

**Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project  
Pre-Identification Mission: August 08-17, 2016**

**Aide Memoire**

**Introduction**

1. The newly formed State of Andhra Pradesh has proposed a next generation irrigated agriculture transformative project with climate resilience as its cross-cutting theme. This proposed project is based on the impact and lessons learnt from the recently completed Andhra Pradesh Community Based Tank Management Project. Following agreement with DEA (Department of Economic Affairs, GoI) and the Government of Andhra Pradesh (GoAP), a World Bank pre-identification mission<sup>1</sup> was undertaken from Aug 8-17, 2016 to assess government's readiness for the proposed Andhra Pradesh Integrated Irrigation and Agriculture Transformation Project (AP-IIATP). Detailed discussions were held with project authorities in Hyderabad, and field visits were made to two districts (Krishna and Chittoor). The mission had discussions with Special Chief Secretary - Agriculture (Mr. T Vijay Kumar), Special Chief Secretary - Animal Husbandry and Fisheries (Dr. Manmohan Singh), and a wrap-up meeting (on 26 August, 2016) with the Chief Secretary (Mr. S P Tucker). Subsequently, the mission had a debriefing meeting with Mr. Rishikesh Singh, Director, DEA in Delhi. The mission is grateful to all concerned for their cooperation and constructive discussions.

**Background and Mission Objectives**

2. The pre-identification mission followed an official request from GoI (DEA letter dated 24 May, 2016) for financial assistance from the World Bank. The World Bank agreed to initiate the project preparation process (Bank response dated 27 May, 2016) to support efforts of GoAP to enhance agricultural productivity, profitability and resilience to climate variability in selected 1,211 tank systems in Andhra Pradesh.

3. The mission agreed with GoAP that the proposed project would be investment Project Financing implemented over a period of 6 years, providing benefits to 200,000 farming families covering 147,000 Ha of agriculture land in 1,211 tank command areas. The total project cost would be an estimated USD 238.08 million (INR 1,600 Crores), to be financed through the IBRD/IDA (70%) and GoAP (30%) co-sharing arrangement.

4. The objectives of this mission were to:

- (i) review the readiness of GoAP (Irrigation, Agriculture and Fishery Departments) on the project preparation process;
- (ii) agree on the project design and major implementation components;
- (iii) concur on a tentative project preparation timeline, and immediate next steps; and

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- (iv) visit some of the project intervention areas.

This aide memoire summarizes the mission's main findings and agreements reached:

### **Readiness and Preparation of GoAP**

5. Project Director and PMU Staffing: A Project Director (PD, an IFS officer) has been officially appointed through a Government Order and taken up his new position on 26 August, 2016. Office facilities for the Project Management Unit (PMU) have been identified and already made available. The process of re-deployment of staff expected to be on deputation to the PMU has been initiated. About 50% staff is already in place. An organizational chart with a staff matrix for a fully operational PMU was developed during the mission (Annex 6); however, the PMU needs to recruit all identified staff positions with immediate effect.
6. Budget Allocation: A dedicated budget head has been created for the project, for the PMU to cover operational costs towards project preparation activities.
7. Project Components: The Bank mission and the PMU discussed and agreed on four pillars of the proposed project and allocated necessary budget needed for each. Specific details are detailed below.
8. Project Preparation Funding/Retroactive Financing: The mission reviewed the processes and requirements for IBRD/IDA retroactive financing and project preparation funding. The mission was informed by the Finance Department that GoAP would use its own resources to fully cover project preparation costs. The GoAP will not use retroactive financing for project preparation.
9. Project Implementation Plan: The PMU confirmed that it would hire a consulting firm to prepare the Project Implementation Plan (PIP). The hiring of an external consulting firm is expected to be completed no later than Sept 30, 2016. In addition, an implementation cycle was finalized with initial 6 months as the mobilization phase. Sequencing of different sub-activities under different pillars was done in consultation with PMU and GoAP. The mobilization phase will also include completion of all bidding documents for works.
10. Preparation Timeline: The PMU and the Bank team reviewed the timeline for the project preparation and agreed to have the project package (all manuals including Social and Environmental Management Framework – SEMF and PIP) to be ready by March 31, 2017.

### **Inter Departmental Coordination and Planning**

11. Given the transformative nature of the project with climate resilience as its cross-cutting theme, inter-sectoral coordination has emerged as a critical task in developing an effective project implementation mechanism. The mission had extensive discussions with senior officials of the participating departments in the project - irrigation, agriculture, horticulture and fishery, who expressed genuine desire to contribute to evolving an effective institutional mechanism to meet the stated objectives of the project.
12. In consultation with the PMU, the task team evolved an organogram (Annex 6) which has provision for a Steering Committee to meet and review progress and accord approvals to the project work plans. Given the scientific nature of the project, the mission is of the opinion that the committee convene every quarter for the first few years of the project to assess progress on measuring and grounding climate resilience in project implementation. The details of an inter-departmental

coordination mechanism with its associated monitoring system will be put in place during the next mission.

### **Implementation Arrangements**

13. The PMU is proposed to be located in the premises of the Command Area Development Authority, with representatives from each of the four participating line department's viz., Agriculture, Irrigation, Fisheries, and Horticulture, drawn to fill the project implementation profile. The PMU will be responsible for the overall monitoring of the project but district-level institutional arrangements are yet to be finalized.

### **Project Pillars**

14. Extensive discussion with and between four departments led to a consensus on identifying integrated pillars on which the project implementation plan will rest. The project has proposed four key pillars; (i) improving irrigated agriculture efficiency at farm level, (ii) promoting adaptive sustainable and resilient agriculture practices; (iii) supporting climate-friendly market and agribusiness promotion, and (iv) project management and capacity building, and associated supportive sub-pillars. As the project interventions will be implemented keeping resilience as the keystone, there will be need for substantial inter-departmental coordination between the water resources, agriculture, horticulture, and fisheries departments.

#### **Pillar 1: Improving Irrigated Agriculture Efficiency at Farm level**

15. As a distinct departure from APCBTMP, the present project envisages applying Integrated Water Resource Management (IWRM) principles to addresses holistic water management in minor irrigation (MI) tank systems for improving irrigated agriculture, i.e., integrating water productivity and water efficiency while expanding irrigation at the farm level. The mission had detailed discussions with the project staff to plan interventions on both the supply and demand sides through four inter-related sub-pillars: (i) institutional strengthening and capacity building of WUAs; (ii) improving tank system performance and resilience; (iii) in-flow hydrology management for improving water productivity and efficiency; and (iv) building synergy with Primary Sector Mission. A more detailed description and findings from field visit are provided in Annex 2.

##### **1A: Institutional Strengthening and capacity building of WUAs**

16. This sub-pillar would focus on engaging communities through water users' associations (WUA) for socio-engineering, concept of reducing water footprints in farm system development without compromising on productivity and profitability. The aim is to sensitize water users and ensure a desired level of GHG emission at the tank level. Community based institutions will assume greater responsibility towards making water-conserving crop choices for water conservation and management.

Water use efficiency will be the *leitmotif* for creating a culture of 'more crops per drop'. The participatory irrigation management (PIM) will follow a distinct approach where better operation and maintenance (O&M) of rehabilitated tank systems will be dovetailed with irrigation outreach based on reduced water footprints through adaptive agriculture practices (Pillar 2) at the farm level. The sub-pillar will strengthen existing WUAs and establish new WUAs for effectively developing all aspects related to efficient in-situ water conservation and management. This way WUA capacity would be enhanced for grounding the concept at the farm level.

## **1B: Improving Tank System Performance and Resilience**

17. Modernizing irrigation infrastructure, including tanks and irrigation canals, is critical to improving tank system performance. The modernization of irrigation infrastructure will focus on improving the bulk water delivery to irrigation systems through rehabilitation and modernization of 1,211 tanks with an ayacut of 0.147 million hectares, covering 11 districts in the state. The selection criteria for these tanks proposed by the PMU were reviewed and were found to be in good order and these were finalised. The expected works will include modernization of control structures (diversion weirs); supply channels; cross-masonry structures; de-silting of tanks; construction of recharge well structures and strengthening and up-gradation of tank bunds; installation of flow measurement; up-gradation of distribution systems; improvements of irrigation and drainage canals; introduction of modern quality testing devices to determine soil compaction parameters; and for meticulously maintaining specified cover to reinforcement steel in the construction of reinforced concrete structures. The unit cost for restoration of tank structures and OFD (On-farm Development) works was worked out and proposed to be INR 25,000 per acre of ayacut of the tank. The Technical Manual and Quality Control Manual for taking up the restoration works were made available and are ready with the PMU.

18. A network of tanks termed as cascade tank systems were also proposed for the first time for treatment (as in operation in the ongoing government program of "Neeru Chettu") in this project. It involves 92 such cascades covering 487 tanks, out of the total 1,211 tanks. Apart from the components involved for restoration of individual tanks, the cascade tank systems would involve treatment works such as jungle and encroachment clearance, silt removal and sectioning and embanking for the vagus and nallas (i.e. the feeder channels) connecting the tanks in the cascade. The unit cost for these works was worked out after extensive discussions with the PMU and during the field visits by the mission members to Chittoor district, and was proposed to be INR 5,000 per acre of ayacut of the cascade tank system.

19. It was proposed that Tank Improvement and Management Plans (TIMPs) and Detailed Project Reports (DPRs) for 100 tanks would be completed in the first year. Assured budget would be given for tender preparation. During the detailed discussions with PMU, it was agreed that TIMP/DPR for each tank would cover the below parameters in addition to the restoration needs of the tank: (i) area irrigated, source wise; (ii) groundwater level; and (iii) water use or present duty. In addition, major crops with areas and crop yields will be assessed at GP level belonging to the tank/cascade. This is expected to be ready before the PIP is finalised.

## **1C: In-flow Hydrology Management for Improving Water Productivity and Efficiency**

20. Runoff management was never given adequate attention as CAD never had control over catchment area land-use vested different departments. This project is in a position to do embark on inflow management at individual tank and at cascade tanks level. Water inflows for each tank/cascade is subject to spatial distribution of rainfall and the terrain characteristics such as topography (elevation), soils, land use/land cover, and hydro-geomorphology. Discussions with the PMU revealed project readiness to delve into it, as a hydrological database exists with the PMU for the selected tank systems. Hydrological models have to be used combining this database for estimating 75% dependable yield for each tank/cascade. These estimates should be validated with ground-truth for sample tanks. Based on the detailed presentation made by AP Space Application Centre (APSAC), it is proposed to entrust this task to them. Moreover, independent consultants will be chosen to develop baseline database related to

current surface water irrigated area and water use in Kharif and Rabi seasons; groundwater status and groundwater use; inventory of existing tube/dugwells; and micro-irrigation systems for each tank/cascade. In addition, surveys will be conducted for assessing major crop choices practiced in each tank/cascade ayacut.

21. Further, IWRM principles will be applied for command area treatment of tank systems including construction of group based mini-irrigation schemes (dug wells, shallow tube wells, water harvesting and groundwater recharging systems). The design specifications for these components have to develop through consultants before finalisation of PIP.

22. A review of the PIP for participatory groundwater management component, developed by the State Groundwater Department, was found to be in good order. It envisages participatory hydrological monitoring (PHM) for the tank/cascade system comprising of time series groundwater levels and rainfall, yield trends and aquifer tests at periodic intervals. This team will form the synergetic link with agriculture and WUAs for implementing water productivity and water use efficiency. It was agreed that the groundwater team will work out the unit cost of groundwater interventions planned for each tank/cascade.

### **1D: Building Synergy with Primary Sector Mission**

23. Various departments and entities involved in water, agriculture and related sub-sectors need to collaborate for effective service delivery to farmers. For achieving this, GoAP is working towards forming a consortium of knowledge stakeholders which includes relevant state line departments, knowledge institutions, civil society organizations and other relevant national and international organizations for planning, implementation and monitoring the activities of the Primary Sector Mission. The project proposes to provide support to policy and institutional reforms for enhancing institutional capacities of relevant departments. It is proposed that the project will provide incentives for capital investments, including through unlocking opportunities for crowding-in private sector investments. Support will also be provided for guiding, designing and implementing holistic strategy for the Primary Sector Mission.

24. As an innovative design feature, Pillar 1 will be supported by information and communication technology (ICT) tools, sensors and remote sensing in two key ways – (i) leveraging Internet of Things (IoT) technologies combined with sensors to remotely capture data and information on various aspects pertaining to minor irrigation systems such as water flows, water quality, and auto management of turnouts, pumps, and regulation of irrigation system operation using a cost effective deployment of wireless sensor networks, and (ii) use ICT and remote sensing products for monitoring and evaluation (M&E). Pilot tanks/cascades for deploying these innovative technologies have to be explored and finalised. In order to incorporate and mainstream these innovative technologies, capacity building would be required through hiring of consultants for selected teams in the PMU and DPUs, to internalize these approaches for the duration of the project.

### **Pillar 2: Promoting Adaptive Sustainable Agriculture Practices**

25. This is an important pillar, aimed at improving production and productivity of the farming systems 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 in a climate-resilient manner. This is proposed to be achieved through creating awareness on sustainable intensification and diversification of crop and horticulture production systems through adoption of low external input sustainable agriculture practices, indigenous/drought and pest tolerant seeds, organic manuring, composting, soil and moisture conservation, reduced or no tillage operations combined with water budgeting and water management practices.

26. The project has selected 1,211 tanks with a designed *ayacut* of 0.360 million acres in 11 districts for promoting sustainable agriculture practices out of about 40,817 tanks under the Minor Irrigation Department, serving an *ayacut* of 2.560 million acres in the state. However, it is proposed to include non-*ayacut* area within a given 'gram panchayat' for awareness generation and extension services. Intensive discussions with senior government officials (see Annex 3) has led to a multi-pronged implementation strategy briefly spelt out below:

(i) Institutional Synergy for Capacity Building: Capacity building of farmers through institutional strengthening is proposed for sustainable intensification and diversification of crop and horticulture production systems. The project will infuse additional expertise in Agriculture Technology Management Agency (ATMA) to meet the project objectives. Backed by a lead technical agency responsible for field-level training-cum-capacity building protocols, field level NGOs will impart knowledge and trainings through community service providers in the villages.

(ii) Decentralized Production System: In line with the ongoing programs in the state, the project is slated to initiate 'seed village program' in selected GPs by supporting inter-institutional linkages for technical know-how, breeder seeds, seed multiplication and certification with ICRISAT, CRIDA, AP State Seed Development Corporation, Agriculture University, Agriculture Department and Farmer Producer Organizations. The Farmer Producer Organizations (FPOs) will be the seed producing agency at the cluster level.

(iii) Basket for Commodity Marketing: Expansion of farm incomes can be effectively achieved through forward market linkages and the project envisages emergence of production clusters. Agri-business strategy will be driven by the goal to organize communities to leverage collective bargaining for farm produce viz., pulses, oilseeds and high-value minor millets. Farmers Producer Organizations/Groups will connect with SHG-led Procurement Centers that will liaise with buyers both government and private. The project will make substantial investments in creating transit storage capacity at cluster levels to reduce post-harvest losses of commodity baskets.

(iv) Delivering and Measuring Resilience: Ensuring climate resilience of crop production systems is at the core of the project. The task team has deliberated on the issue at length and has recommended that crop advisories, along with market advisories, be delivered to end-users in selected cascade clusters through Village Climate Information Centers. The project envisages to set up systems for measuring GHG emissions from its interventions and measure resilience by monitoring changes in crop productivity, soil carbon stock and crop water footprints on a regular basis.

27. To draw a road map of activities and action plans, the task team will hold discussions with the government on September 16, 2016. It has been agreed that project manuals, operational strategy and institutional arrangements will be finalized in time for project appraisal in December 2016.

## **2A: Climate Smart Diversified Agriculture Production Systems**

28. Current climate variability observed in the state of Andhra Pradesh include delayed/untimely rainfall, heat stress, moisture stress, droughts, floods, and cyclones, all of which directly impact crop production and productivity. These climatic flux are predicted to increase in both frequency and magnitude. The objective of this sub-pillar is to promote climate smart agricultural practices that are suitable for local agro-climatic conditions and are resilient to such climate stressors, with the aim of generating stable incomes for farmers to meet living expenses, cover social welfare needs and build assets for their families. Sustainable intensification and diversification of crop and horticulture production systems will be achieved by propagating low external input sustainable agriculture practices through demonstrations, awareness building and training activities. These practices include the use of indigenous/drought and pest tolerant seeds; organic manuring; composting; soil and moisture conservation through mulching; precision nutrient and pest management; and reduced or no tillage operations combined with water budgeting and water management practices.

29. Most agencies working for farmers focus on increasing farm productivity, but their efforts are not always aligned with converting increased yields into greater profitability. This fundamental divergence in practical priorities will be plugged by reducing 'input' costs and enhancing 'output' from farming system on a sustainable basis. This can be achieved by (a) creating a drought/pest tolerant seed production system, incorporating seed village networks already demonstrated in the state; (b) promoting comprehensive, crop specific, low external input sustainable agricultural package of practices; (c) promotion of high production conservation technologies like System of Rice Intensification (SRI), Sustainable Sugarcane Initiative (SSI), etc.; (d) use of water efficient irrigation technology like drip/sprinklers; (e) ensuring efficient nutrient management to reduce deficiency and wastage; (f) installation of integrated weather forecasting systems to provide weather-based crop advisories in selected tank cluster areas; and (g) developing a mechanism to quantify crop resilience to climate variability and creating a baseline for quantifying soil organic carbon and GHG emission from crop production systems.

30. Integrated, mixed/multi-crop agricultural systems have been known to be resilient to a range of pests, diseases and weather shocks. Diversification from mono-crop systems such as paddy/sugarcane to more resilient, multi-crop, mixed systems such as high value fruits, vegetables, spices, oilseeds, pulses and millets have been proposed, which will lead to higher farmers' income and reduced vulnerability to external shocks such as weather and price volatility. Currently, there is a significant scope to expand the production of pulses, oilseeds and high value vegetables in Andhra Pradesh.

## **2B: Innovation and Technology Transfer for Fishery Production**

31. Fisheries in Andhra Pradesh are categorized as sunrise sector due to its resurgence and high-growth potential. Overall, fish production has almost tripled in the past decade from 8.14 lakh tons in 2005-06 to 23.52 lakh tones in 2015-16. The share of the state in India's fishery food exports has increased from about 20% in 2009-10 (Rs.2100 Crore) to about 42% in 2014-15 (Rs.14000 Crore). The sector's contribution to Gross State Domestic Product (GSDP) is 5.40%, and provides employment opportunities to about 14.5 lakh people. With a view to make the state a fisheries hub the GoAP accords top priority to fisheries development in the state, and has released the fisheries policy and plan for 2015 to 2020. Under this policy, the GoAP approved fiscal benefits covering several sections of the industry

including, production, processing, marketing and disease management in order to stimulate the development of the sector.

32. Often referred to as "rich food for poor people", fish provides essential nourishment, especially quality proteins and fats (macronutrients), vitamins and minerals (micronutrients). While the World Health Organization (WHO) has recommended per capita fish consumption of 13 kg per annum, the per capita fish consumption in Andhra Pradesh is only about 9.8 kg per annum. Therefore, there is a great need to promote fish in the domestic market at various levels as the consumer has diverse requirements.

33. There is a huge gap that exists between the actual and potential yield, due to a number of socio-economical, technological, institutional and policy factors. Although there has been some progress in pond aquaculture, fish production in irrigation tank systems requires significant improvement for achieving the potential yield. There is considerable scientific knowledge/technology available in India and in other countries with respect to improved production methods, approaches for community based fishing/fish farming, strengthening market systems and value addition, as well as environment and social concerns. However, very little of this knowledge reaches practitioners in the field, including individual fish farmers, small private sector operations and communities. The government needs to strengthen linkages between research and extension, and enhance the capacity for applied research, technology transfer, and extension services. The objective of this sub-component is to promote an integrated approach to achieve increased productivity and profitability through innovative technology transfer, as well as better linkages of fish farmers in selected value chains. Detailed implementation plan of the fisheries sub-component is provided in Annex 4.

34. The key outcome of this sub-component would be increased production in inland aquaculture through innovative technology and intensification; and significant increase in employment, income and food security for rural populations, particularly for women who undertake 60-80% of the fish farming processing and marketing activities. The AP State fishery food exports would further increase significantly and contribute to earnings in foreign exchange.

### **Pillar 3: Climate-friendly Market and Agribusiness Promotion**

35. Given the size and nature of landholdings, the project is focusing 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, horticulture, and fisheries) by developing transit storage facilities. GoAP is clear what kind of support they need for transitory storage system. Farmers Producer Groups will connect with SHG-led Procurement Centers that will be in the forefront of procuring, storing and marketing select commodities from the Farmers Producer Groups. Based on the agri-business framework (Annex 5) an external agency will be sourced to conduct a detailed mapping exercise to determine typology of commodity clusters, and develop marketing strategies.

### **Pillar 4: Project Management and Capacity Building**

36. 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. Activities to be financed include:

- (i) setting up, supporting and capacity building of PMU to align with the project components at the state & districts level;

- (ii) project monitoring, evaluation and promotion of learning culture at the PMU level;
- (iii) documentation of project processes and experiences on a rolling basis, and its dissemination to the wider development community for cross-learning and sharing;
- (iv) services of an external M&E agency as consultants for the duration of the project for creating a feed-back loop for improving project thrust and implementation;
- (v) providing support for emerging needs and innovations during implementation; and networking with partner organizations, external professional agencies and the Bank.

37. This is a unique project and its transformative nature requires a different skill set. All interventions will be implemented with resilience as the keystone, and will involve cross-sectoral cooperation and implementation including the water resources, agriculture, horticulture and fisheries departments. As such, extensive discussions regarding the PMU staffing structure were held with the Special Chief Secretary, Fisheries; Special Chief Secretary, Agriculture; and Secretary, Water Resources, based on which, the new PMU staffing structure was designed and agreed upon. A copy of the organogram detailing the PMU staffing structure is provided as Annex 6.

38. The mission also had extensive discussions on the incremental costs for managing the PMU for six years. This component will not only ensure capacity building of all four line departments mentioned, but would also involve hiring of climate modelers, hydrologists and economists. A specific budget allocation was done keeping these requirements in mind. There is one critical issue that needs to be addressed regarding the continuity of some staff members who have been retained from the previous project (APCBTMP) based on their performance. Support for their incentive and salary structures until the project is approved by the World Bank Board was discussed in detail. The State government has already provided Rupees two crores as support for PMU operations during project preparation phase.

39. As part of the mission, four follow-up actions were agreed: (i) the State government will issue a Government Order/Gazette Notification for the new project by September 15, 2016; (ii) release the necessary funding for PMU operations; (iii) TORs for all the staff mentioned in Annex 6 will be finalized by August 31, 2016, with most of the staff in place by September 30, 2016, either by deputation of line departments or from the open market; and (iv) all manuals (including finance, procurement, PIP, technical manuals and SEMF) shall be prepared, reviewed and ready for appraisal by December 31, 2016.

### **Social Mobilization, Institutional Development and Gender Inclusion**

40. The project recognizes that human and institutional development activities are critical to ensure success. The project copiously identifies that tank dependent farming communities have a significant role to play in planning, constructing, operating and maintaining the tanks to draw benefits on a sustainable basis. Furthermore, given that the hydraulic dynamics necessarily bind farmers within an ayacut, collective action/efforts are warranted. Towards this, the proposed project would build on the earlier efforts at mobilizing local communities into ‘Water User’s Associations’ (WUAs) which would provide a common platform for undertaking a variety of tank management related activities. Mobilization efforts necessarily have to take into cognizance the heterogeneity among local communities. Due representation will have to be provided for the poor and vulnerable sections such as SC, ST, and women. It is also planned to provide technical support for agriculture production and marketing. As such, sub-groups of common interest groups (CIGs) may also emerge from the ‘mother’

WUA. In addition, the project is also embarking upon supporting fisheries in a large way. Therefore, fisher folk also need to have a stake in the management of tanks. Given the recent amendments to the WUA act, which provides for nomination (as against the earlier practice of elections) and limits to only six members in a Management Committee, further analysis need to be made to understand the representativeness of the nominated WUAs. There is also a need to explore supplementary and complimentary adjustments to make WUAs more inclusive and accountable. Substantial efforts will have to be made towards building the capacity of WUA, in particular, and the tank community, in general.

41. It is well recognized that agriculture is not gender neutral and that both men and women have a role to play. Women contribute to over 60% of the farming operations. Yet, across regions and contexts, women face gender specific constraints that limit their access to productive inputs, assets and services. Gender gaps are observed for land, livestock, farm labor, education, extension services, financial services and technology. These gaps reduce their productivity and limit their contributions to agricultural production, economic growth and the well-being of their families. Especially, it renders women farmers more at risk, especially to climate change, as they often lack the means to cope with the impacts of climate change. Notwithstanding, the considerable efforts made during the previous project (APCBTMP) to address gender gaps, the proposed interventions will undertake an analytical enquiry as part of project preparation process to understand and assess the multi-faceted dimensions of gender gaps. Subsequently, strategic and operational design efforts will be made to ensure not only recognizing women from farming households as ‘farmers’ in their own right, but also as leaders in WUA functioning. Accordingly, the project will have to design two-fold interventions. One of them, generic, aimed at sensitizing and building the capacity of the implementers, and the other set of interventions will be specific to WUAs at the tank village level.

### **Social and Environmental Safeguards**

42. The project is categorized as ‘B’ (Partial Assessment), as the project interventions such as rehabilitation of tanks, improved irrigation efficiency, diversified crop production, etc., may have short term negative impacts on the environment. To mitigate the negative impacts, a Social and Environment Management Framework (SEMF) needs to be developed following a thorough and comprehensive impact assessment. There is already an existing SEMF that was developed for APCBTMP. As this project will cover a larger area and more tanks in different sub-basins and different agro-climatic zones, the SEMF needs to be updated by the client. The learning from implementation of APCBTMP, should be integrated into the SEMF of this project for effectiveness.

43. As one of the project components is ‘promoting adaptive sustainable agricultural practices’ which include Integrated Pest Management and Integrated Nutrient Management, it is important to understand the current use of chemical fertilizers and pesticides in the tank command areas through a representative baselines survey and soil analysis. This would help in designing appropriate package of practices. The expected sample for the survey is 20 tank command areas. The SEMF is expected to be completed by December 31, 2016.

### **Finance Management**

44. The mission assessed the adequacy of financial management arrangements for the project under preparation. The objective of the assessment was to determine whether the implementation agencies have acceptable financial arrangements in place for: (i) use of funds in an efficient and economical

manner for the purposes intended; (ii) preparation of accurate and reliable periodic financial reports; and (iii) mobilizing independent and competent audit/assurance arrangements.

45. This is the follow-on project of APCBTMP, with additional responsibility entrusted to other line departments, viz., Agriculture, Fishery and Horticulture. The mission has noted the accomplishments and gaps in the financial management system of the current project and suggested few improvements/changes to the system to plug the gaps. The key issues noted and the changes proposed are highlighted below:

(i) Financial Management Manual: The Project Financial Management Manual (FMM) is being drafted. The Financial Management (FM) arrangements, including the internal control framework, budgeting, fund authorization, accounting, internal controls, financial reporting and audit arrangements are being documented in the FMM. The mission has reviewed the draft document and has suggested a few improvements.

(ii) Internal Audit Team: The internal audit function of the previous project was entrusted to a Chartered Accountants firm. The current internal audit was mainly focused on WUAs accounts, A.C. bills, etc. Considering the complexity of the proposed project and the involvement of various line departments, it was suggested to establish a separate Internal Audit team within the PMU, who should have a good knowledge of the GoAP financial rules and have sufficient time to visit the DPU/WUAs. The team should audit all financial transactions of the PMU/DPU the line departments at both state level and district level and submit the quarterly/half yearly report on the irregularities/control deficiencies to the Project Director. The Internal audit team should consist of a Deputy Internal Audit Manager in the cadre of APAO and two supporting staff i.e., Senior Assistants (contractual staff/ Govt Staff having audit and accounting knowledge).

(iii) Fund Flow to the Line Departments: Considering that substantial amount of money would be flowing through several Line Departments, it was agreed to restructure the fund flow arrangement for seamless flow of funds to the beneficiaries. The line departments have to submit annual action plan to the PMU for release of funds. After approval of the Annual Action Plan by the Government, the PD will release the funds to the HODs of respective line departments, in turn, the HODs have to distribute the funds to the districts for implementing project activities, as per the action plan. All necessary registers shall be maintained and updated properly. The financial rules and procedures are primarily guided by the AP Financial code, PWD department code, accounts code as well as instructions and circulars issued by the Government of AP and PMU from time to time. This is contrary to the previous arrangement, where the PMU released the funds directly to the DDOs.

(iv) Financial Rules wrt A.C. Bills: In the previous project there were instances where the DDOs were allowed to draw up to INR 10 lakhs through A.C. Bills for project related expenditures and these remain undocumented for long periods. The requirement of A.C. bills need to be discussed with the line departments. If it is an absolute necessity to draw A.C. bills, the DDOs are required to submit monthly status reports on A.C. bills to the PMU, so as to furnish the same to World Bank along with IUFs for reimbursement of claims. It is also suggested that the DDOs should strictly follow the latest instructions of the GoAP financial rules on the subject. In particular, a subsequent A.C. bill shall be drawn only after adjustment of the current A.C. bill. AC bills will be used only for specific one-time expenditures (including contingencies) and not for recurring expenditures like staff salaries or consultant remunerations.

(v) Reconciliation of Expenditure: The mission noticed requirement of timely reconciliation of accounts between the Bill Monitoring System (BMS) and the accounts at DDO level. The DDOs of line departments have to reconcile the expenditure incurred by them with PAOs figures on a monthly basis. Discrepancies found, if any, should be brought to the notice of the concerned PAO immediately for rectification. Also, they have to submit a statement (format is under design) showing monthly expenditure details to their HODs and in turn, the HODs will furnish the same to the PMU. PMU will reconcile the expenditure statement submitted by the DDOs with the AG, Government of AP.

(vi) Requirement of Coordinator under each Line Department to address Financial Issues at the District Level: Under the previous project, funds were released directly to the DDOs of line departments. It was noticed that few DDOs of line departments failed to produce bills/vouchers to AG Audit team during the certification, audit resulting to disallowances of expenditure. There were some challenges in coordinating with all the DDOs of Line Departments. Hence it is desirable to nominate a coordinator under each Line Department, at HOD office who can regulate/coordinate with all the DDOs under their respective Departments, pass the necessary information and documents to the Finance Manager of PMU and vice-versa.

(vii) Cost Sharing: There is ambiguity in cost sharing between the departments and the financing percentage. This is expected to be finalized by October 31, 2016.

46. The finance management assessment is under documentation. FMM is being drafted and is expected to be completed by December 31, 2016. The team is closely working with AG office to recertify earlier disallowances for a smooth closure of the loan account. At this stage, the mission is under the assumption that other financial management arrangements are unchanged and the same arrangements will be applicable to the proposed project. The financial management arrangements would be reviewed again and updated based on further developments in project components and implementation arrangements.

## **Procurement**

47. The Procurement Risk Assessment (PRAMs) of the PMU - APIIATP, the principal Implementing agency for the proposed project was carried out and the Procurement Risk Rating will be "Moderate" based on initial findings. If any other state department(s) are designated as an additional implementing agency, their Procurement Risk Assessment will have to be carried out. The Project will be using the World Bank - Procurement Regulations for IPF Borrowers (July 2016) for procurement of Goods, Works, Non-Consulting and Consulting Services. The salient features of these Procurement Regulations were explained to the procurement and finance staff of the Project. These regulations mandate that the Borrower prepares the Project Procurement Strategy for Development (PPSD) and Procurement Plan during project preparation and the Bank needs to review the PPSD and agree to the Procurement Plan before the completion of loan negotiations.

48. The PPSD provides the basis and justification for procurement decisions, including the approaches to market and selection methods. The Procurement staff will be preparing the project Procurement Manual (which will later be modified, if recommended by the PPSD) and are expected to submit the first draft by December 31, 2016. The terms of reference (TOR) for engaging a consultant for preparing the PPSD will be shared with the Project.

## **Monitoring Framework**

49. The new project has a lot of experience from the predecessor project to fall back upon. Given the implications of monitoring and measuring climate resilience for the first time, the mission in consultation with the PMU has recommended bolstering the unit with 2 additional staff positions, an Economist and a Documentation expert. With the infusing of additional human resources, this unit is projected to serve as a 'knowledge hub' for the project, developing exclusive monitoring system. To match the project requirements. Management Information System (MIS) is an integral part of the project management which ensures smooth implementation of the project activities. Designed to facilitate results-based management, learning and process monitoring, and impact evaluation, this unit will hold overall responsibility for planning and coordinating internal and external monitoring.

50. The mission is pleased to observe that a competent consulting agency has been identified to assist the PMU in developing the Project Implementation Plan (PIP) in time for the project appraisal. It has further been noted that the PMU has initiated the process for procuring the services of a Third Party Monitoring Agency to generate time series data on monitoring the impact of project components on the project development objective. It has been agreed that the PMU will be ready with a robust monitoring framework for field-level data sourcing, its validation and forward flow using effective communication tools before the next mission.

## **Project Concept Note and Project Information Document preparation Status**

51. The mission engaged the PMU in protracted discussions on the draft PCN. The project components were discussed in detail and the sub-components were put to scrutiny at length to come to an agreement on the component-wise budgetary allocation. The Project Information Document (PID) preparation process has been initiated by the task team with the target of completing the same during the next mission.

## **Next Mission Schedule**

52. The next mission is tentatively scheduled from October 15 to 25, 2016.

## **List of Annexures**

- (i) Annex 1: Agreed Action
- (ii) Annex 2: Hydrology in Tank Systems
- (iii) Annex 3: Agriculture Sector in the Context of APIIATP
- (iv) Annex 4: Fisheries Implementation Arrangements
- (v) Annex 5: Climate-friendly Market and Agri-business Promotion
- (vi) Annex 6: PMU Organogram

### Annex 1: Agreed Action

SN	Agreed Actions	Responsible	Deadline
1.	Issuance of a Government Order/Gazette Notification for the new project	PMU	Sep 15, 2016
2.	TORs for all the staff mentioned in Organogram	PMU	Aug 31, 2016
3.	All project staff in place	PMU	Sep 30, 2016
	All manuals (including finance, procurement, technical manuals and SEMF) shall be prepared, reviewed and ready for appraisal	PMU	Dec 31, 2016
1.	Project Implementation Plan (PIP)	PMU	Dec 31, 2016
2.	Hydrological Viability Assessment Study	APSAC	Oct 31, 2016
3	Baseline survey	State Project Director	(i) Aug 31, 2016
	(ii) Commencement of survey		(ii) Sep 30, 2016
4.	Detail Design for Phase 1/Year 1 (100 tanks)	(i) Completion of Tender documents	(i) Oct 31, 2016
		(ii) Completion of DPR (TIMP and bidding documents)	(ii) Dec 30, 2016
5	Deployment of required experts for project preparation and detailed design of the implementation.	AP DoF	Aug 31, 2016
6	Complete survey of tanks and provide tank profiles for designing the implementation and estimating budget requirements	AP DoF	Sep 30, 2016
7	Preparation of detailed Organogram for project implementation	AP DoF	Sep 30, 2016
8	Preparation of DPRs first draft	AP DoF	Oct 31, 2016
9	Necessary project manuals, operational strategies and institutional arrangements shall be ready for developing implementation plans for Component B.	AP DoAg	Sep 30, 2016

10	World Bank Task Team to engage Agriculture Department officials in a meeting to develop implementation plans for Component B.	AP DoAg	Sep 16, 2016
11	Baseline assessment and completion of Social and Environment Management Framework (SEMF)	PMU	Dec 31, 2016
12	Project Financial Management Manual (FMM) to be completed	PMU	Dec 31, 2016
13	Cost sharing between the departments and the financing percentage to be finalized	PMU	Oct 31, 2016
14	Draft Procurement Manual for review	Procurement staff, PMU	Dec 31, 2016

## Annex 2: Hydrology in Tank System

53. Andhra Pradesh state is endowed with 50.38 per cent of total irrigated area to gross area sown. All sources (canal command areas, tanks, tubewells, dugwells and other sources) together provide a gross irrigated area of 4.096 million ha<sup>2</sup> (DES of GOAP<sup>3</sup>, 2014). The percent area irrigated by canals and wells are 48.1% and 37.6%, respectively, while from tanks it's just 10.1%. Moreover, the state is constrained by declining groundwater levels and its overexploitation (area under tubewells has gone up by 500 per cent in the past 25 years - from 3.05 lakh ha in 1990-91 to 15.07 lakh ha in 2013-14). The area irrigated by tank systems is relatively low due to deficient maintenance and management of the tank systems, as a result of which most tanks are performing well below their capacity, with the percentage of actual area irrigated to potential created varying between 35-55 percent depending on rainfall.

54. There are about 6,361 MI tanks (ayacut > 40 ha) serving a registered ayacut of 1.759 million acres, whereas 35,376 tanks (ayacut < 40 ha) have been transferred from Panchayat Raj to Minor Irrigation Department and have an ayacut of 0.801 million acres. The GoAP has substantially expanded capital investments for modernizing tank irrigation infrastructure since 2006-07 to reduce the percentage of irrigated gap ayacut in tanks to bring water to the tail-end of dilapidated tank systems, in addition to arresting the depleting groundwater table in over-exploited tank commands. Through the APCBTMP, which concluded in July 2016, 2,157 MI tanks were rehabilitated, which resulted in 32% increase in tank command area. Moreover, participatory irrigation management of both surface and groundwater in tank commands were brought in to improve the water use efficiency. The state is pursuing restoration of tank systems especially the tanks with ayacut less than 40 ha through the initiative under "Neeru Chettu".

55. The State has embarked on designing an innovative path of development through its Swarnandhra Vision-2029 by the year 2022 and is committed to transform the Primary Sector termed as "Raithu Kosam Strategy" using five pillars in which water sector pillar focuses on conservation, efficient water use and groundwater management. In this direction, the state has initiated efforts to use integrated water resources management (IWRM) approach for efficient utilization of its water resources from all sources through adoption of sprinklers for efficient irrigation; drip irrigation systems; promotion of micro-irrigation; deficit irrigation concept; ICT tools for water use efficiency and higher water productivity; and use of water impact calculator for scheduling irrigation and applying measured quantities of water.

56. Overall, the water sector strategy of the state is in conformity with the objectives of APIIATP. Out of about 40,817 tanks under the Minor Irrigation Department, serving an ayacut of 2.560 million acres in the state, the project has selected 1,211 tanks with a designed ayacut of 0.360 million acres in 11 districts for implementing Improving Irrigated Agriculture Efficiency at Farm level.

57. With an over-arching goal to improve water management and irrigated agriculture in the minor irrigation (MI) tank systems through increased irrigated area, improved water productivity and efficiency at the farm level by adoption of IWRM interventions on both the supply and demand side are proposed through the following three inter-related sub-components: (i) improving tank system

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<sup>2</sup> Source: <http://www.ap.gov.in/wp-content/uploads/2016/01/6-AP-Irrigation.pdf>

<sup>3</sup> Government of Andhra Pradesh 2014. Statistical Abstract, Andhra Pradesh-2014. Directorate of Economics and Statistics, Hyderabad, India.

performance and resilience; (ii) in-flow hydrology management for improving water productivity and efficiency; and (iii) building synergy with Primary Sector Mission (Agriculture, Fishery, Horticulture, Livestock and Irrigation).

58. Improving Tank System Performance and Resilience: This sub-component will modernize irrigation infrastructure, including tanks and irrigation canals. The modernization of irrigation infrastructure will focus on improving the bulk water delivery to irrigation systems through rehabilitation and modernization of approximately 1,200 MI tanks with an ayacut of 0.12 million hectares covering 11 districts in the state. The selection criteria for these tanks proposed by the PMU are listed below and in consultation with the mission members these have to be finalized.

- (i) Hydrological viability and feasibility of cascades to be studied;
- (ii) Gap ayacut for the tanks should be more than 25%;
- (iii) Exclude tanks in which land acquisition is involved;
- (iv) Revision of hydraulic standards will not be allowed in the revival/restoration of the tanks in implementing the project during estimates or execution;
- (v) The tanks having more than 40 ha of ayacut will be considered as isolated;
- (vi) Tanks having less than 40 ha ayacut will be considered if they are part of a cascade;
- (vii) Tanks to be considered as per need based duly considering the repairs and condition of the tank;
- (viii) Priority may be given to tanks where groundwater levels are very low in and around the tanks; and
- (ix) Buttressing of tanks taken up in previous projects may be considered if required under this project.

59. The treatment works will include modernization of control structures (diversion weirs), supply channels, cross-masonry structures, de-silting of tanks, construction of recharge well structures and strengthening and up-gradation of tank bunds, installation of flow measurement, up-gradation of distribution systems, improvements of irrigation and drainage canals, introduction of modern quality testing devices to determine soil compaction parameters, and for meticulously maintaining specified cover to reinforcement steel in the construction of reinforced concrete structures. The unit cost for restoration of tank structures and OFD works has to be proposed per acre of ayacut of the tank. Similarly, additional unit cost in the case of cascade tank systems has to be proposed for treatment of "vagus and nallas" in consultation with mission members and PMU. The Technical Manual and Quality Control Manual for taking up restoration works needs to be made ready by the PMU. The Engineering members of the PMU and DPDs were involved with the recently completed APCBTMP program and hence have a good grasp of the details of this item.

60. In-flow hydrology Management for Improving Water Productivity and Efficiency: Assessment of water inflows for each tank/cascade is one of the critical elements of this project and this would depend on the spatial distribution of rainfall and terrain characteristics such as topography (elevation), soils, land use/land cover, and hydro-geomorphology. Such a hydrological database exists to some extent with the PMU for the selected tank systems and the additional data needed for this task needs to be entrusted to a consultant selected by PMU in consultation with mission members. The consultant will use hydrological models combined with ground and remote sensing data for estimating 75% dependable

yield for each tank/cascade. These estimates should be validated with ground-truth for sample tanks. Moreover, the task of the consultant will be to develop baseline database related to current surface water irrigated area and water use in Kharif and Rabi seasons; groundwater status and groundwater use; and inventory of existing tube/dugwells, as well as micro-irrigation systems for each tank/cascade. In addition, consultant will conduct surveys for assessing the major crop choices practiced in each tank/cascade ayacut.

61. Another important feature of this project is participatory irrigation management of surface and groundwater for improved water use efficiency dovetailing with State's goals. The State Groundwater Department at the district level has expertise with the participatory groundwater management component, which was a component in the recently completed APCBTMP. In the present project it is envisaged to further strengthen this theme by not limiting to participatory hydrological monitoring (PHM), but to include the critical elements of crop water budgeting and crop planning for efficient groundwater use. This would require capacity building of the State Groundwater Department and its teams at district level by providing them with required modeling tools and expertise of a consultant. Moreover, the surface water engineering and agriculture department teams have relatively little expertise on water use efficiency and water productivity. Hence an institutional framework has to be developed to synergistically connect the teams from State groundwater department, irrigation department and the agriculture department.

62. In order to improve Operation and Maintenance (O&M) of modernized and rehabilitated irrigation infrastructures, it would be appropriate to integrate participatory irrigation management (PIM) practices into the operations of the State Irrigation Department as a distinct unit within the Department. This will help assist in strengthening and establishing new water users associations (WUAs), including operationalizing WUAs to undertake O&M, water distribution, and asset rehabilitation works within their command areas. Further, the agricultural component in this project has proposed ATMA as a nodal agency for capacity building of farmers and modalities have to be explored to link the Engineering and Groundwater teams with ATMA to close the beneficial water use loop at the farm level.

63. As an innovative design feature, Component A proposes to be supported by information and communication technology (ICT) tools, sensors and remote sensing in two key ways: (i) leveraging Internet of Things (IoT) technologies combined with sensors to remotely capture data and information on various aspects pertaining to minor irrigation systems such as, water flows, water quality, and auto management of turnouts, pumps, and regulation of irrigation system operation using a cost effective deployment of wireless sensor networks; and (ii) use ICT and remote sensing products for monitoring and evaluation (M&E). Pilot tanks/cascades for deploying these innovative technologies have to be explored and finalized. This would also require capacity building through hiring of consultants for selected teams in the PMU and DPUs to internalize these approaches for the duration of the project.

64. Building Synergy with Primary Sector Mission: Another key feature in this project is the focus on engaging communities through water users associations (WUA) in socio-engineering, the concept of reducing water footprints in farm system development, without compromising on productivity and profitability. Andhra Pradesh has different agro-ecological zones spread over nine districts in coastal region (water abundant) and four districts in Rayalaseema region (drought prone). In order to integrate, innovate, intensify and ensure inclusivity, the state has already developed a program in which pilot sites of around 10,000 ha have been selected and established in each district, working with a plethora of institutions including ICRISAT. These pilot sites provide an on-farm, field laboratory to test and

evaluate technological, institutional, and policy innovations, and fine-tune them as and when needed, before scaling-up in the districts.

65. A few strategies for implementation of these pilot sites among many are: (i) efficient use of available natural resources; (ii) science-led development approach; (iii) synergy through integration of Primary Sector actors needs to be harnessed by discarding sectorial approach; (iv) bringing in participation of stakeholders; and (v) bring science at the door steps of farmers. The focus of themes in these pilot sites is agriculture, horticulture, fisheries, etc. Developing synergy with this ongoing program in the current project will benefit not only the water management component, but also other components. Selected tank/cascades may be explored that are located in these pilot sites and be used as pilot tank systems in this project for linking with the outcomes of the ongoing program and also to provide inputs from this project to the programs of the Primary Sector Mission.

66. Field Visit: The field visit to the Chittoor district sample tanks helped in assessing the state of the tank bund, sluices, and the OFD works carried out in the recently completed APCBTMP project. Further discussions with Irrigation Department Engineers and WUAs were also held with regard to cascade tank systems on what are the key works with regard to drainage links between tanks required for the cascade systems to work efficiently, and the additional budget for implementing them. Further, WUAs have indicated their enthusiastic support for their involvement in kind, to undertake some of these works in vagus and nallas. The present project envisages water productivity and water use efficiency at the farm level, and towards this the primary thrust would be to have efficient and spatially uniform irrigation water distribution in the restored tanks systems. WUAs have also indicated active support and interest to undertake participatory works to build additional feeder canal networks on their own, in addition to those that would be put in place by CAD. The visit also indicated that farmers have developed extensive drip and micro-irrigation systems, combined with groundwater use from tubewells. However, for sustainable functioning of these investments, it is required that the DPD teams have to closely interact with the farmers in providing critical inputs as envisaged in this project through institutional synergy and capacity building.

### **Annex 3: Agriculture Sector in the Context of APIIATP**

67. The role played by the agriculture sector in the economy of Andhra Pradesh, remains crucial, despite its volatility. Dependence of 70.4% of the population living in rural areas, with an average landholding of 1.2 hectares<sup>4</sup>, on agriculture and the rural non-farm sector for livelihoods, employment and income, adds to the vulnerability. Although certain sub sectors have registered double digit growth (and the overall growth of 8.4% in 2015-16), there has been a negative growth in the agriculture sub-sector.

68. The unfavorable seasonal conditions prevailed in some parts of the state have adversely impacted the growth performance of agriculture resulting in a fall in the production of food grains and certain other crops. Food grain production is expected to decline from 160 lakh MTs last year to 137.56 lakh MTs during 2015-16. However, horticulture has done a rescue act registering a growth rate of 9.96%.<sup>5</sup>

69. Reviving the agriculture sector and helping the farming community is the most important priority for the state. The government 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 State is committed to transform the Primary Sector with an aspirational goal of making AP as one of the top three leading states in India through Swarnandhra Vision by 2029. The focused areas under the Primary Sector are:

- (i) increasing productivity of the primary sector;
- (ii) mitigating the impact of droughts through water conservation and micro-irrigation;
- (iii) postharvest management to reduce wastage; and
- (iv) establishment of processing, value addition capacity and supply chain of identified crops.

70. Expansion of farm incomes through forward linkage continues to be an effective strategy for reducing poverty. To that effect, the AP Food Processing Policy (2015-20) lays emphasis on commodity-based cluster development to enable a focused and planned approach to reduce post-harvest losses, alongside addressing critical issues such as infrastructure planning and community development. On top, the government has laid emphasis on making the agriculture sector resilient to climate change and weather anomalies, including drought and temperature stress.

71. Overall, the agriculture sector strategy of the state is in conformity with the objectives of APIIATP, which is to enhance productivity, profitability and resilience of irrigated agriculture in tank systems. Out of about 40,817 tanks under the Minor Irrigation Department, serving an ayacut of 2.560 million acres in the state, the project has selected 1,211 tanks with a designed ayacut of 0.360 million acres in 11 districts for implementing Climate Smart Diversified Agriculture Production Systems. With an over-arching goal to 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, the implementation strategy is proposed to follow a multi-pronged approach<sup>6</sup>:

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<sup>4</sup>Source: [http://www.aponline.gov.in/quick%20links/apfactfile/apfactfile\\_10.html](http://www.aponline.gov.in/quick%20links/apfactfile/apfactfile_10.html)

<sup>5</sup> Socio-Economic Survey 2016, Planning Department, Government of Andhra Pradesh. [http://www.ap.gov.in/wp-content/uploads/2016/03/AP-Socio\\_Eco.-2015-16\\_Final.pdf](http://www.ap.gov.in/wp-content/uploads/2016/03/AP-Socio_Eco.-2015-16_Final.pdf)

<sup>6</sup> Based on extensive discussions with Mr Vijay Kumar, Special Secretary (Agri), Government of AP.

72. Institutional Synergy for Capacity Building: The objective of adopting climate smart agricultural practices will rest on sustainable intensification and diversification of crop and horticulture production systems by awareness generation on adoption of low external input sustainable agriculture practices: quality seeds, organic manuring, composting, soil and moisture conservation, reduced or no tillage operations combined with water budgeting and water management practices. The project proposes to make institutional investments by infusing additional expertise in Agriculture Technology Management Agency (ATMA), the nodal agency for capacity building of farmers, to meet the project objectives. ATMA is a district level autonomous institution that has the key responsibility of disseminating all technology activities at the farmers' field level. Backed by a lead technical agency (drawn from the open market) responsible for field-level training-cum-capacity building protocol, field level NGOs will deliver the same through community service providers in the villages. The transformative nature of the project suggests that Gram Panchayat be the basic unit, covering both tank-irrigated *ayacut* as well as rain fed areas, for transferring climate-smart agriculture practices to reducing input costs and enhance sustainable farm output in a resilient manner.

73. Decentralized Production System: In addition to irrigation, seed production and supply becomes a limiting factor in attaining desired crop harvests in a sustainable manner. Leveraging the ongoing programs in the state, the project will strengthen the concept of 'seed village program'<sup>7</sup> in selected GPs by supporting inter-institutional linkages (involving AP State Seed Development Corporation, Agriculture University, Agriculture Department and Farmer Producer Organizations) for supply of breeder seeds and production of certified seed at the farmers' level. In addition to breaking the 'seed monopoly' of large corporations, the seed village program will provide timely supply of relatively cheaper seeds of desired crop varieties at the local level. Furthermore, participatory varietal selection will provide added incentive to farmers to develop desired traits and promote timely delivery of seeds for better crop productivity. The project envisages partnership with leading agencies, like ICRISAT and CRIDA, for procuring drought, disease and pest-resistant breeder seeds; with agriculture university and line departments for providing technical assistance for production of foundation seeds; and with the AP State Seed Development Corporation for bulk production; and with AP Seed Certification Agency for quality control of certified seeds. The Farmer Producer Organizations (FPO) will be the seed producing agency at the cluster level. It is a first-of-its-kind project that envisages making sizeable investment to develop community-managed seed producers. The details of an institutional architecture will be worked out in a timely manner.

74. Basket for Commodity Marketing: Given the size and nature of landholdings, the project is seized of the fact that the expansion of farm incomes can be effectively achieved through forward market linkages. Backed by irrigation expansion in gap *ayacut*, timely supply of quality inputs (including seeds) and improvement in productivity through precision farming techniques, production clusters will emerge in both cascade clusters, as well as in stand-alone tanks *ayacut*. An external agency will be sourced to conduct a detailed mapping exercise to determine typology of commodity clusters. Agri-business strategy will be driven by the goal to organize communities to leverage collective bargaining for farm produce viz., pulses, oilseeds and high-value minor millets. Farmers Producer Groups will connect with SHG-led Procurement Centers for ensuring supply of farm produce. The Procurement Centers are being proposed as front offices for liaising with buyers, both government and private. Although a set of agribusiness modules will be developed to account for product diversity and volume, the project will make substantial investment in creating transit storage capacity at cluster levels

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<sup>7</sup> Seed Village Program is currently underway in Ananthapur district.

to reduce post-harvest losses of commodity baskets. Necessary agreements will be drawn with Markfed and the State Warehouse Corporation for forward market linkages. The modalities of operations will be spelt out in the Agri-business Strategy and Action Plan, which will be developed before the Project appraisal.

75. Delivering and Measuring Resilience: Ensuring climate resilience of crop production systems is at the core of the project. The project envisages to build upon existing District Crop Contingency Plans and also develop cluster-level contingency plans through installation of automated weather stations. This would provide farmers with real-time, weather based crop advisory, allowing them to take protective measures in case of climate variability and extreme weather events, thereby maintaining crop productivity. These crop advisories, along with market advisory services will be delivered to end-users in selected cascade clusters through Village Climate Information Centers. Furthermore, the project will not only set up systems to measure GHG emissions from its interventions, but will also measure resilience by monitoring changes in crop productivity, soil carbon stock and crop water footprints on a regular basis.

#### **Annex 4: Fisheries Implementation Arrangements**

76. The objective of this component is to promote an integrated approach to achieve increased productivity and profitability through innovative technology transfer, as well as better linkages of fish farmers in selected value chains. Department of Fisheries will implement this subcomponent by following cluster based approach for sustainable inland fish production in irrigation tanks and farm ponds. Project will have special focus on strengthening research-extension linkages in order to improve accessibility to technology for farmers. Building on lessons learned from APCBTMP, the component will promote Good Aquaculture Practices (GAPs), including innovative and climate resilient modern technology packages in production, post-harvest and marketing. The key fisheries interventions identified are: production and supply of quality fish seed, particularly for major commercial species such as GIF Tilapia, Amur Carp, Janathi Rohu, Pangasius and Indian Major Carps through pure line breeding programs; introduction of suitable formulated fish feed using locally available ingredients; demonstrate semi-intensive and intensive production models at suitable locations in ponds and minor irrigation tanks; promote improved fish production techniques in irrigation tanks including innovative technologies such as cage culture in an environmentally sustainable manner; and build the fisheries institutional capacity. The project will also support ornamental fishery production and marketing mainly targeting women beneficiaries.

77. Establishment of infrastructure on a need basis include fish hatcheries, nurseries, fish landing centers, processing units, feed production units, labs for disease diagnosis, quality testing for seed and feed. APIIATP will support a comprehensive disease surveillance program in order to reduce disease risk and ensure food safety. The project will facilitate suitable linkages for better access to markets and support measures for hygienic condition throughout the fish value chain. The subcomponent will support fish kiosks, mobile vending units and produce ready to cook and ready to eat processed fish products mainly involving women.

78. The key outcome of this sub-component would be increased production in inland aquaculture through innovative technology and intensification, significant increase in employment, income and food security for rural populations, particularly for women who undertake 60-80% of the fish farming, processing and marketing activities. The AP state fishery food exports would increase further significantly and contribute to earnings in foreign exchange.

## **Annex 5: Climate-friendly Market and Agribusiness Promotion**

79. Andhra Pradesh is a major producer of food crops such as paddy, Bengal gram, black gram, groundnut, and millets. However, unlike paddy, procurement mechanism for pulses and millets is not in place (The Hindu, 2016). Presence of multiple intermediaries such as aggregators, commission agents, traders, wholesalers, and retailers in the supply chain leads to increase in price of the commodity without adding value to it. Also, the benefit due to fluctuations in prices is seldom passed on to farmers or customers by these intermediaries. For instance, the MSP for both pigeon pea and green gram was INR 46.25 per kg in 2016 (Business Standard, 2016), while the retail prices in Chennai was close to INR 150 (Business Line, 2016). Therefore, there is a need to shorten the supply chain in order to increase farmers' share in wholesale and retail prices.

### **Approach**

80. Agribusiness strategy of APIIATP intends to promote collective farming of farm produce such as pulses, pulses-seed, oilseeds, millets and other high value crops such as vegetables and fruits. This will augment efforts at production end by building a complete supply chain and engaging farmers further in the value chain. Focus would be laid on collective farming so that the farm produce can be aggregated for direct marketing, eliminating few intermediaries in the process. The key element would be to form optimally sized clusters comprising of several tanks or cascades capable of supplying large quantity of raw material as per requirements of bulk procurers.

81. The three value-chains that could potentially be developed are pulses-seed value chain, pulses value chain, and value chain of a high value crops (millet, oilseed, vegetable or fruit). These value chains would be developed mainly by creating forward linkages and strengthening infrastructure. Ongoing efforts of the GoAP would be leveraged to link farmer groups with processors and retailers.

#### **1. Local 'Seed production system'**

82. The low value, high volume seed is dominated by the informal sector. Lack of storage infrastructure at farm or village level is one of the limiting factors which leads to deterioration in quality of seeds. The poor quality is reflected in high seed rates. Another issue which is commonly faced is that the quantity of seed supplied by the central and state agencies is often inadequate. Farmers then turn to traders and other private players for seed, some of whom resort to malpractices such as selling grain as seed.

83. Bearing in mind the need for increasing seed production and ensuring availability of good quality seeds to farmers, a 'Seed Village' concept is being proposed. The entire value chain of seed (of a particular commodity) will be developed, right from production to marketing and supporting infrastructure. To support these functions, strong backward and forward linkages will be created, by involving various stakeholders. The 'Seed village' would consist of farmers from the selected cluster of tanks or a cascade, who will undertake production of seed of a particular crop. An agricultural university or ICAR or other recognized research institutes would supply breeder seeds to the farmers, and provide a package of practices. Depending on the terms of procurement, the same organization may be involved in monitoring production activities to ensure that the recommended practices are being followed.

84. The 'Seed Village' can be linked to agencies such as Andhra Pradesh State Seeds Development Cooperation (APSSDC), Markfed, National Seed Corporation (NSC) and National Agricultural Cooperative Marketing Federation of India (NAFED), for marketing of seeds. Alternatively, the seeds

can be sold in the local market as truthfully labelled seeds or certified seeds. Storage infrastructure would be created at the tank or cascade level, depending on the quantity of seed produced and transportation arrangement. Seed processing facility, certification agency, and supply of inputs such as fertilizers, pesticides and manure, are other essential components of the seed value chain for which support will be provided.

## **2. Collective marketing of grain**

85. Production of pulses is currently fragmented, causing significant loss in opportunity for farmers by reducing their bargaining power. Also, farmers are compelled to sell their produce immediately after harvest due to various factors such as lack of proper storage facilities which renders the grain susceptible to pest attack and microbial contamination, financial incapability to hold stock till markets are favorable, lack of market intelligence, inaccessibility to direct markets, etc.

86. These shortcomings would be addressed through collective marketing supplemented by supply chain improvements, and ancillary support. Farmers will be federated into FPOs, or existing WUAs would be engaged, to undertake production of a single crop – pulse or oilseed. The produce would be aggregated to reach sufficient volume required for wholesale trade through direct marketing channels. These farmer groups would be linked to central and state procurement agencies or large processors, bypassing intermediaries such as aggregators, commission agents, and wholesalers in the process.

87. Farm level and cluster level storage facilities will be developed, while also ensuring availability of in-transit storage, from where the commodity will be purchased and carried forward by buyers. Ancillary support such as market intelligence, and warehouse receipt financing may be provided, based on the needs and capacity of the producer group.

## **3. Alternative, high-value crop production**

88. The objective of promoting cultivation of high-value crops along with other crops is to bring in diversification, and hence more resilience into production systems. High value crops may include oilseeds, millets, vegetables or fruits. The crop would be selected based on production potential and market demand. For instance, vegetable cultivation can be promoted in clusters surrounding major cities. Both open and protected cultivation of vegetables can be promoted, depending on financial feasibility and demand.

89. To add further value to the produce, good post-harvest handling practices, and minimal/ primary processing would be promoted by creating suitable infrastructure and capacity building. This infrastructure may include cleaning, sorting and grading facilities, warehouses, silos, cold storage facilities, specialized vehicles for transportation, and any other commodity specific infrastructure. Marketing strategy for these high value commodities would be developed such that it ensures maximum price realization by farmers to the extent possible through value addition and minimizing intermediaries.

### **Action Plan**

90. Articulating each of the modules mentioned above would require information on production and demand of various commodities, existing infrastructure, marketing systems, and issues in supply chain. In addition to it, production potential, and existing capacity needs to be studied for identified clusters. This data would be obtained through desk research and interaction with local functionaries. Simultaneously, a sample business plan needs to be prepared for one of the modules. This exercise

would be completed before the project appraisal. It would be outsourced to a consultant, who has prior experience in conducting such studies and preparing agri-business plans.

91. Some of the major activities include: (i) short-listing clusters, calculating production potential, and profiling producers; (ii) value chain, and stakeholder mapping for select commodities; and (iii) developing sample business models with estimated incubation period.

## Annex 6: PMU and staffing structure – Organogram

