	993	1,076	48.00%
	TOTAL	40,523	1,231		293,830	3,241	141,481	152,349	48.15%

With the project, the total irrigated area will expand to around 120,000 hectares, of which Nellore, Kadapa, and Visakhapatnam are the leading districts where more than 50% of the registered ayacut will be located.

Fully Irrigated Areas by Districts before and after the Project

	Without Project Area Fully irrigated (Ha)		With Project Area Fully Irrigated (Ha)	
Srikakulam	4,089	6.6%	8,035	6.8%
Vizayanagaram	3,106	5.0%	5,974	5.0%
Visakhapatnam	9,426	15.3%	18,129	15.2%
East Godavari	1,777	2.9%	3,418	2.9%
West Godavari	4,313	7.0%	8,295	7.0%
Krishna	4,107	6.7%	7,898	6.6%
Guntur	-	0.0%	-	0.0%
Prakasam	5,361	8.7%	10,511	8.8%
SPSR Nellore	12,414	20.1%	23,874	20.1%
YSR Kadapa	11,557	18.7%	22,225	18.7%
Anantapuramu	1,585	2.6%	3,302	2.8%
Chittoor	3,482	5.6%	6,411	5.4%
Kurnool	435	0.7%	837	0.7%
	61,653	100.0%	118,909	100.0%

Allocation of Project Cost by Component and Sub-Component

	Estimate at the end of the Mission		
	INR (in Crore)	USD (in Million)	% of ther Total Proposed Project Cost
Component A: Improving Irrigated Agriculture Efficiency at Farm Level	815	121.28	50.9%
A1. Institutional Strengthening and Capacity Building of Watyer Users' Associations	15	2.23	0.9%
A2 and A3. Improving Irrigation System AND Improving Water Productivity and Efficiency	800	119.05	50.0%
Component B. Promotiong Adaptive Sustainable Agriculture Practice	580	86.32	36.3%
B1. Climate Smart Diversified Agriculture Production Systems	460	68.45	28.8%
B2. Innovation and Technology Transfer for Fishery Production	120	17.86	7.5%
Component C. Climate-friendly Market and Agribusiness Promotion	125	18.57	7.8%
Component D. Project Management and Capacity Building	80	11.90	5.0%
TOTAL	1,600	238.08	100.0%

Phasing of Component A Benefits (newly Irrigated Areas by Commodity Type)

	Unit	2017	2018	2019	2020	2021	2022
Phasing of benefits in the new fully irrigated area	Unit						
Total Incremental Irrigated Area	Ha	5,000	23,000	33,000	23,000	24,000	12,000
New area under paddy production	Ha	1,812	8,333	11,957	8,333	8,696	4,348
New area under maize production	Ha	195	899	1,289	899	938	469
New area under redgram production	Ha	184	848	1,217	848	885	443
New area under greengram production	Ha	382	1,758	2,523	1,758	1,835	917
New area under blackgram production	Ha	395	1,816	2,606	1,816	1,895	948
New area under jow ar production	Ha	650	2,989	4,288	2,989	3,119	1,559
New area under groundnut production	Ha	361	1,662	2,385	1,662	1,734	867
New area under mango production	Ha	255	1,173	1,683	1,173	1,224	612
New area under banana production	Ha	76	349	501	349	364	182
New area under papaya production	Ha	16	74	107	74	78	39
New area under sw eet orange production	Ha	83	380	545	380	397	198
New area under tomato production	Ha	141	647	928	647	675	337
New area under onion production	Ha	47	215	309	215	225	112
New area under coconut production	Ha	102	470	675	470	491	245
New area under cashew production	Ha	155	713	1,023	713	744	372
New area under cocoa production	Ha	19	86	123	86	89	45
New area under chilli production	Ha	110	506	727	506	528	264
New area under turmeric production	Ha	17	80	115	80	84	42

Incremental Benefits Generated from Newly Irrigated Areas (Main Agriculture Products)

Total Incremental Benefits (in USD)		2017	2018	2019	2020	2021	2022
Paddy	USD	864,018	3,974,481	5,702,517	3,974,481	4,147,285	2,073,642
Maize	USD	299,706	1,378,647	1,978,059	1,378,647	1,438,588	719,294
Red Gram	USD	29,271	134,648	193,191	134,648	140,502	70,251
Green Gram	USD	264,296	1,215,761	1,744,353	1,215,761	1,268,620	634,310
Black Gram	USD	186,418	857,521	1,230,356	857,521	894,804	447,402
Jowar	USD	51,030	234,740	336,800	234,740	244,946	122,473
Groundnut	USD	72,390	332,994	477,774	332,994	347,472	173,736
		1,767,129	8,128,792	11,663,049	8,128,792	8,482,218	4,241,109

Incremental Benefits Generated from Newly Irrigated Areas (Horticulture Products)

Total Incremental Benefits (in USD)		2017	2018	2019	2020	2021	2022
Mango	USD	201,698	927,811	1,331,207	927,811	968,150	484,075
Banana	USD	344,846	1,586,290	2,275,982	1,586,290	1,655,259	827,630
Papaya	USD	44,660	205,435	294,754	205,435	214,367	107,183
Sweet Orange	USD	65,532	301,446	432,510	301,446	314,553	157,276
Tomato	USD	30,566	140,605	201,738	140,605	146,719	73,359
Onion	USD	(17,899)	(82,337)	(118,136)	(82,337)	(85,917)	(42,959)
Coconut	USD	89,366	411,086	589,819	411,086	428,959	214,480
Cashew	USD	(57,232)	(263,268)	(377,732)	(263,268)	(274,714)	(137,357)
Cocoa	USD	(12,381)	(56,954)	(81,717)	(56,954)	(59,431)	(29,715)
Chilli	USD	192,251	884,355	1,268,857	884,355	922,805	461,402
Turmeric	USD	7,116	32,733	46,964	32,733	34,156	17,078
		792,040	3,643,382	5,227,462	3,643,382	3,801,790	1,900,895

Annexure 5: Results Framework and Indicators

The mission has proposed the following result indicators, aligning with PDO and project components, which will be taken up for discussion and fine-tuning during PAD preparation.

PROJECT INDICATORS

PDO / IOI	OUTCOME INDICATORS	Baseline Value		PY I		PY II		PY III (MTR)		PY IV		PY V		PY VI (ELA)		Remarks
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	
PROJECT DEVELOPMENT OBJECTIVE																
To Enhance Agricultural Productivity, Profitability & Resilience to Climate Variability in Selected Tank Systems of Andhra Pradesh	1. Productivity of Specific Crops increased in the tank command within the cascade During Normal Monsoon Period															1. Assessment will be done only during MTR and ELA as these are PDO level Indicators; 2. Measuring only for the project supported crops; 3. Computation of Productivity taking both Kharif and Rabi in all the project years (Intermediate Indicators);
	Crop															4. Reference of Crop Cutting Report / Farmer Data;
	1. Paddy															5. Comparing Normal Year and Drought Year Productivity (historical data to be considered);
	2. Red Gram															6. Collection of data in each crop season (Kharif + Rabi and), computed annually and presented in MTR and ELA with specific assessment, if required
	3. Black Gram															
	4. Maize															
	5. Millet															
	6. Ground Nut															
	7. Fruits / Vegetables															
	2. Cost of Cultivation of Farmers in general and SF / MF in Particular Reduced by - ----- percent															1. Cost of Cultivation of Project Supported Crops 2. Estimation in both Kharif and Rabi Season 3. Estimation in Tank Command and Influence Zone 4. Estimation for Ground & Surface Water Users
3. Agricultural Profitability of the farmers increased by -----															1. Profitability Estimation of Project Supported Crops 2. Estimation in both Kharif and Rabi Season	

PDO / IOI	OUTCOME INDICATORS	Baseline Value		PY I		PY II		PY III (MTR)		PY IV		PY V		PY VI (ELA)		Remarks
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	
																3. Estimation in Tank Command and Influence Zone 4. Estimation for Ground & Surface Water Users
	4. Cropping Intensity Increased by ----- Percent and Gross Cropped Area Increased by ----- Percent															1. Computation of CI on Annual basis (Kharif + Rabi) 2. Computation of GCA on Annual basis (Kharif + Rabi) 3. It will also be covered in Mid-Term & End Term Review
	5. Water Productivity Increased by ----- Percent															1. Estimation for All Crops, including Project Supported Crops 2. Estimation in both Kharif and Rabi Season 3. Estimation in Tank Command and Influence Zone 4. Estimation for Ground & Surface Water Users
	6. Reduction in Gap Ayacut by ----- Percent															1. Mapping after the Tank Specific Works Completed as per the DPR 2. Annual Tracking for Kharif and Rabi after Tank System Improvement (as per DPR) 3. Mid-Term and End-Line Review of Gap Ayacut Reduction
	7. Area Covered under Irrigation Increased by ----- Percent through Surface and Ground Water Irrigation															1. Area under Surface water irrigation during Kharif and Rabi Seasons: Coverage Growth Estimation 2. Area under Ground water irrigation during Kharif and Rabi Seasons: Coverage Growth Estimation
INTERMEDIATE OUTCOME																
COMPONENT A: IMPROVING IRRIGATED AGRICULTURE EFFICIENCY AT FIRM LEVEL																

PDO / IOI	OUTCOME INDICATORS	Baseline Value		PY I		PY II		PY III (MTR)		PY IV		PY V		PY VI (ELA)		Remarks
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	
A.1 Institutional Strengthening	1. In ----- -- Percent WUAs, GB and EC meeting registers maintained regularly															Assessment during MTR and ELA
A.2 Tank System Performance	1. The Gap Ayacut Reduced by - ----- Percent with Increase in irrigated area in the Tank Command															1. Gap Ayacut in the Tank Command, covering all the Project Tanks in a Cascade 2. Mapping after the Tank Specific Works Completed as per the DPR 3. Annual Tracking for Kharif and Rabi after Tank System Improvement (as per DPR) 4. Mid-Term and End-Line Review of Gap Ayacut Reduction Note: As tanks are mostly designed for providing protective irrigation during Kharif, Gap Ayacut estimation could be only for Kharif area coverage. Area Coverage during Rabi is additional only to understand any improvement in irrigated area during Rabi because of availability of more water due to tank improvement, water management etc.
	2. Water Availability in the Tank Increased by ----- Days / ----- ----- MCM during Normal Monsoon															1. Annual Assessment in each Project Tank within the Cascades 2. Use of Measuring Device to map Water Storage 3. Area irrigated and Days of Irrigation coverage as Indicators for Improved Water Availability
A.3 Inflow	1. Water Productivity															1. Project supported crops (6 crops) to

PDO / IOI	OUTCOME INDICATORS	Baseline Value		PY I		PY II		PY III (MTR)		PY IV		PY V		PY VI (ELA)		Remarks
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	
Hydrology Management, Improving Water Productivity & Efficiency	of Selected Crops Increased by ----- Percent															2. be looked in to Crop area coverage in both Tank Command and Influence Zone 3. Inclusion of both surface and ground water
	2. Crop Water Budgeting and Crop Planning in ----- Tank Commands and Zone of Influence															1. Crop water Budgeting and Crop Planning taking both surface and ground water resources 2. Crop water Budgeting and Crop Planning for both Kharif and Rabi Season 3. Crop water Budgeting and Crop Planning for all crops, including project supported crops
	3. Water Use Efficiency Improved in ----- Ha. with the use of Micro Irrigation System.															1. Water use Efficiency for both surface and ground water resources 2. Water use Efficiency for both Kharif and Rabi Season 3. Water use Efficiency for all crops, including project supported crops
	4. Ground Water Development Status Increased / Decreased by ----- Percent.															1. Ground Water Measurement in Tank Area and Influence Zone 2. Ground Water Management twice annually, as per the existing norm/s
COMPONENT B: PROMOTING ADAPTIVE SUSTAINABLE AGRICULTURE PRACTICES																
B.1 CLIMATE SMART DIVERSIFIED AGRICULTURE PRODUCTION SYSTEM	1. ----- Percent of Net Sown Area and ----- Percent of Gross Cropped Area Diversified to Millets, Pulses and															1. Measurement / Assessment for Kharif and Rabi and computed Annually to compare percentage growth 2. Coverage of both tank command and influence zone within the cascade

PDO / IOI	OUTCOME INDICATORS	Baseline Value		PY I		PY II		PY III (MTR)		PY IV		PY V		PY VI (ELA)		Remarks
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	
	Horticultural Crops															or taking village as the unit
	2. Annual Income of Farmers from Diversification Increased by ----- --- Percent of the Previous Income (Non-Diversified Income)															1. Measurement / Assessment for Kharif and Rabi 2. Coverage of both tank command and influence zone within the cascade or taking village as the unit 3. Focus on Marginal & Small Farmers
	3. Soil Organic Carbon Increased on an Average to ----- -															1. Soil Organic Carbon (SOC) Measurement during MTR and ELA 2. Measurement in Tank Command and Influence Zone
	4. Soil Micro-Nutrient Deficiency Reduced by - -----															1. Measurement may be on Annual basis 2. Measurement in Tank Command and Influence Zone
	5. Cost of Cultivation / Production Reduced by - ----- Percent															1. Measurement / Assessment for Kharif and Rabi 2. Coverage of both tank command and influence zone within the cascade or taking village as the unit 3. Focus on Marginal & Small Farmers 4. Cost estimation for all crops, including project supported crops
	6. Area under Micro Irrigation Increased by ----- Percent															1. Assessment of Crop wise area covered under micro irrigation 2. Assessment could be in both Kharif and Rabi season
B.2 INNOVATION AND TECHNOLOGY TRANSFER FOR FISHERY PRODUCTION.	1. Fish Seed Production of Pure Line Breeds Increased by ----- Percent															Annual Assessment before / during monsoon
	2. Fish Productivity Increased by ----- Percent															Annual Assessment

PDO / IOI	OUTCOME INDICATORS	Baseline Value		PY I		PY II		PY III (MTR)		PY IV		PY V		PY VI (ELA)		Remarks
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	
	3. Annual Income of Fishers Increased ---- ----- Percent from Fishery Activities															Annual Assessment
	4. Income of the Fishermen cooperatives / Pvt. Entrepreneurs Increased by ----- -- Percent															Annual Assessment
	5. Semi-Intensive Fish Farming Adopted by - ----- Percent Fishermen Cooperatives															Annual Assessment
COMPONENT C: CLIMATE FRIENDLY MARKET AND AGRI-BUSINESS PROMOTION	1. Increment in Value Share of Farmers to the Consumer Price by ---- ----- Percent															Annual Assessment
	2. Annual Turnover of FIGs/CIGs Increased by ----- Percent through Agribusiness Activities															Annual Assessment

Note:

PY: Project Year (total 6 years)

PDO: Project Development Objective

IOI: Intermediate Outcome Indicators

MTR: Mid-Term Review (in 3rd Year of the Project)

ELA: End-Line Assessment (in 6th Year of the Project)

GB: General Body (General Body of WUA)

EC: Executive Committee (Executive Committee of WUA)

Annexure 6: Minutes of the Workshop held on 4th August 2017

Andhra Pradesh (AP) needs a project that will transform its agricultural sector, and adapt an integrated approach. The activities proposed should aim at moving beyond business-as-usual, bringing best practices from the globe, and implement activities that would genuinely transform the agriculture sector.

For the first time, AP is going to implement two externally funded projects, each bringing about Rs 500 crores in the next 5 years into the sector (IFAD and WB). The common theme that runs through both the projects is sustainable agricultural development by implementing innovative climate resilience technologies.

In order to bring tangible transformation to the agriculture sector, fundamental issues need to be addressed. Land tenure is one such issue where agriculture is moving from the land owner to the tenant (cultivator) in most of the areas. A strong political leadership from both State and Central Government with support from external funding organizations such as the World Bank (WB) and relevant stakeholders need to come together and address such fundamental issues in the agriculture sector.

Highlights of Presentations

The mission set the scene by pointing out the agriculture productivity gap in the state, and in different locations within the state, between state and across countries. The presentation brought out the linkages on how the proposed APIIATP project development objective is aligned with the State's Sunrise AP Vision, and how the project's components and sub-components need to be designed to achieve key objectives of productivity and profitability enhancement in an environmentally sustainable manner.

It is evident that the key challenges in the farm sector are deficit and erratic rainfall, decline in net irrigated area, stagnating crop yields, rising input costs, and declining profitability for the farmers. The revival in farm sector will require strategic and intensive interventions for enhancing crop productivity, minimizing production risks simultaneously enhancing water use efficiency, reducing the cost of cultivation, and enabling the farmers to receive remunerative commodity prices while handling price risks.

The state is ranked as one in the Ease of Doing Business (EODB) index, and is seen as an example by many states. However, the index has to raise the bar within the state, linking it with the farm sector through appropriate policy and investment interventions. The state should move out of their routine work plan for input distribution approaches towards transformational shift for enhancing soil health and farmer's income. The evapotranspiration and soil moisture data for Dattapa tank reflects that the soil moisture within the ayacut is relatively lower than what is outside the ayacut. A temporal variation in the same tank depicts that augmenting the soil moisture at the right time can enable farmers to take up crops like pulses. To plan the interventions, an analysis of ET and soil moisture should be considered at tank and ayacut levels.

With the low quantity of water available, it is proven that by using other crops instead of the traditional paddy crop, incomes are higher to a tune of 3-4 times.

It is also noted that the potential for using groundwater is high. The groundwater extraction is very less in certain areas. While there is a groundwater irrigated area of 15,000 Ha, only 12% of irrigated or 5% of sown area is dependent on GW. Maize and pulses can bring good transformation in the State, thus resulting in water saving and overall reduction in cost of cultivation. To diversify the crops, drainage is equally important to irrigation. The presentation brought three key areas for consideration:

- due to higher uncertainty, only one crop (kharif paddy) is grown;
- need to promote more groundwater usage outside and inside ayacut; and
- tank ayacut should be mapped and monitored using ICT and remote sensing techniques.

Post-harvest marketing and promoting agribusiness under component B3 aims to bring higher profitability for farmers. Enabling farmers to get better prices need to be customized such that farmers get a higher percentage of consumer spending, thus reducing price risk. The project interventions will need to experiment with new mechanisms to handle the post-harvest produce and practices. The following suggestions were discussed.

1. Farmer-market linkages have been retiring, as the fundamental problem is that the farm owner is different than the cultivator (tenant), thus having no control on the produce. The recent chili crisis ended up in failed institutional support within the state, thus giving an important lesson for handling the very fundamental issue at the first place. However, alternate thoughts on how the owner-farmers need to build as an example to strengthen the formal agri-business cycle at institutional levels.

2. To prevent farmers from resorting to distress sales, Rythu Bandhu Pathakam has been introduced in the Agricultural Market Committees to provide finance to farmers against the pledge of their produce. However, only 3000 farmers in the entire state are availing this benefit thus questioning the very basic issue of integration of agri-value chains at the ground level.

3. Significant price instability in commodities such as tomatoes were reported based on investigation spanning a 120 month where farmers received minimal price. Only in 2 or 3 weeks of price peaks indicated high price volatility resulting in significant revenue decline. The price volatility occurred because the demand for tomatoes was constant in the state, as against the supply (production); vis-à-vis the varieties of tomatoes cultivated. This was further acerbated by the fact that not only the shelf-life was short but the quality was poor too.

4. In the case of groundnut, it was noticed that the prices were unaffected with respect to the cleaned and uncleaned produce. It was revealed that the commission agents resort to cleaning and selling the produce at premium prices, thus fetching lesser income to the farmer. Therefore, establishing farmer – market linkages will require deep understanding and intervention keeping the farmer's profitability in mind, by enabling them to aggregate, and by observing primary grading at farm level for fetching them better prices.

Key practical aspects to be considered by the APIIATP Project:

The discussion followed by the presentation highlighted following key points to be considered for designing activities for project implementation.

- 1) 'Single Window Information and Knowledge Centers': (SWIKC) To create an efficient and effective service delivery mechanism, convergence of eight government departmental' (Water Resources Department, Agriculture, Horticulture, Agriculture Engineering, Agriculture University, Agricultural Marketing, Animal Husbandry, and Fisheries departments) activities will be facilitated by establishing SWIKC centers at the Taluk and District level. SWIKC will act as a common platform for the officials and farmers to meet and discuss issues and find solutions in a common space. The departments involved in the water sector need to collaborate for effective service delivery to farmers. The proposed project will aim to build upon convergence between the departments in an integrated and transformative way to bring results for small and marginal farmers in the command area.
- 2) Management of skilled human resources: A part of the project, the agriculture department has surplus of human resource (JD-Agri and PD-ATMA) in every district. Coupled with the DART centres, and other line departments, there is an urgent need to break vertical silos within the department of agriculture. This brings out an urgent need for demonstrating the institutional transformation in the state, in the way the department is functioning. The three districts (at least) should portray an altogether different operational structure for implementing the project, along with active participation from the farmers. The SHG communities can also be built for demonstration and adoption of technologies and practices by the farmers. Intensive IEC and innovative awareness generation modes need to be tapped.
- 3) Perspective on conjunctive use of water.
 - a) In AP, with the current farmer income, only 37% is coming from agriculture, and 63% is coming from the non-crop sector.
 - b) In AP, in the last 2 decades, the crop sector has been stagnant, and the major growth has been from horticulture, livestock and fisheries sector. Crop sector has not contributed to the growth which needs to be considered while designing the project activities.
- 4) Lessons from other regions / countries: It is important to consider lessons learnt from other regions and relevant countries while designing the project activities. For example; African Soil Investigation System (ASIS); and using technologies like drones to monitor soil quality parameters. Data capturing is important to develop customized analytics and solutions.
- 5) Water delivery efficiency: It is equally important to address the issue of availability of water within the ayacut, and outside ayacut area where farmers are cultivating crops and water use efficiency needs to be improved. Irrigation component should address the fact that the water productivity is declining because of lack of close sync between the time of release of water versus storage and leakage issues.
- 6) Diversification crops and ensuring supply of quality seed: The project should consider promoting high value crops wherever suitable and also ensure the supply of quality seed by

addressing related constraints. An action plan for each tank (customized) would be needed to tailor interventions suiting to the demand.

- 7) Targeting the beneficiaries: The project benefits need to be targeted to the cultivators. The land owner can have institutional credit; however, the mechanism of extending the same to the cultivators has to be envisaged under the project. Unless the cultivator's practical issues are addressed and extending benefits to them, the agriculture scenario cannot be transformed.
- 8) Pilot trials for the designing the tailored project interventions: It is recognized that there will be notable difference in the physical, social and environmental conditions in each tank, and command area which need to be taken into consideration while prescribing the project activities to be implemented under the project. Although baseline survey information and secondary data extend valuable statistics, the pilot trials in selected locations will give information on practical issues which need to be addressed for the smooth implementation of the project. Three pilot trials in each district has been recommended.

Annex 7: Financial Management

Budget Head and Budget Allotment: For financial year ('FY') 2017-18, the office of Commissioner, Command Area Development Authority ('CADA') under the Water Resources Department ('WRD') has been sanctioned Rs 125 crores for the proposed project – Andhra Pradesh Integrated Irrigation and Agricultural Transformation Project (APIIATP). Administrative approval for the same has been accorded *vide* GO dated August 07, 2017 which specified the budget head – “4702-00-101-03 - Capital outlay on minor irrigation for externally aided projects” to be used for the project. This budget code was used for the now closed Andhra Pradesh Community Based Tank Management Project (APCBTMP). The mission was informed that WRD has written to state finance department ('FD') for change in nomenclature of the sub-heads to reflect the components of the proposed APIIATP. The same is under process and is expected to be cleared by the FD soon.

Financial Management Manual (FMM): The Draft of the Project FMM was shared with the Bank prior to the mission. The same was discussed in detail with project officials. *Inter-alia*, it was agreed that the FMM would be a concise document, would reflect procedures to be followed at each level (i.e. PMU, DPU, WUA) and would attempt to facilitate users in following sound financial management systems. The draft was also revised during the mission and shared with the Bank team. It was agreed that the same would be once approved by the PD and shared with the Bank.

Funds Flow: The project would follow extant principles of GoAP with regards to funds flow. The state government would make a departmental budgetary allocation for the Water Resources Department under the relevant Demand for Grant and a sub-allocation to the CADA, which is authorized to incur overall expenditure limited to the allocations. The state government (Finance Department) would then issue a BRO/CBRO authorizing Commissioner, CADA to draw the funds, who will then allocate funds to the District Project Directors (Executive Engineers) and also allocate funds to HODs of Line Departments in the state as per the demand or requirement by way of the LoC (LoC is applicable only in case of non-civil works). The amounts are drawn by raising claims on the concerned Pay and Accounts Officers, based on the bills prepared by them as per the Action Plan approved by the Government. The payments would be made to beneficiaries by way of account transfers and there would be no cheque based payments. The system of A.C. bills is discontinued.

Further, the department uses Bill Monitoring System- a web-based MIS tool for making allocation of funds and recording and reconciling expenditure.

Internal Audit Function: During previous missions, it was agreed that considering complexity of the proposed project and involvement of various line departments, a separate Internal Audit team within the PMU would be established who would audit all financial transactions of the PMU/DPUs of the line departments at both state level and district level and submit the quarterly/half yearly report on the irregularities/control deficiencies to the State Project Director. In line with this, the PMU had written to the FD for sanctioning posts of additional staff that may consist of a Deputy Internal Audit Manager in the cadre of APAO and two supporting staff i.e. Senior Assistants (may be contractual staff) for performing the audit function. However, FD *vide*

Go No. 106 dated June 29, 2017 has sanctioned the engagement of only one Chartered Accountant at Rs 50,000 per month, the services of whom would not only be inadequate, but would also be lacking the institutional knowledge of GoAP systems and procedures.

It was discussed that internal audit function is going to be an important function which should be institutionalized within the department itself rather than being outsourced. Since incurring of expenditure will begin shortly (as DPRs have been finalized for Phase – I tanks by DPUs), it was agreed that the PMU would now again write to FD for sanctioning of posts for internal audit team and maintain a regular follow up for timely issuance of the administrative sanction in this regard.

DPU level arrangements: The mission visited the DPUs at West Godavari and Krishna districts to understand project related documentation and funds flow process at the DPU level. FM staffing at both DPUs was adequate; DAOs were present in both. Contractor ledgers, though manual, had been prepared in proper formats. The mission also stressed that going forward, it would be important to maintain proper documentation and ensure timely reconciliation of expenditure with the AG records, so as to avoid unnecessary disallowance of expenditure incurred.

Cost Sharing: The mission was given to understand that the final cost table is under preparation basis which the cost sharing pattern between different line departments shall be finalized.