Investing in rural people

India

Andhra Pradesh: Drought Mitigation Project

Final design report

Main report and appendices

Document Date: 17-Sep 2016
Project No. 2000001420
Asia Pacific Division
Programme Management Department

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Currency equivalents

Currency Unit	=	India Rupee (INR / Rs)
US$1.00	=	INR 68.00 (INR 70.00 used in calculations)

Weights and measures

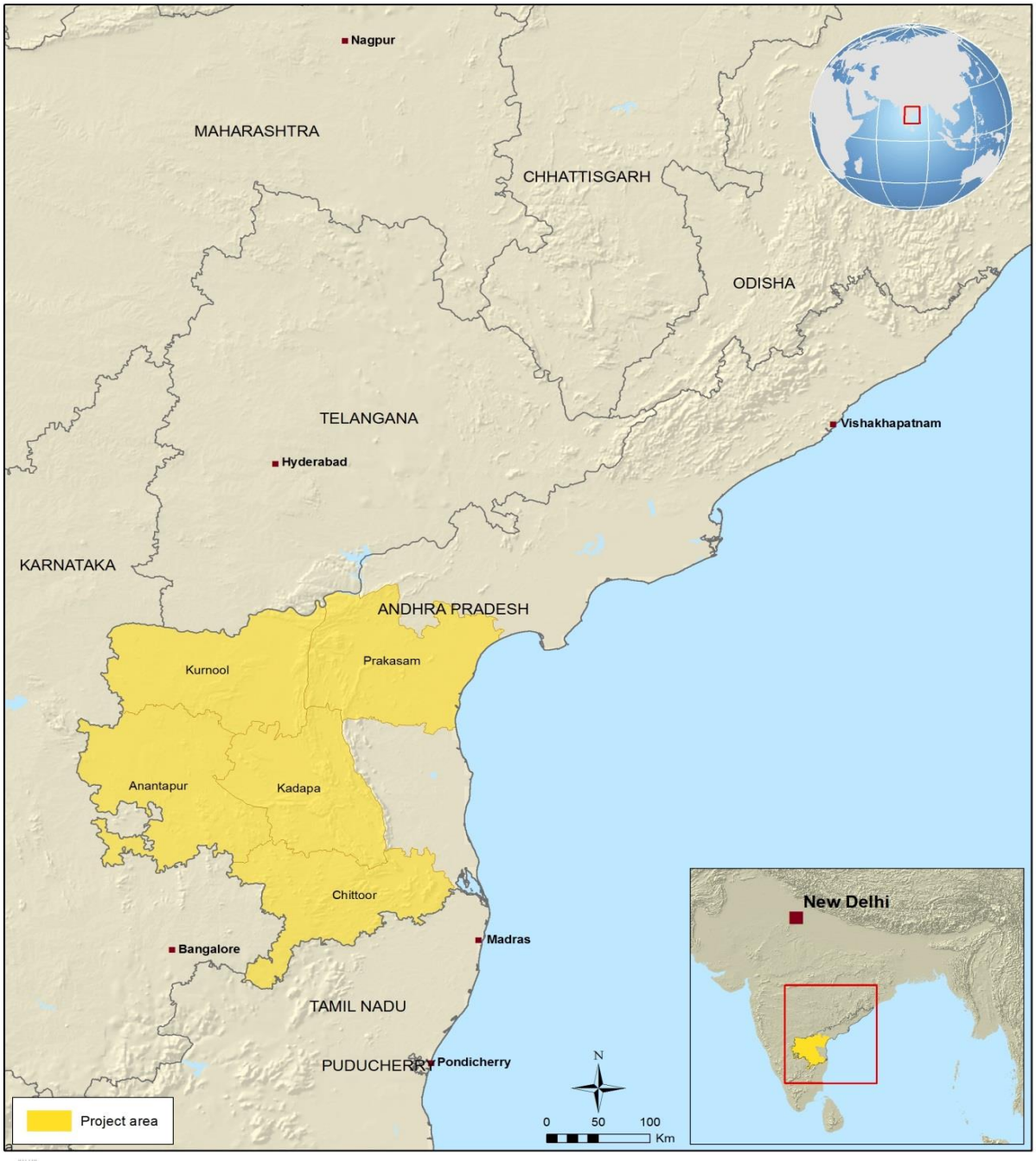
1 kilogram	=	1000 g
1 000 kg	=	2.204 lb.
1 kilometre (km)	=	0.62 mile
1 metre	=	1.09 yards
1 square metre	=	10.76 square feet
1 acre	=	0.405 hectare
1 hectare	=	2.47 acres
1 lakh	=	100,000
1 crore	=	10,000,000

Abbreviations and acronyms

AOS	Annual Outcome Survey
AP	Andhra Pradesh
APFAMGS	Andhra Pradesh Farmers Managed Groundwater Systems
APDMP	Andhra Pradesh Drought Mitigation Project
APD	Additional Project Director
APSAC	Andhra Pradesh Space Applications Centre
ATMA	Agricultural Technology and Management Agency
AWPB	Annual Work Plan and Budget
BIAF	Resource NGO specialising in livestock development
BPL	Below Poverty Line
CA	Conservation Agriculture
CAAA	Controller of Aid, Accounts and Audit
CLICCLIC	Climate Information Centre
COO	Chief Operating Officer
CPR	Common Property Rangeland
CRP	Community Resource Person
DAC	Department of Agriculture and Cooperation
DAH	Department of Animal Husbandry
DC	District Collector
DFA/LFA	District Facilitating Agency / Lead Facilitating Agency
DoA	Directorate of Agriculture
DoAH	Department of Animal Husbandry
DoH	Department of Horticulture
DoWR	Department of Water Resources
DPMU	District Project Management Unit
DWMA	District Water Management Agency
FA	Facilitating Agency
FAO	Food and Agricultural Organisation (of the United Nations)
FFS	Farmer Field School
FIG	Farmer Interest Group
FM	Financial Management
FMD	Foot and Mouth Disease
FPO	Farmer Producer Organisation
GoI	Government of India
GoAP	Government of Andhra Pradesh
GIZ	German Technical Cooperation
GP	Gram Panchayat
GSDP	Gross State Domestic Product
HH/hh	Household
HU	Hydrological Unit
HUN	Hydrological Unit Network
IAS	Indian Administrative Service
ICAR	Indian Council for Agricultural Research
ICRISAT	International Centre for Research in the Semi-Arid Tropics
ICT	Information and Communications Technology
IFAD	International Fund for Agricultural Development
IGA	Income Generating Activity
INR	Indian Rupee (also Rs)
IPM	Integrated Pest Management
IT	Information Technology
JICA	Japanese International Cooperation Agency

KCC	Kissan Credit Card
KM	Knowledge management
LPA	Lead Project Agency
LTA	Lead Technical Agency
M&E	Monitoring and Evaluation
MACS	Mutually Aided Cooperative Society
MGNREGA/S	Mahatma Gandhi National Rural Employment Guarantee Act/Scheme
MIS	Management Information System
MoU	Memorandum of Understanding
MTR	Mid-Term Review
NABARD	National Bank for Agriculture and Rural Development
NGO	Non-Government Organisation
NR	Natural Resources
NRLM	National Rural Livelihoods Mission
NRM	Natural Resource Management
PD	Project Director
PDS	Public Distribution System
PIM	Project Implementation Manual
PMSKY	Pradhan Mantri Krishi Sinchai Yojana
PMU	Project Management Unit
PSC	Project Steering Committee
RBI	Reserve Bank of India
RIDF	Rural Infrastructure Development Fund
RIMS	Results and Impact Monitoring System
RKVY	Rashtriya Krishi Vikas Yojana
RNGO	Resource NGO
SC	Scheduled Caste
SERP	Society for Elimination of Rural Poverty
SFAC	Small Farmers Agribusiness Consortium
SHG	Self Help Group
SPMU	State Project Management Unit
SRI	System of Rice Intensification
ST	Scheduled Tribe
ST/SC	Scheduled Tribe/ Scheduled Caste
ToR	Terms of Reference
USD	United States Dollar
WASSAN	Watershed Support Services and Activities Network
W/M	Women/ Men
WMC	Water Management Committee
WP	Working Paper

Map of the project area



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Map compiled by IFAD | 13-07-2016

Executive Summary[1]

Background. The southern part of AP is one of the most climate-vulnerable regions in India. Rainfall is low and unreliable, with frequent droughts. Irrigation is limited - there is little surface water and groundwater resources have been over-exploited with many borewell drilling regularly failing to strike water and/or borewells are running dry. Rainfed crops are predominantly oilseeds followed by pulses and cotton - all grown as cash crops. Soils over most the area are thin, with low water holding capacity. Rainfall and crop yields vary considerably from year to year, making farming a risky business, with typical marginal or smallholder farmers (80% of farmers are in this category) generating one third of their income from farming, the balance coming from public safety net programmes and seasonal migration to low paid jobs in the cities. Limited areas of irrigation are used for commercial horticulture, an important sub-sector, although these farmers are vulnerable to wells running dry, resulting in considerable distress, and some have committed suicide. Lack of soil moisture is further aggravated by poor soil fertility, crop pests and diseases, poor quality seed, lack of access to improved and drought tolerant varieties, and delays in weather-critical crop operations caused by lack of labour and machinery. Farmers also lack access to information and advice on drought-adapted technologies.

Andhra Pradesh has more sheep and goats than any other state in India, and the five project districts have the highest number (12 million) of these small ruminants in the state. The number of cattle and buffalo are generally declining, due to increasing shortages of fodder and water, and replacement of draught animals by tractors. Sheep and goats are well adapted to survive drought and climate change, and the numbers of sheep are growing. However animal productivity is low and mortality rates are high due to poor access to support services and inputs - delivery of support being made more difficult as flocks generally migrate in search of seasonal grazing.

Rationale and approach

The overarching problem that the project will address is the low productivity and high risk of farming in the drought-prone districts of southern AP. The project will have a concerted and coordinated effort to address the problem of repeated drought and enable farmers to increase their income in a very difficult farming environment. The project will do this via three sets of interventions and outcomes:

(a) Adoption of resilient and better adapted agriculture, with supplementary irrigation to protect crops from drought periods, along with improved soil management (including improving its water-holding capacity) and better germplasm (including drought tolerant crop varieties). This would be linked to providing farmers with information on weather, markets and cropping options, along with promotion of improved husbandry practices for annual crops and horticulture.

(b) Making better use of rainfall for small ruminants (mainly sheep) grazing on improved and managed rangeland, along with improved access to animal healthcare and improved standards of animal husbandry to reduce losses and improve productivity. Backyard poultry will also be promoted to diversify income as part of building household resilience to drought.

(c) Better management of water resources through groundwater demand management at the community level and embedding this in local government structures, along with making more water available through rainwater harvesting and storage, and via improved recharge of groundwater aquifers.

[1] **Composition of the two design missions:** [1] Edward Mallorie (Mission Leader); Aissa Touré (IFAD Country Programme Officer and project focal person), Kumara Reddy (State Government Representative), Helen Leitch (Livestock Specialist), Dr S Gopalakrishnan (Agronomist), Dr Toon van Eijk (Agronomist), Dr BMK Reddy (Agronomist), Audrey Nepveu (IFAD Technical Advisor, Water & Rural Infrastructure), Pooja Khosla (Economist), A M Alam (Economist), Konda Reddy (Water Governance Expert), Girija Srinivasan (Inclusive Finance and Livelihoods Specialist), Sunpreet Kaur (Climate Change and Environment Specialist), Vincent Darlong (IFAD India Country Office, Poverty Targeting, Gender Mainstreaming, M&E and Knowledge Management), Claudio Mainella (IFAD Programme Officer, Finance), and Sriram Subramanian (IFAD India Country Office, Fiduciary Issues).Ms. Rasha Omar, CPM, IFAD, participated in the wrap-up meetings of the 2 design missions.

The project will build on, and scale up, a number of current and recent initiatives for farming in a drought-prone environment. These include the Andhra Pradesh Farmers Managed Groundwater Systems (APFAMGS) project, which was implemented by FAO in 640 villages and involved participatory hydrological monitoring along with water budgeting to better allocate and manage scarce water resources locally. The state is investing in soil and water conservation works with the objective of harvesting rainfall and recharging aquifers. The Department of Agriculture has a number of programmes, aspects of which will be incorporated into, and scaled up, by APDMP. These include: community seed multiplication, millet production, groundwater sharing, rainfed farming, and Farmer Producer Organisations. The project will also take advantage of innovations in plant breeding for drought tolerance, soil fertility management, farm ponds to store water for protective irrigation, and in community management of common property rangeland.

IFAD's investment in APDMP will add value by bringing all these interventions together in a coordinated manner with a multi-pronged intervention to address issues of drought and climate change. APDMP will also include interventions which have been shown to work well on other IFAD projects in India - such as Pashu Sakhis to support livestock producers. IFAD investment will also fund a comprehensive project management and monitoring system to ensure "last mile" delivery of project support and gathering evidence of the resulting outcomes. IFAD can also link the project to other international development initiatives and agencies - so providing access to best practices and new ideas, and disseminating lessons from APDMP to a wider audience.

As well as making farming more resilient and adaptable to drought, interventions are sustainable and environmentally appropriate. Farming will also become more productive and profitable, creating employment and addressing poverty .The experience of the project, especially groundwater demand management, will generate information and knowledge that will feed into policy discussions for adapting agriculture to climate change.

Project Area and target group. The project area will be located in Anantapur, Chittoor, Kadapa, Kurnool (the Rayalaseema region) and Prakasam, the five driest districts of the state. The project will be implemented in habitation village clusters that equate to a Gram Panchayat (GP), the lowest level of local government in India. These clusters will each cover about 1660 ha, of which 45 percent is cropped by about 500 farmers with an average farm size of 1.6 ha. The project will aim to cover 330 of these clusters with a total of 165,000 farm households. In addition, APDMP will engage with clusters of GPs that belong to the same drainage basin: the river drainage basin together with the underlying groundwater define Hydrological Units (HUs). One HU includes on average 5 GPs. The project **target group** will include all farmers and livestock producers in the selected village clusters. The project will adopt a two-step **targeting strategy**. First, the project will use geographic targeting by focusing on the most drought-affected villages in the poorest mandals. Second, the project will use the social-targeting approach based on the findings of the poverty and gender analysis to refine the classification of farmers and provide them with tailored support to improve their drought resilience. Through the social-targeting approach, the 100 poorer householders in each cluster will benefit from the project interventions.**Project goal and development objective.** The **goal** of APDMP will be to improve the incomes and strengthen the drought resilience of 165,000 farm households. The Programme Development Objective (PDO) is to strengthen the adaptive capacity and productivity of agriculture in the rainfed areas of five districts in southern AP.

Project Description

Component 1: Climate resilient production systems aim to increase the resilience of crop and livestock production systems to drought, and provide farmers with information to provide adequate supplementary irrigation (locally called protective irrigation), improve soil fertility, irrigation efficiency, diversify cropping systems, and improve livestock productivity. The component’s objective will be achieved through the following sub-components:

- **Sub-component 1.1: Improved crop production systems** through support to farmer information centres, farmer field schools, and promotion of integrated soil fertility management and protective irrigation.
- **Sub-component 1.2: Improved livestock production systems** through support to community livestock facilitators providing fee-based services to sheep producers (improved housing, feeding and breeding) and a backyard poultry scheme targeted at the poorest women.
- **Sub-component 1.3: Strengthened farmer organisations** whereby the project will take a flexible approach and work with existing organisations where possible and form new organisations where needed to support farmers through input supply, seed multiplication, production services, machinery hire centres and marketing support.

Component 2: Drought proofing through NRM and water governance aims to mitigate drought and make agriculture more productive through the management of, and investment in, common property resources. The component's objective will be achieved through the following sub-components:

- **Sub-component 2.1: Water governance** will support water planning, and supply and demand management via water sub-committees at the Gram Panchayat level, with these forming Hydrological Unit Network (HUN) at the drainage basin level. Training and workshops will build local capacity and support development of surface water and groundwater planning and monitoring.
- **Sub-component 2.2: Water monitoring and conservation** will invest in local hydrological and meteorological monitoring to support local decision making and planning of water resources, and in ensuring that GP water sub-committees and HUNs establish adequate working relationships with relevant administrations involved in water supply and demand monitoring. A pilot hydrological mapping of aquifers is proposed to complement available knowledge of and information on groundwater. Soil and water conservation activities will support the recharge of soil moisture and groundwater, and geographically targeted water harvesting activities will complement local water supply management.
- **Sub-component 2.3: Regeneration of common property rangeland** will support vegetative methods for water conservation and strengthen community management of grazing, rainwater harvesting and other environmental services on 130 ha per village cluster totalling 42900 Ha.

Component 3: Management and Lesson Learning. A State Project Management Unit (SPMU) would be established, with District PMUs located in each of the five districts. Lesson learning will cover water resource planning and management, drought-resilient agriculture and climate change adaptation, and development of policies for the crop and livestock sectors, especially for small ruminants.

Project duration and cost. The Project would be implemented over a **seven year period.** Total cost is estimated at INR 151.8 million and would be will be financed by an IFAD loan of USD 75.5 million, a contribution of USD 15.0 million from the Government of Andhra Pradesh, a loan of USD 6.2 million from National Bank for Agriculture and Rural Development (NABARD's) Rural Infrastructure Development Fund (RIDF), convergence of USD 42.3 million from Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and USD 2.9 million from Rashtriya Krishi Vikas Yojana (RKVY) and other schemes of the central and state governments. In addition USD 10.3 million would be contributed in cash and labour by beneficiaries.

Benefits and beneficiaries: A total of 165,000 households in 330 clusters will directly benefit from the project. Additional benefits will accrue to farmers in other parts of the state from the generation and dissemination of knowledge, and from the institution building of Farmer Producers Organizations (FPOs).

Project Economic Internal Rate of Return and Net Present Value – The project investment has an overall Economic Internal Rate of Return of 19 percent. The NPV remains positive under the current

Opportunity Cost of Capital (OCC), unless benefits decrease by 20 percent. Farm model analysis shows good increases in net income for participating households.

Organisational Framework: at the state level, the Department of Agriculture and Cooperation (DAC) of the Government of Andhra Pradesh will be the nodal agency, with the implementing agency at the state level being the Directorate of Agriculture and the Agricultural Technology Management Agency (ATMA) at the district level. ATMA is an autonomous government agency responsible for extension services with a mandate for multi-sector support including livestock and horticulture. To implement APDMP, the capacity of ATMA would be strengthened via project management units with additional staff. A Lead Technical Agency (LTA) will be contracted to advise the SPMU on planning, capacity building, monitoring, documentation and IT services. To support implementation at the field level, District Facilitating Agencies would be hired to: (i) carry out participatory planning at the community level; (ii) form and support FPOs and farmer interest groups and the GP water sub-committees and Hydrological Unit Networks (HUN); (iii) organise farmer field schools and other extension provision and capacity building; (iv) initially operate the Climate Information Centers (CLIC) before it is handed over to a Farmer Producers' Organization (FPO); and (v) monitor implementation, including oversight on financial expenditure.

Sustainability. Project interventions will be sustainable as improved agricultural practices will be supported by services operated as businesses by individuals or small informal groups, e.g. pashu sakhis. While there is a risk that not all FPOs will be fully self-sustaining by the end of the project, there is every likelihood that continuing support from the State Government will be available as part of the promotion of FPOs in the State and at national level.

Groundwater demand management will be sustained as Water Management Committees are embedded in the GP local government structure. Linked to this, it will also be important to maintain groundwater sharing networks and farm ponds - through building a sense of ownership via farmer contributions to the cost of construction and via a water user maintenance fund.

Adherence to IFAD policies. The project is fully in line with IFAD's Strategic Framework (2016-2025), and adheres to IFAD policies for targeting and gender mainstreaming, environment and natural resource management, climate change and social, environmental and climate assessment. The environmental and social category is considered to be B, while the climate risk classification is deemed to be High Risk.

Alignment to RB-COSOP. APDMP is fully aligned to the RB-COSOP for India which has been extended to 2016. The RB-COSOP first strategic objective of increased access to agricultural technologies and natural resources is of particular relevance for the APDMP.

Scaling up. The project is an attempt to scale up and improve past experiences of groundwater management in AP in order to provide a holistic and integrated response to the multifaceted and complex acute drought situation of many districts. The project will opt for an integrated approach of water demand and supply side management building on past experiences in the state. The project will expand and adapt the participatory hydrological monitoring programme of the Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) implemented with assistance of FAO and combine it with the groundwater water sharing and water supply investments from public and private funds. It is expected that the results and knowledge of the intervention will be able to influence enabling policies, leverage resources and partners to sustainably deliver larger results for a greater number of rural poor (see Appendix 12).

Partnerships. The project funding mechanism which involves government schemes MGNREGS and RKVY and NABARD as co-financiers provide the primary level of partnership with key stakeholders. Moreover, the projects holistic approach building on past experiences provides a wide range of partnership opportunities: i) technical with FAO and ICRISAT and the Small Farmer Agri business Consortium (SFAC), ii) operational with the Watershed Support Services and Activity Network (WASSAN), the Foundation for Ecological Security (FES), the BAIF development research foundation, the Bharati Integrated Rural Development Society (BIRDS) among others.

Logical Framework

Results Hierarchy	Indicators				Means of Verification			Assumptions (A)/ Risks(R)
	Name	**Baseline**		**End Target**	**Source**	**Frequency**	**Responsibility**	
Goal: Improve the incomes of 165,000 farm households and strengthen their resilience to drought.	▪ At least 75 percent of households report increased assets of 20% (W/M) (ST/SC)	0		124 000	RIMS+ impact surveys	At baseline and completion	Contracted agency	Continued economic stability ensures an expanding market with reasonable prices for farm products (A); Effective coverage of Gvt social safety net programmes (PDS)
	▪ Reduction in the prevalence of child malnutrition(Boys/Girls)	0		5%	RIMS + impact surveys + on-going health and nutrition surveys by GVT			
	▪ Number of households reporting cultivation of more than 2 crops in kharif, at least 15% increase in rabi cultivated area, and integration with livestock			165 000	Annual survey	Yearly	Project M&E unit / contracted agency	
Development objective: Strengthen the adaptive capacity and productivity of agriculture in the rainfed zones of 5 districts in southern AP	▪ Overall project profitability	EIRR=19%		EIRR=19%	Annual outcome surveys (drought resilience index)	Yearly	Project M&E unit	Climate change and other opportunities combine to mean the rainfed areas of southern AP can no longer compete with more favoured part of India (R).
	▪ Number of households reporting increased adaptive capacity*	TBD		165 000				
	▪ Average annual income from farm activities (W/M) (ST/SC)	INR47 000 per HH		INR 67500 per HH				
	▪ Number of farmers using protective irrigation and the area receiving protective irrigation (W/M) (ST/SC)	35,310 farmers 42,762 ha		52,800 farmers 52,662 ha				
	▪ Yield of main crops relative to non-project farmers.	G-nut rainfed 650kg/ha, irrig. 900kg/ha		G-nut rainfed 800kg/ha, irrig. 1200kg/ha				
	▪ Offtake of sheep breeding flocks	30%		50%				
Component 1: Climate resilient production systems								
Outcome 1: Adoption of more productive and resilient crop and livestock production systems	▪ No of farmers (W/M) (ST/SC) who adopt sustainable PoP for rainfed crops, and/or livestock, and/or supplemental irrigation	0		132,000	Annual outcome survey	Yearly	DPMU and District FAs	PoP are profitable and sustainable
Output 1.1: Improved crop production systems	▪ Numbers of farmers (W/M) (ST/SC) accessing CLIC services	0		132,000	DPMU reports	Annually / seasonally		

Results Hierarchy	Indicators				Means of Verification			Assumptions (A)/ Risks(R)
	Name	**Baseline**		**End Target**	**Source**	**Frequency**	**Responsibility**	
	▪ Numbers of farmers (W/M) (ST/SC) trained via FFS	0		115,500	DPMU & FA reports	Yearly	Project M&E unit	Control of wild animal damage by community (A)
	▪ Increased production of nutritious crops (coarse cereals, pulses and vegetables) (W/M) (ST/SC)	710 kg/HH/yr		1120 kg/HH/yr				
Output 1.2 Improved livestock production systems for small ruminants and poultry	▪ Number of livestock producers using Pashu Sakhi services	0		43,000	Annual outcome surveys Pashu Sakhi records	Yearly Quarterly	Project M&E unit DFA	Migration of sheep flocks reduces as better grazing, enabling provision of supporting services (A)
Output 1.3 Farmer Producer Organizations established	▪ No of FPOs established and registered	0		40	DPMU reports	Quarterly		FPOs continue to be a major part of policy for the agricultural sector (A)
Component 2: Drought proofing via NRM & governance								
Outcome 2: Water committees empowered at GP and HUN level to plan investments in water supply and manage water demand	▪ No of functional Water Committees at GP and HUN level in project area	TBD		300	Water Management Plan adoption suvey Annual assessment of the performance of water committees at GP and HUN levels	yearly	GP WMC supported by DFA organisations Via FA and Dept of GW	Economic and other pressures mean communities fail to reach agreement on, and enforce, sustainable water resource management.
Output1.1: Water Management Committees established in Gram Panchayats and strengthened take lead in water governance	▪ Water Management Committees (WMC) established	0		330	DPMU reports	monthly	DFA	Govt policy continues to allow GP to make local decisions on the use of groundwater resources (A)
Output 1.2: Rainwater harvesting and conservation infrastructure built and maintained	▪ Water harvesting capacity	0		Increase of 9.9 million m^3	DPMU reports	Monthly	DFA	Effective convergence with MGNREGS and other state programmes for soil and water conservation and rangeland development (A)
Output 1.3: Common property rangelands developed	▪ Area of improved rangeland	0		42,900 ha	DPMU reports	Quarterly	DFA	
Component 3: Management and lesson learning								

Results Hierarchy	Indicators				Means of Verification			Assumptions (A)/ Risks(R)
	Name	**Baseline**		**End Target**	**Source**	**Frequency**	**Responsibility**	
Outcome 3: Lessons from the project identified and utilised to inform future development strategies.	▪ Three major lessons from APDMP discussed within the government and public institutions	N/A		3	PMU reports	Yearly	SPMU	Champions for drought mitigation identified and lobby for replication of APMP approach
Outputs: 3.1 Lesson learning-related documents and events	▪ Number and type of evidence-led documents and events	0		21	PMU reports	Yearly	SPMU	Project able to engage experts who can prepare high calibre documents and events.

1- Adaptive capacity to drought is defined as the number of farm HHs having access to at least four project activities of the following: i) Participation in Groundwater Sharing arrangements, ii)Access to weather and other crop/livestock information through CLICs, iii) Access to micro-irrigation, iv) Participation in crops FFS, v) Participation in livestock FFS, vi) access to Pashu Sakhi services and vii) Access to fodder from regenerated common property resources.

I. Strategic context and rationale

A. Country and rural development context

Economic and Agricultural development

1. India is now the third largest economy in the world, having grown at a robust 7.5 percent per year between 2004 and 2013. Poverty (in terms of headcount ratio) declined significantly over the last decade from 39 percent in 2005 to 22 percent in 2014, and India has achieved Millennium Development Goal 1 of reducing extreme poverty by half. Despite its remarkable economic growth, poverty remains a major issue, with 23.6 percent of the population living on less than USD 1.25 per day. India has 33 percent of the world's poor people, and nutritional levels are unacceptably low, with 29.4 percent of children underweight.

2. **Agriculture sector**. India's agricultural performance has been remarkable over the past decades, transforming the nation from chronic dependence on grain imports into net exporter of food, particularly of rice, cotton, sugar and beef. Nevertheless, with faster growth in other sectors, the share of agriculture in India's economy has declined to less than 17 percent. However structural adjustment has been slow and agriculture remains the main livelihood for just over half of the population, and nearly three-quarters of India's families depend on rural incomes. Without increasing the productivity of farm land and labour, there are risks to the country's food security and supply of fruits, vegetables and milk to meet the demands of a growing population with rising incomes.

3. Rainfed agriculture is practised on 58 percent of farmlands and with climate change farmers continue to be vulnerable to monsoon variability and failures and heavy rainfall events. In 2015 there was a deficit of about 13 percent in monsoon rainfall and food grain output from the monsoon season dropped from 128.7 million tons in 2013 to 124 million tons in 2015; and food price inflation topped 5 percent, with the inflation rate exceeding 50 percent for pulses and onions. Farmers report being in increasing distress and unable to cope with the pressures on their livelihoods. A number of factors contribute to these pressures: (i) increasingly small land holdings means it is difficult to scale up production to earn enough cash income to meet family needs; (ii) falling prices for farm produce – due to production gluts in good rainfall seasons; and (iii) risks and uncertainty regarding the physical factors of production (rainfall, temperature, pests, diseases) and markets/prices.

4. **Rural development**: The country is in the midst of a massive wave of urbanization as some 10 million people move to towns and cities each year in search of jobs and opportunity (World Bank, 2015). At present, rural India comprises 69 percent of the country's population, but its share in the total national income is less than 30 percent. Despite its impressive economic growth India's rural-urban transformation may result in larger disparities in welfare levels-between the rich and the poor, and between rural and urban areas.

5. The challenge for India will be to develop policies and programs to ensure that a large part of the population-especially the most vulnerable-is not left behind. India's spatial transformation also requires the effective development of the rural economy through the expansion of farm and non-farm employment and income opportunities. Rural incomes have not grown apace with urban incomes, and job creation in the non-agricultural sector has been slow.

Policies and programmes

6. The Government of India (GoI) has put in place several rural development schemes with important policies, strategies and acts that provide the framework for agriculture, forestry, rural development and growth, and which are central to IFAD's efforts in India. The GoI has over the years, implemented flagship programmes across the country to increase to livelihood potential, especially in rural areas. Among these, the Mahatma Ghandi National Rural Employment Guarantee Scheme (MGNREGS), the National Rural Livelihood Mission, the National Urban Livelihood Mission and the

Food Security Program under the National Food Security Act and the National Mission for Sustainable Agriculture (NMSA).

7. Although the green revolution transformed the agricultural sector in India, its share in the economy has progressively declined to less than 17% due to the higher growth rates in the secondary and the tertiary sectors. A major priority of agricultural policy at the national level remains to increase the productivity of rainfed agriculture: the option taken is to do so by supplying water, and this approach is getting to its limits. The budget for 2016-17, announced in March 2016, included a major increase in the allocation for agriculture and farmers' welfare. Funding of INR 359,840 million (approx. 5,370 million USD)includes expanded support for irrigation schemes, groundwater development and water-efficient minor irrigation through the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), and the digging of 500,000 farm ponds and one million compost pits via MGNREGS, as well as a new crop insurance plan with reduced premium rates, and the promotion of organic farming.

Andhra Pradesh Context

8. **Policy:** The State of Andhra Pradesh has produced an overarching strategy document, *Achieving Double Digit Growth* which states that. “as part of our inclusive growth strategy, our prime focus is the agriculture sector linked with improvement in soil fertility, better seed, reducing the cost of cultivation, productivity enhancement and value addition in the agriculture, horticulture, livestock and fisheries sub sectors. We can observe a structural change – labour force shifting from agriculture to non-farm and service sectors. Necessary skilling needs to be done to improve productivity of the abundant labour force”.

9. The State’s Strategy Paper for the Primary Sector, produced in 2014 with assistance from ICRISAT, places a priority on harvesting more rainwater in dry districts such as Anantapur, managing scarce groundwater resources, including regulating use through licencing of new wells and adoption of the lessons from groundwater management initiatives. However, limits on sinking of new wells are yet to be implemented, and free electricity for agricultural use provides no incentive not to pump from increasing depths or to use water more efficiently. The strategy paper also supports soil health mapping and increasing organic soil matter, organic farming, and development of horticulture.

10. In the project area, the mitigation of the impacts of drought has been a key area of focus of the Government of India (GoI) and Government of Andhra Pradesh (GoAP) since the 1950s, as evident through programs such as the Drought Prone Areas Programme, Desert Development Programme, National Watershed Management Programme for Rain-Fed Areas, National Calamity Contingency Fund and the National Agricultural Crop Insurance Scheme. Drought-related initiatives are also being supported by donor agencies - the World Bank, JICA and GIZ.

11. **Poverty.** Nearly 11 percent of the rural population in undivided Andhra Pradesh were below poverty line as per estimates of 2011-12[2]. Poverty in the state has been significantly reduced, with Andhra Pradesh being one of the pioneers of the women's Self-Help Group model of rural poverty eradication. This programme has now been implemented for 20 years, and continues to be actively supported by Society for Elimination of Rural Poverty (SERP), an autonomous society of the Department of Rural Development.

12. The five districts proposed for APDMP (Anantapur, Chittoor, Kadapa, Kurnool and Prakasam), are largely dependent on agriculture, with between 66 percent and 80 percent of the population being in rural areas. The overall literacy rate ranges from a low of 60 percent in Kurnool to a high of 71.5 percent in Chittoor, but female literacy is under 50 percent in Kurnool. Furthermore, nearly 28 percent of the households are from the vulnerable categories (being women headed, or having members who have migrated or are disabled). In addition 18 percent of the population in the five districts is made up of scheduled castes (SC) while 3 percent are scheduled tribes (ST). As part of the design

[2] Press Note on Poverty Estimates, 2011-12. Govt of India, Planning Commission, July 2013

process, a poverty and gender study was carried out[3] in 20 sample villages. Wealth ranking of households showed that 51 percent were in the poor and poorest categories. Field visits by the mission corroborated these findings, also finding that, in many cases, agricultural productivity had declined due to drought and depleting groundwater resources.

13. **Agriculture:** although Andhra Pradesh is one of the major rice producing states in India, this crop is predominantly grown in the higher rainfall and canal-irrigated districts to the north of the project area. Cropping in the project area is dominated by rainfed cash crops - primarily oilseeds (groundnuts), followed by pulses and cotton - all grown primarily for sale. Less than one fifth of the predominantly rainfed area is irrigated, mainly by groundwater, with irrigation used for commercial horticulture and some paddy and dry-season crops, along with supplementary irrigation for rainfed crops. Agriculture in the region has not always been based on cash crops. In the early 1960's two-thirds of the crop in Anantapur district (the least irrigated of the project districts, and so the most typical of the rainfed farming system) was taken up by food grains, with half the land being used to grow millets. Since the late 1970's the area under millets has fallen to under 1%, while groundnuts are grown on two-thirds to three quarters of land (often intercropped with pigeon pea). This change has come about with the availability (for most farm households) of subsidised wheat and rice, so removing the incentive to grow food for subsistence purposes, and the need to generate cash income in an increasingly monetised economy.

14. Although a relatively small area is occupied by horticulture, in much of the project area the value of this sub-sector is greater than that for crops. AP is the major tomato producing state in India, and the project districts are the main tomato hub in the state - capitalising on their dry climate. Chillis and melons are also grown on a large scale and there are extensive fruit tree orchards. However limited and depleting groundwater reserves constrain the development of this sub-sector. The project area is located not far from three of India's metro-cities (Bangalore, Chennai and Hyderabad), and access to markets is generally good for crops, horticulture and livestock, with farmers getting a fair share of retail prices - except in production gluts when producer prices can fall sharply. There is good crop storage infrastructure. Further information on agricultural markets is available in working paper 5.

15. Soils over most of the project area are thin with little water-holding capacity. Uncertain rainfall means crop areas and yields vary significantly from year to year - over the last 20 years in Anantapur district the area of groundnuts has varied by a factor of two and yield by a factor of 20 (between 1310 kg/ha and 67 kg/ha). Low and unreliable rainfall is an overriding constraint, but irrigation resources are limited - most rivers are seasonal and traditional irrigation tanks (used to store water) have not been maintained (a major programme is revitalising them). Farmers have come to rely more and more on groundwater, and over a million borewells have been sunk in Rayalaseema. However groundwater has become over-exploited, and only 5 percent to 10 percent of these borewells provide water year round. Lack of any controls on borewell drilling, subsidies for irrigation equipment[4] and free electricity for pumping have contributed to this situation. The risks involved in farming - related to both rainfall and irrigation - mean that farmers are finding themselves increasingly in debt and, in particular, unable to repay the loans they took to pay for sinking of boreholes that produce no water. This has caused considerable distress and farmer suicides, especially amongst farmers who have made large investments in commercial horticulture.

16. Lack of soil moisture severely limits crop productivity, but this is further aggravated by poor soil fertility (with low levels of organic matter and increasing shortages of micro-nutrients that are blamed for a downward trend in groundnut yields), pests and diseases for field and horticultural crops, poor quality seed, lack of access to improved and drought tolerant varieties, and delays in weather-critical crop operations caused by lack of labour and machinery. In this difficult environment farmers find is difficult to manage their production as they lack access to information (such as weather forecasts that

[3] Poverty and Gender Analysis Study Report of Ananthapur, Chittoor, Kadapa, Kurnool and Prakasam districts of Andhra Pradesh State. Bharati Integrated Rural Development Society (BIRDS), Nandyal, May 2016.

[4] There is also a programme that sinks borewells and provide pumps for small and marginal farmers, but this is limited to areas where there is not a scarcity of groundwater - i.e. areas which have supplies of canal and tank water.

are useful at a village level) and to advice on appropriate and drought-adapted technologies. This is made more difficult as holdings are small and fragmented - the average landholding is only 1.6 ha, with 80% of farmers being in the small and marginal category with under 2 ha of land[5].

17. Livestock: in rainfed areas the numbers of cattle and buffalo are generally declining due to increasing shortages of fodder and water, and replacement of draught animals by tractors (although compared with most of India, animals still play an important role in crop cultivation). Andhra Pradesh has more sheep and goats than any other state in India, and the five project districts have the highest number (12 million) of these small ruminants in the state. Sheep outnumber goats by 3.7:1. Small ruminants are well adapted to survive drought and climate change, and the numbers of sheep are growing. However animal productivity is low and mortality rates are high due to poor access to support services and inputs - delivery of support being made more difficult as flocks generally migrate in search of seasonal grazing.

18. **Nutrition.** Initiatives to improve agricultural productivity have helped increase farm incomes, but have failed to address malnutrition, and neither has the impressive growth in the IT industry and increasing private sector investments in infrastructure and industry (UNICEF, 2016). The national Family Health Survey-3 (2006) reveals that Andhra Pradesh nutrition and health situations are alarming as many as 30% of women (15 - 49 years) have a sub-normal Body Mass Index (BMI) and 62.7 percent are anaemic. The state still has high prevalence of acute malnourishment among the children under three years, 38.4 percent are stunted, 14.9 percent wasted, and 29.8 percent are under-weight. The incidence of stunting, wasting and under-weight among the SC and the ST children is substantially higher as 42,7 % of SC children are stunted, 9,5 % wasted and 43,4 % are under-weight. In scheduled tribe communities, 4,2 % of children are stunted, 7,5 % wasted and 45,9 % are under-weight. The state Infant Mortality Rate (IMR) is 39 (per 1000 live birth)[6] and ranks from 37 to 45 in the 5 districts of the project area. The Maternal Mortality Ratio (MMR) was 92 (2011-13)[7] and much severe in the 5 districts (102 – 129). In many ways this situation reflects India's paradox and the disconnect between the country economic growth and social development crisis.

19. **Climate change.** The climate of the region is tropical dry sub-humid, receiving between 500 and 1000 mm of rain per year (with rainfall generally declining from east to west). Most of rainfall is provided between June and September by the south-west monsoon, but some areas also benefit from the north-east monsoon from October to December. Historically the area has been prone to drought, with 66 drought years out of 133 between 1876 and 2006. Climate change is forecast to result in higher temperatures (and so more evapotranspiration) and reduced rainfall - especially from the south-west monsoon, which provides the bulk of rainfall. With much of the rest of India forecast to get more rainfall, reduced rainfall in the project area will make farming more difficult and could result in land going out of rainfed crop production. Further details on climate variability are in working paper 1.

20. **Rural finance**. Farmers in AP have better access to finance than in most other states in India. GoAP has strived to improve credit flows and ensure adequate credit for farmers by setting targets through State Level Bankers' Committee (SLBC). Overall, there is adequate credit flow for crop loans with average outstanding ranging between INR 97,000 and INR 117,000 per active farmer and INR 43,000 and INR 87,000 per hectare of net sown area in the project districts. Tenant farmers (about 15% of farmers are tenants) have difficulties in accessing bank credit although the Andhra Pradesh Land Licenced Cultivators' Act in 2011 provides a policy framework for providing them with credit. The operational issues in financing tenant farmers are likely to be resolved by the sub-committee of SLBC recently constituted with senior Government and bank representatives.

21. In the project districts between 85% to 95% of women are members of SHGs. Women are able to access loans from banks, their own internal savings, Streenidhi and also Mandal Samakhya for a

[5] At National level, 1% of farmer holding are considerate large with more than 10 ha, 4% are considerate medium (4-10 ha) and 10% are considerate semi-medium (2 – ha) and 85 % are considerate small (18%) and marginal (67%).
[6] National statistics
[7] MMR in the state is still higher than that of Tamil Nadu (79) and Kerala (61) as per SRS-2013.

variety of purposes. A typical SHG member is able to access, INR 150,000 to INR 300,000 in loans from their groups for cropping and other purposes. The bank loans are available at zero percent interest, supported by the interest subvention scheme of Government. Further information on rural finance in the State is available in working paper 6.

Rationale

22. The overarching problem that the project will address is the low productivity and high risk of farming in the drought-prone districts of southern AP. As a result of low and uncertain rainfall, and over-exploited groundwater, farming is risky leading to low level of investment by farmers. The situation is further aggravated by farmers' poor access to information - especially relating to weather and weather-related decisions (crop choices, planting dates, pest and disease control), lack of any governance or management system for water resources specifically limiting new borewell drilling, poor farming practices, and sub-optimal use of technology. The typical smallholder and marginal farm household with rainfed land now only gets one third of their income from farming, with another third coming from government safety net programmes and the final third from migration to cities for labouring jobs. The effects of water scarcity are felt more severely by socio-economically marginalized groups, especially rural women.

23. The rationale behind the project is a concerted and coordinated effort to address the problem of repeated drought and enable farmers to increase their income in a very difficult farming environment. The project will do this via three sets of interventions and outcomes:

(d) Adoption of resilient and better adapted agriculture, with supplementary irrigation to protect rainfed crops from drought periods, along with improved soil management (including improving its water-holding capacity) and better germplasm (including drought tolerant crop varieties). This would be linked to providing farmers with information on weather, markets and cropping options, along with promotion of improved husbandry practices for annual crops and horticulture.

(e) Making better use of rainfall for small ruminants (mainly sheep) grazing on improved and managed rangeland, along with improved access to animal health care to reduce losses and improved standards of animal husbandry to reduce losses and improve productivity. Backyard poultry will also be promoted to diversify income as part of building household resilience to drought.

(f) Better management of water resources through groundwater demand management at the community level and embedding this in local government structures, along with making more water available through rainwater harvesting and storage, and via improved recharge of groundwater aquifers.

24. As well as making farming more resilient and adaptable to climate change, interventions are sustainable and environmentally appropriate - with specific interventions to conserve soil and water resources. Farming will also become more productive and profitable, creating employment and addressing poverty. The experience of the project, especially groundwater demand management, will generate information and knowledge that will feed into policies for adapting agriculture to drought and climate change.

25. The theory of change in Figure 1 shows how project outputs will generate the following outcomes and impacts:

(a) Building the capacity of farmers in drought resilient and alternate cropping systems; support for improved animal husbandry from pashu sakhis (community livestock facilitators), information on weather and water resources, along with markets and technology from Climate Information Centres (CLIC) all contribute to the adoption by farmers of drought-resilient packages of improved practices for crops and livestock, which in turn lead to increased farm income.

(b) The information from CLICs and from the establishment of community organisations for water management (as well as for supplying inputs and services to crop and livestock producers) will help farmers access protective irrigation from farm ponds and shared borewells, and more efficient water application via drip and sprinkler systems.

(c) The information on weather and water from CLICs, and support from community organisations, will enable the development of water budgets and water management plans by GP and HUN to manage demand for water for crops and livestock and plan investments for conserving and improving the supply of water. This improved management of scarce water resources and investment in water conservation will contribute to improved adaptive capacity to drought.

(d) Mechanical and vegetative interventions to conserve rainwater (farm ponds, soil and water conservation works, re-vegetation of common property land) will also contribute to protective irrigation though improving the availability of water. Water conservation will also support water planning and budgeting by GPs thus contributing to better adaptive capacity to drought at community and household level.

(e) Finally, the evidence-based lessons from project implementation will be disseminated via documents and events and then discussed and mainstreamed in the drought resilience strategy of the state which would lead to improvement in the adaptive capacity and thus resilience of households to drought.

26. The project will build on, and scale up, a number of current and recent initiatives for farming in a drought-prone environment. These include the Andhra Pradesh Farmers Managed Groundwater Systems (APFAMGS) project implemented by FAO in 640 villages, with 7000 beneficiaries over 4 years, and involved participatory hydrological monitoring along with water budgeting to allocate and manage scare water resources.

27. The state is also investing in soil and water conservation works with the objective of harvesting rainfall and recharging the aquifer. Farm ponds are being built through the “Panta Sanjeevani” programme and existing rainwater-harvesting structures repaired, with micro-irrigation practices (drip systems, sprinklers and rain guns) to make more efficient use of scarce water.

28. Another important initiative was the Community Managed Sustainable Agriculture (CMSA) implemented from 2004 by SERP (Society for Elimination of Rural Poverty - part of the Department of Rural Development) to support poor farmers in adopting sustainable agriculture practices to reduce the cost of cultivation and increase net farm income. The initiative included Farmer Field Schools and Community Resource Persons - both of which are included in APDMP. Another initiative of SERP was the AP Drought Adaptation Initiative which was implemented from 2006 to 2011 and addressed groundwater management though borewell sharing.

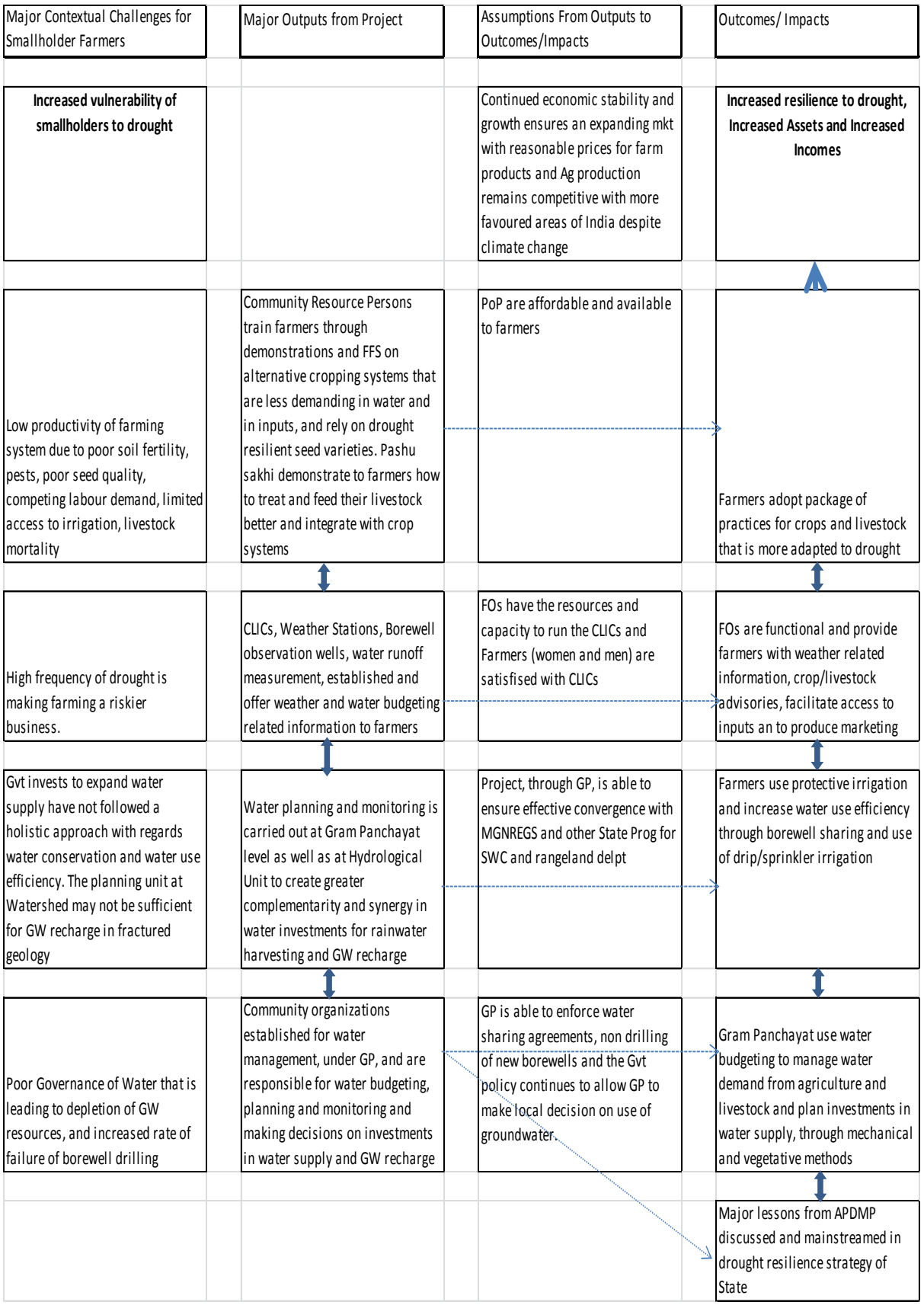
29. The Department of Agriculture has a number of programmes, aspects of which will be incorporated into APDMP. These include: (i) Community Managed Seed Systems, a seed multiplication scheme which will be scaled up by APDMP; (ii) a programme to popularise millet production; (iii) a groundwater sharing scheme involving borewell owners sharing water with other farmers to provide protective irrigation; (iv) Revitalising Rainfed Agriculture; and (v) support for Farmer Producer Organisations. In additional APDMP water conservation will build on the work done by the watershed programmes of the Rural Development Department and NABARD, using the hydrological unit (HU) for planning purposes as more adapted to groundwater management than the watershed approach.

30. There are also opportunities to take advantage of research innovations: new crop varieties that are drought tolerant, more productive, and resistant to diseases. On-farm research in the project districts by ICRISAT has shown the benefits of micro-nutrient application for groundnuts and the potential for organic soil amendments, while lined farm ponds have been tested by the Agricultural University and some NGOs. The development and community management of common property rangeland with support from NGOs has been shown to have a very positive impact on grazing

resources for sheep and goats, with migration in search of better pastures being greatly reduced. A promising scheme for backyard poultry from northern AP will be scaled-up.

31. IFAD's investment in APDMP will add value by bringing all these interventions together in a coordinated manner with a multi-pronged intervention to address issues of drought and climate change. APDMP will also include interventions which have been shown to work well on other IFAD projects in India - such as participatory planning at the community level, pashu sakhis to support livestock producers at the village level, farmer field schools, organic input production enterprises and collective marketing. IFAD investment will also fund a comprehensive project management and monitoring system to ensure "last mile" delivery of project support and gathering evidence of the resulting outcomes. IFAD can also link the project to other international development initiatives and agencies - so providing access to best practices and new ideas, and disseminating lessons from APDMP to a wider audience.

Figure 1: Theory of Change: Andhra Pradesh Drought Mitigation Project



II. Project description

A. Project area and target group

32. **Project area and number of participating households** - the project will focus on the five most drought-prone districts in the State of Andhra Pradesh: Chittoor: Anantapur, Kurnool, Kadapa and Prakasam. Average annual rainfall is highest in Chittoor district with 877 mm, and lowest in Anantapur with 543 mm - this being the second driest district in India. Thirty percent of the mandals (sub-districts) in these five districts have overexploited their groundwater.

33. The project will be implemented in village clusters that, more or less equate to a Gram Panchayat (GP), the lowest level of local government in India. In this part of AP, a Gram Panchayat typically comprises of around two or three villages with an average of 640 households, and covers an area of almost 1660 ha, of which 45 percent is cropped by about 500 farmers with an average farm size of 1.6 ha. Around 130 of the 640 households (many of them landless) are involved in small-ruminant and back-yard poultry production. The project will aim to cover 330 of these clusters with a total of 165,000 participating crop and/or livestock farm households[8]. If at all possible, the selection clusters will aim to produce a group of contiguous clusters (estimated 5 clusters) to cover a drainage basin of around 8,000 ha. This will allow more comprehensive water management planning for both ground and surface water resources to take place. There are also advantages from having a larger unit in terms of getting a good area of common property rangeland for grazing development, and a scale needed to help Farmer Producer Organisations (FPOs) become viable and allow for more efficient support from project agencies.

34. **Target group and targeting approach.** The target group will include all farmers and livestock producers in the selected village clusters. Nearly 80 percent of the farmers in the five districts are small and marginal farmers having less than two hectares of land. The project will adopt a two-step targeting strategy. First, the project will adopt geographic targeting by focusing on the most drought-affected villages in the poorest mandals. Second, the project will adopt a social-targeting approach based on the findings of the poverty and gender analysis in Appendix 2 as a way to refine the classification of farmers. The target group categories will therefore include all of farmers and landless including the Scheduled Caste (SC) and Scheduled Tribe (ST) and vulnerable households such as women-headed households, households having person with disability (PwD) and migrated labour. The State has requested that the project ensures support is provided to the 100 poorer households in each cluster which will represent 20% of the project target group. Gender focusing on women would be integrated across the categories. Youth is another important target group, especially those already engaged in agriculture or the new ones interested and willing to be involved in commercial agriculture, ICT activities, water monitoring, small scale agribusiness (e.g. butchery or postharvest activities). For each category and subcategory of farmers, a tailored package of support will be provided based on their vulnerability and needs. The village clusters will be selected according to the following criteria:

(a) In a mandal that has frequently been declared a "drought mandal"

(b) In a mandal dominated by rainfed farming, with a low cropping intensity.

(c) In a mandal where groundwater resources are under stress

(d) In one of the poorest mandals[9] as defined by the District Administration

[8] Detailed calculations and projections of the number of farm households and areas of land are in Attachment 1 of Appendix 4. If needed project clusters may expand to include neighbouring villages.

[9] This is measured in terms of Mandal Domestic Products (MDP) based on Gross Value Added (GVA) in agriculture, industry and services, along with per capita income (PCI). These poorest Mandals are also in the list of drought Mandals declared by AP Government during 2015. It is currently envisaged that the project will not work in the 66 mandals of the five districts where the AP Rural Inclusive Growth Project (implemented by SERP and funded by the World Bank) is working. Some of the interventions in this project are in the same sectors as the planned APDMP. The criteria used to select poor mandals for this project differs from that used by the District Administration, with the result that only 7 of the 66 mandals in this project are on the District lists of poorest mandals.

(e) At a location where some relevant initiatives have already taken place (so the project can build on what has already been achieved).

(f) At a location where there is potential for the proposed project interventions to be effective – this includes a potential for groundwater management (which means the GP selected should, as far as possible, form a groundwater sub-basin) and an adequate area of common property rangeland that can be developed as a grazing resource.

35. **Scaling up** - The project is an attempt to scale up and improve past experiences of groundwater management in AP in order to provide an holistic and integrated response to the multifaceted and complex acute drought situation of many districts. The project will opt for an integrated approach of water demand and supply side management building on past experiences in the state. The current and recent efforts that will be scaled up are : i) groundwater demand management (in particular APFAMGS which was supported by FAO) in 640 villages, benefitting 7000 farmers over approx 4 years, ii) water harvesting and conservation, iii) supplementary irrigation including borewell water sharing and lined farm ponds and iv) drought-resilient agriculture. The latter include the Rainfed Area Development Programme of GoI, the community seed scheme of GoAP, and the millet expansion programme. The combination of IFAD and GoAP resources (including convergence with Government programmes and co-financing from NARBARD's Rural infrastructure Development Fund) will enable a substantial scale of operation (reaching in the order of 165,000 farm households). The building of systems for community implementation, and creation of capacity in government agencies and in service providers will enable further scaling up in drought-prone areas.

36. One immediate opportunity for scaling up is the application by GoAP for funding of USD 85 million from the Green Climate Fund. If these funds are used alongside GoAP and convergence resources, this could allow the outreach of APDMP to be doubled to 330,000 households. The scaling up framework is in Appendix 12.

37. **Nutrition**: APDMP will not have direct intervention on nutrition because of the massive coverage of nutrition schemes in the state. The project will seek convergence with flagship programmes such as the Integrated Child Development Services (ICDS) Scheme, the Supplementary Nutrition Programme (SNP), the Anna Amrutha Hastham (AAH) programme to name the few which reach 98% of women and 83% of children in the state. The project is promoting coarse cereals which are more nutritious than wheat and rice, a variety of pulses, vegetable production as well as eggs/ poultry and sheep meat and as such will have an indirect contribution to nutrition status in the project area. A module on nutrition will be added to the farmer field schools on crops and livestock.

B. Development objective and impact indicators

38. The overall goal of the APDMP is to Improve the incomes of 165,000 farm households and strengthen their resilience to drought. This goal will be achieved through the development objective of strengthening the adaptive capacity and productivity of agriculture in the rainfed zones of five districts in southern Andhra Pradesh. These efforts will be supported by a governance framework for water exploitation and irrigation development.

39. Key indicators of impact at the goal level will include the RIMS anchor indicator of household assets and an indicator of overall household resilience to drought. This indicator will be an index reflecting the vulnerability of farm production systems to low rainfall, and the ability of households to manage during droughts. This index will be developed and tested at project start-up.

40. To measure impact at the development objective level, data will be gathered on the farm level production (including yield and area of crops, and off-take of small ruminants) of major crops to measure increases in underlying production brought about by project interventions and, most

important, how resilient these increases are in a year of reduced rainfall. Data will also be gathered on the number of farmers (and crop area) with access to protective irrigation, and the numbers who actually use this in a drought year. Given fluctuations in rainfall these indicators will require data to be collected on an annual basis and compared with a control group of non-project farmers. Tracking the results chain from project outputs through outcomes to impacts in terms of increased production (and resilience of production) will strengthen attribution of these results to project interventions and generate useful lessons on which interventions worked best.

C. Outcomes/Components

41. The project will have three components: (i) Climate resilient production systems; (ii) Drought proofing through natural resource management and governance; and (iii) Project management and lessons learned. A detailed project description is in Appendix 4.

Component 1: Climate resilient production systems - USD 101.0 million, 73% of total cost

42. This component aims to increase the resilience of crop and livestock production systems to climate change (specifically drought), and provide farmers (individuals and small groups) with information to make informed decisions on how to invest in protective irrigation, improve soil fertility practices, diversify cropping systems, and improve their livestock productivity. The project will not support the dairy sector as this is getting significant support from other sources. Similarly, the project will not promote crops that have high water demands (e.g. paddy rice) and instead will focus on drought tolerant and low water consuming crops (e.g. millet and pulses), water-efficient horticultural production systems, and drought tolerant fodder species.

43. **Sub-component 1.1: Improved crop production systems** will provide farmers with the information and skills needed to adapt their farming systems to climate change. This will be based on increasing their access to knowledge and skills, demonstration of new varieties and production technologies, understanding the risk of investing in different cropping system and by linking them to insurance products that reduce the risk of this investment. Yields will be increased through timely use of appropriate irrigation, integrated soil fertility management, improved germplasm, mechanisation, and new cultivation practices. The main project investments will be in capacity building to enhance the knowledge base of the stakeholders for sustainable agricultural development and to empower the farmers to adopt the improved practices.

44. *Climate Information Centres* (CLIC) will be established in each village cluster. They will be connected to the internet and have the following functions: (i) access to extension services and other support agencies, and provide weather forecasts, market price data, and technical information for both crops and livestock; (ii) create and maintain a data base of local knowledge, including soils and water resources; (iii) promote tools to support decision making at the farm level on topics such as crop selection when the start of the monsoon is delayed; and (iv) support the use of ICT tools by farmers, including mobile phone based information and advice systems. CLICs will be set up by project facilitating agencies and staffed by a trained local person. Operation of each CLIC will then be transferred to a Farmer Organisations and will act as a centre for the organisation.

45. *Extension service provision* will be through: (i) farmer field schools (FFS) for 350 farmers per cluster, which will include general guidelines on crop agronomy and soil fertility management, and awareness on water/irrigation issues taking into consideration the available water and weather information from the water budget exercise, the weather forecast and the crop advisories available in the CLICs. A module on Farming as a Business will be included in the FFS curricula to support the commercialisation of agriculture. A module will also be included on nutrition to improve farmers' awareness about the nutritive value of coarse cereals, pulses, vegetables, oilseeds that are promoted as part of more drought resilient cropping systems; (ii) farmer to farmer exchange visits; and (iii) community resource persons - trained farmers to support project activities and provide a link between farmers and the staff of project and extension agencies.

46. *Integrated soil fertility management* (ISFM) is an approach based on the use of organic and inorganic nutrient sources, combined with the use of improved and/or adapted crop germplasm. To increase soil fertility and water retention a range of activities will be supported by APDMP, including: (i) soil testing and soil fertility mapping of the village clusters; (ii) development of soil fertility recommendations based on the availability of organic and inorganic nutrients sources at the household level resulting in better targeting and more efficient use of nutrient sources; (iii) use of plant growth-promoting bacteria; and (iv) production of compost and green manure cover crops as intercrops, relay crops or sole crops, as well as planting of Nitrogen fixing shrubs on field bunds.

47. *Protective irrigation* will reduce the risk of drought loss for crops grown during the main kharif (monsoon) cropping season. This will include the construction of 60 lined farm ponds per cluster, designed to store water for protective irrigation (0.5 ha per pond is assumed), infrastructure to enable groundwater to be shared between owners of borewells and other farmers (40 ha per cluster), and equipment to efficiently apply water to crops. The proportion of crop area getting protective irrigation is estimated to increase from a current 20% to 25% in future. Protective irrigation is the major investment in this component, accounting for 37% of total component cost - but over one third of this will be labour costs funded via MGNREGS convergence.

48. *Support to adaptive research* will be based on needs/ opportunities emerging from the water budgeting exercise, from soil analysis and mapping and from farmers' priorities. The topics will be mapped across different agro-ecological areas taking into consideration certain socio-economic specificities (labour availability in particular). The mission tentatively identified 3 topics related to : (i) conservation agriculture given its contribution to the retention of soil moisture, lower production costs and its potential for increasing soil organic matter - at the same time it can reduce the carbon footprint of agriculture; (ii) the development of strategies for pest and disease control in the context of climate change in view of increasing incidence of viruses/rusts/blights; (iii) evolutionary plant breeding that was tested in similar semi-arid environments and yielded positive results for the production of drought resilient germplasm. Once prioritized, the topics for adaptive research would either be the object of on-farm demonstrations (when solutions have been tested in research stations), or of complementary research (either through a competitive award system or through direct agreement with qualified research agencies/universities/NGOs/ private sector), or of additional data collection/ evaluation that would be undertaken by interns from research and university programs.

49. **Sub-component 1.2: Improved livestock production systems.** With a focus on drought resilient small ruminants (largely sheep in the project area) complemented by backyard poultry (for income diversification purposes), interventions will build on Department of Animal Husbandry (DoAH) activities, address gaps in last-mile delivery and build the capacity of vets, paravets, community animal health service providers and producers. Livestock production is a particularly important income-generating activity for the poorest households including marginal farmers, landless households, and widows. *Support for sheep production*: the key agent in supporting sheep producers (and also backyard poultry) will be the Pashu Sakhi. These community livestock facilitators are usually women from the communities that they serve. A total of 800 pashu sakhi will receive extensive training over a three year period in a series of short courses. They will provide fee-based services and inputs including vaccination, first aid services and castration, feed inputs like blocks and mineral mix, chaffing fodder, weighing animals and providing market information. To ensure sustainable linkages between pashu sakhi and DoAH paravets, 50 of the latter will be trained to supervise and support pashu sakhis, and both will get animal health kits and tablet computers, while paravets would also be provided with a travel allowance.

50. Alongside this support from Pashu Sakhi and paravets, the livestock production systems sub-component will support: (a) cold chains for vaccine distribution; (b) demonstrations of improved night shelters (12 per cluster) for small ruminants to reduce lamb mortality; (c) breeding of high quality rams by selected sheep breeders with nucleus flocks, and ram exchange events to avoid in-breeding; and (d) fodder development including fodder nurseries, fodder seeds, and demonstrations of new types of

fodder to complement the grazing in rehabilitated CPR. Fodder chopping machines (chaffers) would be provided at subsidised prices, to reduce labour and waste of fodder.

51. *Support for backyard poultry* would provide funds to establish 10,890 backyard poultry units (each with five hens) and along with 110 poultry breeder units (the latter being another household enterprise). This will be based on a very promising model that is being implemented in the north of AP with support from WASSAN[10]. Five hens will be provided on a one time basis to widows or other extremely poor women to set up a backyard unit to enable them to produce 50-60 saleable birds annually. The project will also provide facilities such as a night shelter for birds, equipment, chicks and feed for both backyard and breeder poultry units (see detail in Appendix 10: Economic and financial analysis and working paper 4). Small scale poultry breeding enterprise will supply the backyard units with birds. The poultry component will use locally available desi birds. Productivity will be enhanced with vaccination by Pashu Sakhi trained by the project, and feed supplementation comprising 30% of the diet, with the remaining based on scavenging. Low cost feed supplement from rice hulls, millet and azolla will be produced by the poultry keeping households.

52. Capacity building for livestock production would be via farmer field schools for 37,000 livestock producers focusing on improved sheep and poultry production practices. These would be facilitated by Pashu Sakhis, who would first receive specialised training. In addition 100 veterinary officers will be trained in project strategies and approaches and in livestock production related interventions. Capacity building will be backed up by access to information on production technology, service providers and markets via CLICs, and by opportunities for collective marketing via FPOs - see below.

53. **Sub-component 1.3: Strengthened farmer organisations.** The project will work with and strengthen existing farmer organisations and create new organisations where needed, with the objective of providing a focal point for implementation of APDMP interventions which will continue to provide farmers with a range of services for drought-resilient agriculture after completion of the project.

54. *Farmer producer organisations*: New Farmer Producer Organisations (FPO) will either be based on a village cluster of about 1000 ha and 500 farmers, or at a super-cluster level comprising, say, 10,000 ha, 3,000 farmers. Where needed Facilitating Agencies (FAs) will mobilise the farmers into Farmer Interest Groups (FIGs) as focal points for dissemination improved packages of practices, technology access, information sharing and mutual support. FPO Village branches (or village level FPOs) would provide information services, and community seed multiplication units, and where applicable, will manage machine hiring services (for crops and livestock). Where needed they will aggregate produce for marketing by the FPO, supply organic and other inputs, provide animal veterinary services, manage common property rangeland, and manage business related credit on behalf of FPO.

55. About 40 FPOs at the super-cluster level are likely to be formed/supported under the project. These may be organised as Producer Companies and undertake: (i) productivity enhancement services – adoption of practices for improving productivity, water conservation measures, machinery hiring; (ii) input services – seeds, fertilisers including production and sale of organic farming inputs, pesticides, livestock feed, veterinary services for animal rearing; (iii) marketing of produce via linkages with private sector companies, local mandis and large traders; (iv) value addition via primary processing, grading, packaging etc.; and (v) financial services including acting as a business correspondent of banks for lending to tenant farmers, facilitation of loans for crops and livestock (including warehouse receipt financing), and information / facilitation for crop and livestock insurance.

56. Given the successful experience of village/GP level FPOs in the form of Mutually Aided Cooperative Societies (MACS) that was tested in AP for CPR management and provision of livestock services, this model will be promoted for livestock producers. The formation of MACS will be

[10] more information is available at http://www.wassan.org/apdai/apdai_9.htm. The WASSAN model has been selected out of a comparison with other models being implemented in AP. The model has resulted in: (i) an attractive profit which is more than 60% more than comparable options for same size operations; and (ii) the model is the most easy to implement and sustain.

facilitated and this will require hand-holding for 3 years. The fundamental focus of MACS will be to manage the common property (which might be 400 ha per MACS) for the benefit of the community. MACS will provide the focus for services and inputs delivery, promote integration and a farming systems approach to improve productivity, profitability and drought resilience, foster entrepreneurs and support access to markets. At these locations, crop producers would join the same MACS.

57. *Farmer support services*: via the development of FPOs and other community service providers the project will support: (i) the development and expansion of community seed production via seed multiplication groups to enable more farmers to access good quality seed of improved/in-demand crop varieties (especially for crops and varieties best able to withstand drought); (ii) machinery hire centres (the operation of these may be leased out by FPOs to an individual enterprise) to provide access to equipment for crop cultivation (and also portable irrigation equipment and other farm-related tools); (iii) centres (run by individuals or small groups) for production and sale of bio-inputs; and (iv) support for collective marketing via FPOs with some basic infrastructure (weighing machines, moisture meters and tarpaulins) and value chain / market studies to identify new opportunities.

58. **Sub-component 1.4: Field facilitation.** Implementation at the field level would be supported through facilitating agencies, with five or six consortiums of agencies with the required capacity and experience being contracted to provide this support to each cluster for a period of 4.5 years and, in particular, to organise capacity building and support producer organisations. Further details of their role and activities are in section III B below and in Appendix 5.

Component 2: Drought proofing through NRM & governance – USD 30.7 million, 22% of total cost

59. This component will intervene through investment and improved management of public goods (common property resources) of water and rangeland with the aim of mitigating drought and making agricultural more productive.

60. **Sub-component 2.1: Water governance** will engage with all water users in each cluster to make rational choices regarding access and equity in water management based on: improving awareness of the water resources available locally; mapping different water users; budgeting water demand; establishing a monitoring network of all forms of water use; carrying out water auditing; and developing water management plans.

61. In order to build an understanding of the linkages between surface water and groundwater, a drainage basin approach will be used to define a Hydrological Unit (HU) that will include the underlying groundwater. On average, one HU covers about 5 GPs and an area about 8,300 ha. A Habitation Water Committee will be formed in each village, with representation from all types of water users. About 2 to 4 representatives from each habitation water committee will be nominated to the GP Water Sub-committee. These nominated members along with the elected members of the GP will form the GP Water Sub-Committee. The sub-committee will be chaired by the GP Sarpanch (the elected head of the GP) will have legal powers as integral part of the GP. Habitation Water Committees and GP Water Sub-committees will meet once in every two weeks in the first year, and then at monthly intervals to review hydrological and meteorological data, monitor water supply and demand, monitor the adoption of the HU water management plan, and discuss strategies for effective implementation of the plan. All the GP Water Sub-Committees in an HU will form a Hydrological Unit Network (HUN). The HUN will be registered under the AP Societies Act, and will meet once every 3 months to review the implementation of water management plans by the GPs in the drainage basin and identify strategies for effective implementation of the plan.

62. Capacities of GP water sub-committee members will be built along the lines of the Farmer Water School curriculum ; and water and climate change content will be incorporated into FFS on crops and livestock. The capacity of GPs and of the various departments involved with water development will be strengthened via training of staff. Water Budgeting will be organized at the GP and HU levels to discuss water supply and demand, water balance and develop a HU management plan. Later, GP-level water management plans will be developed in line with the HU plan. The Water Budgeting (WB)

exercise will be undertaken prior to each cropping season at the HU level. Water budgeting involves the following steps: (i) resource inventory updating; (ii) estimation of water supply; (iii) estimation of demand; (iv) computation of water balance; and (v) water budgeting workshops to discuss and agree on water management plans. Plans will ensure water security for drinking purpose and for farmers in distress. An annual survey will be carried out on the adoption of the water management plan, collecting data on crop-water use, water sharing arrangements, water security and prevention of sinking and deepening of borewells. Results of this survey will be shared in GP meetings and remedial actions discussed if needed. Water management plans will be supported by awareness raising via the CLICs, local water conservation and agreements on the sinking/deepening of borewells. It is planned that these processes will make extensive use of maps and GIS data generated by the Andhra Pradesh Space Applications Centre, which will be contracted by the project to provide this support.

63. **Sub-component 2.2: Water monitoring and conservation.** This sub-component will comprise water demand and supply monitoring activities and supply-side water management interventions to increase water availability though investments in rainwater harvesting and groundwater recharge.

64. **Water supply and demand monitoring:** Overall water supply and demand monitoring will work with the line departments that are involved at a local-level so as to encompass all elements required to a comprehensive water budget: water transfer, rainfall, surface water, surface water stored, soil moisture and groundwater available for water supply; water used by the various sectors (domestic, crops, livestock, industries and environment) for the water demand. It will create an opportunity for interactions between line departments and farmers, since farmers will be collecting new data that can be brought into the respective public systems. Participatory Hydrological Monitoring is critical for water budgeting, and will include: borewell discharge and water levels in each GP; current meters and gauging rods will be established for surface water supply measurement in each drainage basin. Community Weather Stations (CoWS) will be established for meteorological monitoring. Hydrological and weather data will be collected by trained data collection volunteers, and provision has been made to recruit and pay allowances to two persons in each cluster for a period of 4-5 years. The data collected locally will be complemented with public data and displayed on boards in the CLICs and GPs and will be disseminated to other habitations in the GP to enable farmers to make informed decisions on agricultural crops, crop growing practices, and crop-water management - both collectively and individually.

65. At higher geographic scales, the knowledge of groundwater remains approximate. In order to complement groundwater knowledge, a pilot hydrological mapping of aquifers is proposed. This high resolution aquifer mapping involves airborne electromagnetic surveys complemented with ground investigations and a decision support tool that will enable local water committees to explore various groundwater management scenari[11]. The exercise will produce maps of the fractured pathways that control the groundwater movement to a depth of up to 300 meters. This will provide precise information on groundwater prospects (volume and location), which will be useful to identify sustainable borehole sites for pumping, as wells as effective recharge. The estimated cost of the pilot is USD 1 million to map an area of 391 km^2, approximately covering two mandals. A drainage basin of about 300 km^2 , coinciding with several HU, will be identified, so that the pilot mapping can done on a drainage basin and include the administrative area of the villages concerned with the basin.

66. **Water conservation infrastructure** will aim to add to the supply of available water. Soil and water conservation activities will support the recharge of soil moisture and groundwater, and geographically targeted water harvesting activities will complement local water supply management. It will include some farm ponds (not lined as these are primarily recharge structures), check dams and other nulla improvement works, various types of bunds. This has been included in the project budget at 140 m^3 of earthworks per hectare for 25% of the cultivated land (about 26,200 m^3 per cluster), which would entirely be funded via convergence with MGNREGS. These works would be identified

[11] The design mission discussed the scope of the study and the methodology with the National Geophysical Research Institute (NGRI).

and planned as part of the initial participatory cluster planning - and in some locations may have been part of a planned watershed development scheme that was not fully implemented. In addition APDMP will invest project funds in about three borewell recharge structures per village cluster. A single structure is reported to benefit a number of boreholes in the vicinity. In total these works are the major cost item in this component, accounting for 55% of component costs, but 96% of this will be funded via convergence with MGNREGS.

67. **Sub-component 2.3: Regeneration of common property rangeland** (CPR). The entry point for small ruminant development is the development of common property rangeland. Better grazing resources on such common land have been shown to allow producers to stop flocks migrating (in the face of increasing drought) in search of seasonal grazing. Static flocks enable the delivery of animal health and other productivity enhancement services (Component 1.2) as well as the formation of Producer Organisations (Component 1.3) for increasing off-take and value per animal.

68. CPR are, like water, another public resource that are of vital importance for communities to adapt to climate change and increasing drought. Regeneration of common grazing lands is the key to livestock development, as better grazing improves animal nutrition and so productivity, and enables producers to reduce seasonal migration in search of new pastures. About 13 percent of the land in AP is wasteland held by the Revenue Department[12]. Small rocky hills and other uncultivated land are widespread in the project area. The mission visited a number of areas where communities had been supported to regenerate and revegetate this land resulting, despite increasing drought, in increased supplies of fodder and forest products, along with ecological services for resource conservation, recharge of groundwater and sustainability of agro-ecological systems, including pollination of food crops. The project would regenerate about 42,900 ha of degraded land across the five districts, this works out as an average of 130 ha in each of the 330 village clusters, but in practice this may not take place in every cluster.

69. Investment in CPR regeneration would include soil and water conservation works, planting of fodder plants on about 40 percent of the area, and supplies of livestock drinking water (renovation of water bodies and construction of new ponds - about one per 40 ha of CPR). Most of the funding for this work will come from MGNREGS, with a 5 percent contribution from users of the CPR, and the balance from project funds.

Component 3: Management and lesson learning

70. A State Project Management Unit (SPMU) would be established at the state level (SPMU), with District PMUs in each of the five districts. Details are in the next section on project management.

71. *Lesson learning* Comprehensive M&E together with special studies will generate detailed information on the process and results of project implementation. These will bring together lessons learned, and collect more information to help formulate future strategies and support additional convergence. Specific areas for such lesson learning include:

72. Water resources: the proposed hydrological survey will contribute to decisions regarding groundwater exploitation, recharge and management; findings will be reflected in the GP and HU management plans and shared with the concerned line departments. The experience of community water management involving GPs and water resource planning at the GP and HU levels will also inform state strategies regarding water resource planning and management. In order to bridge the operational gaps among the various ongoing initiatives, workshops will be organized annually on specific themes. An initial list of topics identified as being of interest is: watershed management plans, water sharing arrangements, regulations around groundwater drilling, water reuse, water sector legislative framework; such meetings will require that the project commissions preparatory studies to facilitate the discussions. In addition two studies have been identified:

(a) Groundwater Economy of borehole drilling in Anantapur and Chittoor Districts will map the stakeholders involved, their technical competence, registration and certification, technical skills,

[12] Excludes common property held under Forestry Department.

operational strategies, sourcing of the technology, localization if any, associated downstream sectors, overall economy, profit margins, quality assurance, investments in research and development and the investments of the profits. The study will identify strengths, weaknesses, opportunities and threats to bring about positive changes in the sector by moving from exploitation to management of the critical resource.

(b) Pilot Implementation of Registration of Wells in Anantapur district will obtain a total count of all types of wells, with their location, technical details, photographs and water use information on a dedicated software platform. Results will be validated by GP water management committees and then discussed with the Water Resources Department to drawn lessons for future regulation of water use.

(c) To bridge the operational gaps among the various ongoing initiatives, workshops will be organized annually on specific themes. An initial list of topics is: watershed management plans, water sharing arrangements, regulations around groundwater drilling, water reuse, water sector legislative framework. Such meetings will require preparatory studies to facilitate the discussions.

73. Crops: a wealth of data will be generated by the project M&E system, and the lessons emerging from this would provide insights regarding issues such as: (i) the viability of rainfed farming under conditions of climate change; (ii) interventions that are most effective for rainfed agriculture; (iii) marketing systems and producer support (including the impact of a range of subsidies and support mechanisms on farmer decisions); (iv) damage to crops by wild animals; and (v) areas of potential in horticulture.

74. Livestock - the project will support the development of a new curriculum for the training of paravets, and studies to inform policy development. The latter would include calculation of carrying capacity of improved common property rangelands, leading to policies for community management of this resource. Other studies, along with the experience of community animal health services, could inform strategies for disease control and the veterinary treatment of animals, animal breeding and the use of subsidies to promote livestock development.

75. Future small ruminant development will be informed with support from the recently funded BMGF project to IFAD “Program design for private-public-private producer partnerships (4Ps) in small ruminant value chain development in India” which is finalising a “White Paper” on small ruminant policy engagement.

76. Farmer organisations: the flexible approach to be adopted in the formation and support of farmer organisations will enable a number of different models to be compared and lessons learned regarding what works best and the factors that contribute to success.

D. Lessons learned and adherence to IFAD policies

Lessons Learned

77. The project will build on the successes and lessons learned from a number of initiatives in this part of AP that aim to conserve water and make farming more productive and drought resilient. Other successes have been the development of underutilised common property rangeland for use by small ruminants and various efforts to manage groundwater resources in a more sustainable manner. A number of these programmes have involved a partnership between the government, NGOs and rural communities, and the project will use a similar approach. The project will leverage on the experience of the state in social mobilization.

78. The project incorporates lessons from other projects supported by IFAD in India and other countries in the region. These include:

- **Gender mainstreaming**. Like other IFAD funded projects in India, APDMP will mainstream gender in project activities and use gender disaggregated data in all reporting formats. APDMP will follow a Gender and Development (GAD) approach, focusing on equitable

inclusion of both men and women in all FPOs and farmers organisations and institutions to be formed. GAD seeks to have both women and men equitably participate, make decisions and share benefits. It aims at meeting practical needs as well as promoting strategic interests of women and men and is in line with IFAD's Gender Equality and Women's Empowerment Policy.

- **Leveraging government resources** through convergence. Strengthening the linkages with public programmes and collaboration with sub-state and local government entities (also known as "convergence") with public programmes is particularly relevant in a Middle Income Country like India where government investments for developmental activities are big and where IFAD finances play a catalytic role. The convergence approach has enhanced the policy engagement opportunities at different level from central to state government and boosted the scaling-up landscape.
- **Groundwater Governance & Climate Change/ Adaptation:** approaches in community managed weather monitoring and adaptation and climate Information Centers (CLICs) developed under the Australian supported ACCA project (implemented via WASSAN) will be replicated in the project. Collectivising groundwater for protective irrigation has been piloted by the World Bank AP Drought Adaptation Project and will also be scaled up, along with other initiatives for climate smart agriculture and livestock, and for lined farm ponds. The main lessons learned from the CLICs are that it is very important to select qualified people for the facilitation of the CLIC and that information available in the CLIC should be more easily broadcasted through videos (for package of practices on crop diseases for example) and loudspeakers (for weather information). The main lessons learned from the collectivization of borewells are developing formal agreements for borewell sharing between bore-well farmers and farmers with failed wells or without any wells, with the condition that for farmers participating in such a water sharing arrangement, no additional borewell will be drilled. Such models are supported by local institutions, in this case the Gram Panchayat, and participants are not limited to two. The replication of such sharing arrangements require more accurate quantification of the available groundwater resource with the overall objective of reducing water abstraction while improving overall water use efficiency.
- **Groundwater Governance approach from the** Andhra Pradesh Farmers Managed Groundwater project (APFAMGS) experience. The APFAMGS project adopted a Hydrological Unit (HU) approach and facilitated the formation of 640 Groundwater Monitoring Committees (GMCs) village-level that monitored groundwater resources in particular villages. These committees were then federated into 63 Hydrological Unit Networks (HUNs) at the HU level. APFAMGS helped farmers understand the concept of groundwater as a common property resource and were willing to manage it for the collective benefit reduce groundwater draft. As a result, farmers were willing to the replacement of high water demanding crops (such as bananas, rice and cotton) by other crops that need less water (such as peanuts and a locally bred variety of green lentils). This was achieved through strong focus and investment on capacity building and through the process of demystification of science, without compromising on the basic scientific principles of sustainable management.

79. APDMP will scale up the APFAMGS approach by taking into consideration key lessons learned in terms of i) Farmers' Producers Organizations organizing cost recovery for the agricultural information they provide, ii) embedding the water planning, monitoring and audit within the Gram Panchayat, iii) promoting a voluntary compliance with the GP by-laws for the efficient use of water, capacity building on water use efficiency through the farmer field schools and periodic audit of water utilization.

- **Soil and water conservation**. watershed development supported by a number of different agencies (including the Rural Development Department and NABARD) have shown how water availability can be increased through rainwater harvesting structures such as check

dams, nulla bunds and farm ponds - increase groundwater recharge resulting in more water available for irrigation. These programmes have resulted in a rise on groundwater level by 2 to 3 metres, reduced water scarcity, and increased cropping intensity. Results from a simulation model show how such investment can double groundwater recharge and expand the area irrigated by 2.5 times (Table 3 in Appendix 4).

- **Project management**. A dedicated team is needed to work at the village level to mobilise target households, ensure delivery of project outputs and follow up on the results of these outputs. Effective "last mile delivery" is the key to successful project implementation.
- **Extension services and capacity building** Farmer Field Schools are a cost-effective method of transferring skills and building farmer capacity. They need to be supported by an efficient system of recruiting and training FFS facilitators and monitoring outcomes. In the project districts Farmer Water Schools have been effective in disseminating sustainable approaches for management of groundwater. Likewise Community Livestock Facilitators ("Pashu Sakhi") - local women with specialised training and support, are the key to unlocking very significant improvements in the productivity of goats. This same approach can be applied to sheep.

Adherence to IFAD policies

80. IFAD's Strategic Framework (2016-2025) reiterates its mandate of improving rural food security and nutrition through remunerative, sustainable and resilient livelihoods and to enable rural poor overcome poverty. The Framework identifies five principles of engagement namely targeting, empowerment, gender equality, innovation, learning and scaling up and partnerships all relevant to the current project. The Project would empower farmers by (i) strengthening their organizations, capacities and skills through existing community platforms such as the SHGs, different forms of farmers producers organizations (FPOs), Farmers Interest Groups (FIGs), and groundwater management committees, (ii) enabling them to improve the management of groundwater for sustainable use, (iii) improve the adaptability and productivity of farming systems by increasing the resilience of crop and livestock production systems to drought and climate change; and (iv) strengthen market linkages and increase sales of crop and livestock products.

81. The project design also adheres to IFAD policies and strategies for targeting and gender mainstreaming, environment and natural resource management, climate change and social, environmental and climate assessment, engagement with indigenous peoples, and scaling up (see Appendix 12). The environmental and social category is considered to be B, while the climate risk classification is deemed to be High Risk.

82. APDMP is fully aligned to the RB-COSOP for India which has been extended to 2016. The project is particularly aligned to the first strategic objective of the RB COSOP of increased access to agricultural technologies and natural resources. The RB COSOP was found relevant and satisfactory by the Country Programme Evaluation undertaken in 2015.

III. Project implementation

A. Approach

83. Overarching principles: two broad principles will govern the management and co-ordination structure for APDMP:

a. Alignment to exiting government structure of DAC and ATMA.
b. Dynamic and flexible. The proposed arrangement is based on current assessment of project needs and may be modified based on the requirements that may arise during implementation.

84. Alignment to the existing structures: this will be manifested in the following ways:

a. The State Project Management Unit will be located in the Directorate of Agriculture
b. The Director (or Commissioner) of Agriculture will be the ex-officio Project Director of APDMP
c. At the district level the District PMUs will be located in the district level ATMA societies
d. The District Collector (DC) is the chairman of the district-level ATMA society.
e. The ATMA Society Project Director (a DoA staff member) would manage APDMP at the district level.
f. The Joint Collector (Development) would become the Vice-Chair of ATMA and of the Primary Sector Mission Committee. This Committee, with representatives of departments of Agriculture, Animal Husbandry, Horticulture and Water Resources/Groundwater, along with SERP, would coordinate implementation of APDMP and ensure convergence with other programmes.
g. Water planning and management would be the responsibility of Water Management Committees to be established as part of Gram Panchayats - the lowest tier of loan government. The committees will come together with district staff of the Ministry of Water Resources and the District Water Management Agency (under the Department for Rural Development) to draw up plans for water resource use at the sub-basin and basin levels.

85. Support agencies: implementation would be supported by two tiers of technical support agencies, a Lead Technical Agency (LTA) at the state level, and facilitating agencies at the district level. This support structure is the same as is now being used to support implementation of a number of government programmes, including watershed development, groundwater management, community seed villages, and millet promotion.

86. Given the successful FAO experience in promoting water demand management approaches and their vast experience in the key project technical domains, it is proposed that FAO supports the SPMU and LTA of the project with global bet practices and provide the following capacity building : (i) building the capacity of SPMU, LTA and FAs on water demand management, and governance; (ii) lead the development of the curriculum of FFS for water, crop and livestock production following an integrated drought resilient farming system approach, and train the master trainers; (iii) upgrade the training curriculum of livestock services providers in the provision of livestock services; (iv) in consultation with project stakeholders, develop the project M&E system incorporating the measurement of farmers' adaptive capacity to drought and the resilience of the farming systems promoted; (v) provide critical technical assistance for drought resilient farming systems and carrying out quality control of implementation of related activities; and (vi) technical support for priority studies needed for lesson learning and sustainability.

87. Period of implementation: Drought mitigation requires a long term approach and the project would be implemented over a seven-year period – although eight years are normal for IFAD projects in India. Given the large number of clusters, it would not be feasible to start work on all clusters in a single year, so the 330 clusters would be divided into two phases, each with a one year start-up period, four-years of intensive implementation, and between one and two years for phasing out of support during which community institutions take over the supporting role. In the first year of project implementation, in addition to preparatory work for the first batch of clusters, state and district PMU staff will need to be recruited and the various service providers selected and contracted.

	No. of clusters	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Batch 1	150	Prepare	------- intensive implementation -----				----phase out --	
Batch 2	180		Prepare	------- intensive implementation -----				-P-out

B. Organizational framework

Executing Agencies

88. At the central level the Department of Economic Affairs will be the nodal agency for the project. At the state level, the Department of Agriculture and Cooperation (DAC) of the Government of Andhra

Pradesh will be the nodal agency, with the implementing agency at the state level being the Directorate of Agriculture. The Agricultural Technology Management Agency (ATMA) will implement the project at the district level. ATMA is an autonomous, government owned, agency responsible for extension services. At the district level, each ATMA society is headed by the District Collector and has staff at the district and mandal (sub-district) level.

89. ATMA is an appropriate agency to manage implementation of APDMP at district level as it has a mandate for multi-sector support including livestock and horticulture as well as crops, to facilitate convergence of different programmes, and to work with farmer groups. Unlike the mainstream Directorate of Agriculture at the district level and below, ATMA is not fully occupied with the management of input subsidies, data collection and other administrative tasks. Current ATMA tasks largely relate to delivery of farmer training, and it has some spare capacity for additional work. To implement APDMP, the capacity of ATMA would be strengthened via project management units with additional staff at the district levels. Existing ATMA staff would be trained, as would those from DoA itself and from other line agencies responsible for livestock and groundwater. This capacity building, together with the experience gained in the implementation of APDMP, will aim to enable ATMA to provide technical support for integrated and multi-sector farming systems, and to implement programmes supporting such development.

Management Structure

90. Details of project management and implementation arrangements, including an organogram, are in Appendix 5.

91. The State Project Management Unit (SPMU) will be housed within the Directorate of Agriculture (DoA). It will be headed by the Director (or Commissioner) of Agriculture who will be *ex officio* Project Director of APDMP, with day-to-day management of the SPMU in the hands of an Additional Project Director or COO (staff for this post being seconded from the State Service or recruited from the market). The SPMU will include four sector specialists. These positions being filled by staff seconded from the relevant departments of the state government or recruited on the open market and employed on a contract basis. The SPMU would also have a Planning and Monitoring Manager, two Monitoring Officers, two IT specialists, along administrative, financial and support staff - some seconded from the government, but most recruited on a contract basis

92. District Project Management Unit (DPMU) in each of the five districts would be headed by the ATMA society Project Director. The district PMU would be managed on a full time basis by an ATMA Deputy Project Director, assisted by two ATMA Assistant Project Directors. Administrative, MIS accounts and support staff would be hired on a contract basis. To ensure convergence with MGNREGS, which has an important role in the funding and construction of rainwater harvesting works, farm ponds and rangeland development, the DPMU will station one of its staff in the District Water Management Agency (DWMA) office responsible for the planning of MGNREGS. DWMA have a huge work load in planning MGNREGS (the 2016-17 budget for the five districts is USD 290 million for 62.7 million person-days of work). Having someone from the DPMU in the DWMA office will ensure that works for APDMP are incorporated into the MGNREGS worksheet for the district.

93. Support Agencies: the SPMU would contract an experienced organisation to be the Lead Technical Agency (LTA) at the state level. The LTA would be staffed by thematic specialists and support the PMU in terms of advice on project strategies and approaches, capacity building, annual planning and review, process and impact monitoring, documentation and IT services.

94. The SPMU would contract experienced agencies to implement the project at the field level. These agencies will carry out the following tasks: (i) plan and implement project activities in the clusters selected in one district (about 50 to 100 GP clusters), including arranging for inputs, works and personnel; (ii) facilitate community water planning and monitoring; (iii) operate CLICs at the initial stage; (iv) form/ support FIG, FPO, GP, WMC & other organisations; (v) organize and provide training including to farmers, community organizations and government staff; (vi) provide oversight on

financial expenditure at FPO level; (vii) monitor outcomes and support IT networks and (viii) support innovation (such as organising field trials).

95. Given the existence of a number of specialized agencies and multitude of grassroots type NGOs, it is expected that NGOs will apply to work as Facilitating Agencies on a consortium basis, with a specialised agency in the lead as the District Facilitating (or Resource) Agency (DFA) working in a partnership consortium with a number of smaller Facilitating Agencies (FA) that have good contacts and experience at the local level. Each of these FA, depending on their capacity, would support activities in around 10 GP clusters. Given that a significant proportion of priority clusters are likely to be in Anantapur district, this district may be divided between two DFA. If there were six DFA, each DFA would be in a consortium with around 5 to 6 FA (although some clusters could be directly implemented by the DFA). Such an arrangement will avoid the need to procure and manage contracts with a large number of organisations.

96. It is also recommended to hire FAO to provide specialized support to the SPMU and LTA. FAO would be hired by the SPMU for the duration of the project and the technical support provided would be funded form the loan resources. FAO indicated that they would be able to mobilize a Technical Cooperation Programme (TCP) to partially cover their TA costs. Such a collaboration is proposed to State Government to capitalize FAO experience in promoting water demand management approaches and their vast experience in the key project technical domains. It is proposed that FAO supports the SPMU and LTA of the project with the following capacity building: (i) building the capacity of SPMU, LTA, FA on water demand management, budgeting, and governance; (ii) lead the development of the curriculum of FFS for water, crop and livestock production following an integrated drought resilient farming system approach, and train the master trainers; (iii) upgrade the training of livestock services providers in the provision of livestock services; (iv) in consultation with project stakeholders, develop the project M&E system incorporating the measurement of farmers' adaptive capacity to drought and the resilience of the farming systems promoted; (v) provide critical technical assistance for drought resilient farming systems and carrying out quality control of implementation of related activities; and (vi) technical backstopping to SPMU and LTA for priority studies needed to shape policy and project sustainability.

97. Other implementation partners. In addition APDMP will work closely with a number of GoAP departments and agencies. Apart from the technical line departments responsible for agriculture, horticulture, livestock and groundwater, the project will also work with the Rural Development Department and its agencies responsible for MGNREGS, SHGs (SERP) and watershed development. At a local level the Gram Pachayat will be the key partner for groundwater management. The project may sign MoUs for cooperation with a number of central and state government research agencies like NGRI and with international agencies such as ICRISAT. APSAC could be contracted to provide the GIS layers to be displayed in the CLICs, complementing public data with locally-collected data and with remote sensing based data, images and maps. An assessment of potential APDMP stakeholders and partners is in Appendix 5.

Coordination

98. Coordination at the highest level will be provided by a Project Steering Committee (PSC) chaired by the Chief Secretary or his nominee, with members being the Agricultural Production Commissioner, Principal Secretaries / Secretaries of Agriculture and Cooperation, Livestock and Fisheries, Water Resources and Rural Development. The PSC will meet twice-yearly to review the progress of APDMP and ensure that its activities are coordinated with other development efforts in the state. The PSC will also review and approve Annual Workplans and Budgets before incorporation into state plans and submission to IFAD for its approval.

99. To ensure that APDMP is coordinated at a high level with other major programme supported by external agencies, the same PSC may also oversee these other programmes, with PSC meetings involving all of these projects. These projects are: (i) a second phase or follow-up the AP Community-Based Tank Management Project - World Bank; (ii) on-farm irrigation and agricultural

development (JICA); Promotion of Farmer Producer Organisations (ICRISAT); and (iii) AP Rural Inclusive Growth Project - World Bank. In addition GIZ is supporting climate change adaptation. The State Government expressed its interest in a unified monitoring framework for all the externally aided projects that address drought resilient agriculture.

100. At the district level coordination and convergence will be ensured by the Joint Collector (Development) chair a Primary Sector Mission Committee with representatives of departments of Agriculture, Animal Husbandry, Horticulture and Water Resources/Groundwater, along with SERP, to coordinate implementation of APDMP and ensure convergence with other programmes. If there are any issues in the formation or operation of this committee, then the existing ATMA Governance Committee, chaired by the District Collector, could also undertake this role.

101. At the village level, APDMP activities will be coordinated through close links with Gram Panchayats - which themselves have responsibilities for local organisation of MGNREGS, which provides a major source of funds for soil and water conservation and for regeneration of common property rangelands. In locations where water management planning at hydrological unit level is feasible, GP water management committees from this basin will work with district staff of the Department of Water Resources (DoWR) and the District Water Management Agency (DWMA).

C. Planning, M&E, learning and knowledge management

Planning

102. A draft Annual Work Plan and Budget (AWPB) will be consolidated by the SPMU with inputs from the DPMUs and other entities such as Lead Technical Agency (LTA) and District Facilitating Agencies (DFA). Each DPMU will consolidate the proposals that will come from project GPs or FPOs. The draft AWPB would then be approved by the Project Steering Committee in February, before being sent to IFAD along with the annual procurement plan for its approval. The approved AWPB would be used as a key document when reviewing performance and progress during the supervision missions.

Monitoring and evaluation

103. The Monitoring and Evaluation (M&E) system will collect data and information to measure performance and progress towards objectives, and be a learning tool to provide information for critical reflection on project strategies and operations. It would support decision-making at various levels and be a basis for results-based management. More details on M&E are in Appendix 6.

104. M&E would be guided by an M&E framework as set out in the Project Implementation Manual. A process M&E unit would be established in the LTA to support outcome monitoring by the DFAs (supporting the DPMUs). But prime responsibility for overall M&E and reporting would lie with the Additional Project Director and the Planning and Monitoring Manager in the SPMU. The LTA M&E unit will assist the project in outcome and impact monitoring, as well as production of consolidated reports on project progress and results.

(a) Outline of a project M&E framework

105. The M&E framework is a system to collect, analyse and report on data at three different levels of project implementation: (i) outputs; (ii) outcomes; and (iii) impact.

106. Output monitoring will measure the progress of activities and achievement of outputs against annual targets in the annual work plan and budget (AWPB) for each project component. Information on the progress of the annual work plan will be measured against indicators in the plan, such as number of farm ponds completed, numbers of people trained, and area covered by groundwater sharing. This can be linked to the financial expenditure on the concerned activities, and data may be stored and reported via a computerised MIS. Data would be collected by DPMUs from DFAs, FPOs, GP-WMCs, CLICs and other field implementation agencies, including information from the registers and accounts kept by community organisations. Wherever necessary, data will be collected disaggregated by gender and caste, particularly those related to training and access to services.

107. Outcome monitoring measures the immediate changes coming about as a result of project interventions. In APDMP this would include:

- Number of farmers adoption of improved practices - such as composting and green manure, vaccination of sheep, and integrated pest management.
- Number of farmers (and crop area) with access to protective irrigation and use of this irrigation in a drought year.
- Number of farmers making drought-resilient crop choices - including intercropping and mixed cropping.
- Number of farmers reporting increases in yield or area of key crops, or production of sheep
- Performance of FPOs in terms of active membership, services provided, governance practices and financial sustainability.

108. This information is not so easy for implementation staff to collect from every household, so M&E staff in the LTA (hiring enumerators if needed) unit would conduct Annual Outcome Surveys (AOS), interviewing a sample of 400 to 800 farmers/households to gather data on indicators such as those listed above. An AOS may also be carried out on a thematic basis in order to focus on a specific area of project intervention, such as groundwater sharing.

109. Related to outcome monitoring is process monitoring, which involves monitoring the processes leading to outputs and outcomes. Specific areas where progress monitoring will be useful in APDMP include: provision of animal health services by Pashu Sakhi, the use made of CLICs and the functioning of FPOs. Information on these may be gathered using Participatory M&E tools, as well as from the records of community organisations and service providers. Information on the effectiveness of training will be assessed via KAP (Knowledge, Attitude and Practice) surveys.

110. Impact evaluation is the process which will assess the contribution of APDMP in achieving the overall goal of the project. It will consist of baseline and end-of-project surveys. This survey will be contracted to an external agency, with specific expertise in such assessments. Information to be collected will include the impact level indicators of IFAD's Results and Impact Monitoring System (RIMS). These include mandatory 'anchor indicators' relating to household assets, food security and child malnutrition (anthropometric data of children under five years of age). ToR for this survey will be in the draft Project implementation Manual (PIM).

(b) RIMS indicators

111. The Results and Impact Monitoring System of IFAD generates annual report tables on a number of first and second level results indicators that correspond to the output and outcome indicators. IFAD has produced a standard list of these indicators, but only some of these will apply to an individual project. Prior to mid-term review, the project will report on only the first level results, but after the mid-term report it reports on second level indicators. The third level RIMS results are the anchor indicators used for impact assessment (see impact evaluation paragraph above).

(c) Management Information System (MIS).

112. Project will establish an MIS system in the first year of project implementation. The MIS would generate, monthly, quarterly and annual progress reports on physical and financial progress and on project outputs and outcomes - and may have a GIS interface so that key data can be shown on maps. APDMP can draw lessons from the high level of IT application in the government agencies in AP, as well as lessons from other IFAD projects in India such as Integrated Livelihoods Support Project in Uttarakhand.

113. IT professionals in the SPMU and LTA would be responsible for setting up the project MIS - the project has provision for actual software development/adaptation and support to be contracted to a specialised company, along with software support. Project IT/MIS in the DPMUs and FAs will be responsible for the operation of the MIS. Much data will be actually entered by other people (such as DPMU Assistant Project Directors, CLIC facilitators, Pashu Sakhi, FFS facilitators, GP water management committees, weather and water data collection assistants) via office computers, tablet

computers and other devices. A major part of the job for MIS/IT staff will be helping these people enter accurate and complete data, and checking on data quality.

(d) Learning and knowledge management

114. Learning and knowledge management are a key element of the project. The project will prepare a Knowledge Management Strategy building on IFAD's Knowledge Management Strategy in the first year of project implementation - this will be the responsibility of the Knowledge Management and Communications Advisor in the LTA. In line with IFAD's policy, learning and knowledge management would be key element in APDMP with integrated approach in which M&E will lead to generating learning for the project and from the project. While the KM functions in the project would be cross-cutting and would be the responsibility of every sector head or manager, the Knowledge Management and Communications Advisor will ensure that information generated by the project is disseminated through Directorate of Agriculture, Department of Agriculture and Cooperation, and IFAD websites, newsletters, thematic reports and at learning events.

D. Financial management, procurement and governance

Financial Management Capacity of the Directorate of Agriculture (DoA)

115. The introduction of Single Treasury System (STS) by Finance Department few years ago has brought major enhancements in the management and control of DoA financial transactions. Internal control systems are very effective, with stringent segregation of duties; all disbursements must be authorized by the Director of Agriculture, the highest operative authority of DoA. For disbursements greater than INR 10 million (approx. USD 160,000) it is necessary get the second signature of Finance Department; however such a rule is not applicable to external funded projects. At district level, all disbursements need the authorization of the District Collector who is also Chairperson of ATMA Society, before release via STS.

116. DoA currently is not the lead implementing agency for any externally funded projects, and the reporting of schemes implemented is transactional, based on the download of transactions from the STS and PD Accounts websites. IFAD reporting requirements need a more detailed set of reports.

117. DoA has its internal audit function and is subject to a financial transactional audit performed by the AG-AP on a yearly basis. In AP, AG is entrusted for the audit of DoA and all its implemented schemes.

118. ATMA societies function in each of the districts. ATMA has been established under the guidelines of Ministry of Agriculture and Farmers Welfare, Government of India for strengthening agricultural extension activities. The funding for ATMA is borne by Government of India and Government of Andhra Pradesh. At present the budgetary allocation and activities are limited and the capacity of finance staff to handle fund management for higher level reporting is low. Government of AP has indicated its preference to implement the APDMP through ATMA in each of the programme districts. APDMP being a more diversified project design, requires significant strengthening of capacities on programme management, fund management, service provider coordination and support to grassroots institutions.

119. As a result of the above mentioned shortcomings, the inherent fiduciary risk associated with the public financial management system at State and DoA level is considered high as summarized in the table below.

Summary of FM risks and mitigating actions

Summary of Project Fiduciary Risk Assessment at Design			
	Initial Risk Assessment	**Proposed Mitigation**	**Final Risk Assessment**
Inherent Risk			
1. TI Index	**M**	**-**	**M**

Summary of Project Fiduciary Risk Assessment at Design			
	Initial Risk Assessment	**Proposed Mitigation**	**Final Risk Assessment**
	Index: **38** in 2015 (**ranking 76** out of 175 surveyed countries)		
2. RSP Score	**M** Score: **4.00** (2015)[13]	-	**M**
Control Risks			
1. Organization and Staffing	**H**	• The PMU currently does not exist, to ensure deputation of adequate Gov Staff supplemented by contracted staff • Ensure the recruitment process of contracted staff provides the project with qualified and experienced human resources • Comprehensive, user-friendly PIM	**M**
2. Budgeting	**H**	• Ensure inclusion of an adequate ATMA-PMU budget in DAC budget submission • Ensure adequate coding of project's activities at DF to ensure correct accounting and reporting	**H**
3. Funds flow and Disbursement Arrangements	**H**	• If budgeting issues are resolved, funds flow should be sufficiently efficient	**H**
4. Internal Controls	**M**	• Application of Gov. rules ensures adequate internal control mechanism, sometimes to detriment of efficiency	**M**
5. Accounting Systems, Policies & Procedures	**H**	• use of Gov. procedures does not ensure conformity to IFAD standards • The hiring of a Finance Officer in the market to serve the project should mitigate reporting risks	**M**
6. Reporting and monitoring	**H**	• PIM to detail reporting and monitoring requirements and rules • To ensure finance staff contracted in the market has the means to fulfil IFAD reporting requirements	**H**
7. Internal Audit	**H**	• FO vested with an internal audit role • Project management to act on internal audit findings and recommendations	**M**
8. External Audit	**M**	• Continuous dialogue with AG to ensure submission of acceptable reports, timely submission of annual audits and informative management letters	**M**
Project Fiduciary Risk @ Design	**H**		**H**

120. The proposed financial management arrangements for the project incorporate a number of measures intended to reduce such risks to acceptable levels and ensure that (i) the project funds and assets created are used for intended purposes in an efficient and effective way, and (ii) reliable and timely financial reports are prepared and submitted to the Government and IFAD. The summary of FM risks and mitigating actions are included in Appendix 7. Despite mitigation, the overall project fiduciary risk remains **High** at the design stage.

Financial Management and disbursement arrangements

121. **Finance unit organization of at state and district level.** A dedicated SPMU will be established within DoA to implement APDMP. In order to ensure an effective and efficient FM function for APDMP it shall be necessary to reinforce SPMU structure with a number of fiduciary staff.

122. An Accounting Officer and Accounting Assistant shall be deputed by GoAP administration and shall be in charge for the management of all disbursements via STS and PD Account. Both staff shall report to the Project Director.

[13] http://www.ifad.org/operations/pbas/

123. A Finance Officer (FO) and a Finance Support Officer (FSO) shall be contracted from the market and play a pivotal role for the project's administration. Their TORs will make clear reference to the fact that the FO, supported by the Accounts Officer, shall be responsible for the preparation of consolidated Interim Financial Report (IFRs), preparation of project's financial statements, review of financial reports and audits of NGOs, and will be in charge for a number of internal control and administrative organizational activities. They shall report to the Project Director.

124. At district level, in the ATMA district offices, an Accounting Officer shall be hired from the market to manage financial resources received from the SPMU and prepare the related financial reports. S/he will be supported by an Accounts Assistant seconded from DAC or other Government departments.

125. **Budgeting.** The SPMU located in DoA, after consultation with District ATMA and relevant community organizations and stakeholders, shall prepare its annual budget linking all the planned activities at state and district levels to the cost categories outlined in the schedule II of the Financing Agreement. The finalized budget shall be embedded in the overall budget document of DoA. The overall DoA budget document transmitted to Finance Department (FD) shall request the determination/creation of separate budget codes (with proper classification i.e. separate detailed head for each category at state and district levels) to receive fund allocation for the year from the State Treasury. The estimated budget will include different sources of funding like NABARD RIDF, IFAD financing, Government Counterpart funding and other sources like convergence funds, and community contribution.

126. **Internal Controls**. Procedures and record maintenance at all levels will be based on GoAP procedures as well as other specific project's procedures properly documented in the PIM. The PIM shall include specific provisions outlining: internal controls settings, IFRs preparation procedure, financial reporting arrangements between the districts and the central PMU, NGO contract management, and financial reporting and audit requirements for NGOs.

127. **Financial Powers at District ATMA Societies.** GOAP will issue a Government Order delegating appropriate and adequate financial powers to Joint Collector (Development) or PD, ATMA for APDMP expenditure. This is required to facilitate reduction of approvals and resultant delays at the level of Chairperson, ATMA.

128. **Disbursement arrangements and Flow of Funds.** IFAD financing to the Programme will be routed through a Designated Account denominated in United States Dollars maintained at the Reserve Bank of India. Controller of Aid, Accounts and Audit, DEA, Ministry of Finance will administer the Designated Account. IFAD will establish an Authorised Allocation for initial advance. It is recommended that the Authorised Allocation may be established at USD 5 Million. However, the quantum is subject to the agreement of both GoI and GoAP at Loan Negotiations, as this will count for the payment of interest and service charge. Given the extensive use of the AP STS at state level, it will be necessary to open project accounts only at district level for the use of ATMA district offices. These accounts will be called district accounts for the purpose of the APDMP. Disbursements from the state to the districts shall be done using Government system and their authorization's procedures. Funds shall leave the Government system while credited in the ATMA district accounts. District accounts shall be opened in a bank mutually acceptable to IFAD and the State Government. All transactions at district level shall be done using these bank accounts. Disbursements to the LTA NGO and to all other facilitating agencies shall be managed by the SPMU, while disbursements to be performed by the district offices shall be outlined in detail in the PIM.

129. APDMP shall submit withdrawal applications every quarter based on the actual expenditures incurred at state and district levels. These expenditures shall be reported in quarterly consolidated Interim Financial Reports (IFR), subject to audit certification at the end of each financial year. Expenditure categories eligible for financing under the Financing Agreement and as per the disbursement percentage will be financed out of the proceeds of the IFAD loan. IFRs will be submitted to IFAD through the office of CAA&A within 30 days after the end of each quarter. The format and

threshold limits for full documentation will be included in the Programme Implementation Manual and the separate Finance Manual of the Project.

130. IFAD resources for the project could be disbursed in different methods and the details will be made available in the Letter to the Borrower during Loan Negotiations.

131. Government of Andhra Pradesh will pre-finance the resources required for implementation of APDMP including its counterpart funding share, projected IFAD financing requirements and RIDF financing as per the approved Annual Work Plan and Budget from its budgetary sources and the advances received from IFAD Initial Deposit and RIDF.

132. **Retroactive financing**. The Government of Andhra Pradesh in order to take up pre-implementation activities immediately, requested for retro-active financing of a total amount not exceeding USD 1,000,000 for financing the preparatory activities like baseline survey, preparation of PIM, manuals and guidelines land surveys related to Component 1, engagement costs for procurement of implementing agencies and some staff costs between September 2016 and March 2017 (probable date of entry into force). The retroactive financing could be claimed from the loan financing, when the project complies with the conditions of disbursement specified in the Financing Agreement after entry into force. The retroactive financing will not be additional financing and it is within the limits of IFAD financing. The retroactive financing to APDMP will be an exception to the provisions of IFAD General Conditions on Agricultural Development Financing.

133. **Accounting software:** As the resources required for implementation of APDMP will be administered through single treasury system and bank transactions, PMU will adopt an accounting software (like Tally or similar software) and customise it to record and generate financial reports and preserve financial data. The customisation should comply to the chart of accounts, disbursement rules and share of financiers and should be able to generate Interim Financial Statements required.

134. Due consideration shall be given to the fact that expenditures at district level are financed and executed by ATMA outside Government system (funds deposited in commercial banks and accounted for through a dedicated accounting software, possibly Tally). Such IFRs shall be valid also for submission to IFAD as WAs. The FO of the SPMU shall use a dedicated accounting software to consolidate project's expenditures and prepare IFRs.

135. **Internal Audit.** The internal audit office of DoA shall be in charge for the internal audit of APDMP. The FSO will complement the DoA internal audit office activities by performing internal control reviews at central and district level on a six monthly basis, he/she shall propose improvements in the processes and provide recommendations. Implementation of such recommendations shall be monitored during the SPMU and DPMU monthly review meetings.

136. **External Financial Audit.** The Auditor General Office of Andhra Pradesh (AG-AP) shall perform the yearly financial audit of APDMP in accordance with its statutory TORs and in accordance with National Audit Standards. The AG-AP shall perform a "certification audit" for externally funded projects; this includes some specific activities as the audit of the project's financial statements, the audit of the IFRs submitted to IFAD during the year, the audit of the APDMP Treasury transactions, use of the APDMP PD Account, use of the project commercial bank accounts and all related supporting documentation.

137. For APDMP, the AG-AP shall also issue a management letter outlining any internal control weaknesses and recommending remedies; more particularly, the auditor shall ascertain that the information included in the annual financial statements are correct, reliable, and present a true and fair description of the project financial position. The management letter will provide an update on the status of implementation of audit recommendations issued in previous years. The audited financial statements and audit report containing the three different opinions shall be submitted to IFAD within six months after the end of each financial year and by the project closing date.

138. Prior to Loan Negotiations, DEA, Ministry of Finance and GoAP will request the office of C&AG for the annual audit of APDMP complying with the submission of audit report within 6 months of the end of financial year.

139. Contracts with all NGOs shall need to include provisions for the submission of the project audits to the SPMU within four months after the end of each financial year and by the project's completion date. SPMU shall transmit copies of such reports to IFAD together with its own audit.

140. **Taxes.** The proceeds of the IFAD financing may not be used to pay taxes which will be part of the contribution of GoI and GoAP to the project. Social security benefits (employee's portion) and income tax (employee deductions) are eligible for IFAD financing.

141. Financing Terms: IFAD financing to APDMP will be USD 75.5 million on Blend terms and subject to interest on the principal amount outstanding at a fixed rate of 1.25% per annum, a service charge of 0.75% and shall have a maturity period of 25 years, including a grace period of five years. Government of India has agreed for the Single Currency Lending for APDMP and the loan assistance will be denominated in United States Dollars. The amortization schedule for repayment will be provided during the Loan Negotiations. IFAD assistance to the Programme will be on back-to-back terms decided by the Government of India. While the responsibility of repayment of principal, interest and service charge rests with the Government of Andhra Pradesh, Government of India only effects the payment in foreign exchange and adjusts with the State as per national procedure

142. More details on financial management are available in Appendix 7.

Procurement arrangements

143. Procurement of goods, works and services under APDMP financed from resources provided or administered by IFAD will be undertaken in accordance with IFAD's Procurement Guidelines and Handbook (dated September 2010) and as amended from time to time as an exception to the provisions of the General Conditions of Agricultural Development Financing.

144. Directorate of Agriculture do not have recent experience of being the lead implementation agency for any external aided programme and will require building their staff capacity to implement the multi-disciplinary approach of APMDP. The APDMP is proposed to be implemented by setting up a dedicated Project Management Unit at the state and district levels. This implementation structure is yet to be created. The project strategy is to involve engagement of multiple Facilitation Agencies, creating community level organizations which will implement some of the activities at the ground level and a Lead Technical Agency to support the SPMU. Considering the complexity of multiple service providers, the procurement risk assessment of the existing Directorate of Agriculture is **High**.

145. It is proposed to establish the following risk mitigation measures to address the High Risk assessment:

(a) Engaging one full time Procurement Officer with the experience and skill sets of procurement and compliance to established procurement norms. As and when required, an individual Procurement Specialist should be engaged to support the Procurement Officer. As the Procurement Officer will be engaged from the market, it should be ensured that some of the Government staff should also be involved as second line arrangement to address the issues of attrition and continuity of capacity;

(b) Appropriate and regular procurement training of selected procurement staff in "IFAD Procurement Guidelines" to enable efficient and effective project procurement actions; IFAD will be providing this support at start-up as well as on-the-job training during supervision and implementation support missions during the first 2 years of project implementation;

(c) A Project Procurement Manual with adequate controls and safeguards would be prepared by the project, consistent with IFAD Procurement Guidelines and Procurement Handbook would be prepared by the Project. The manual shall include the adequate provision risk mitigation

measures/safeguards; procurement planning; the processes and procedures; contract management and its controls and records retention and the manual shall be subject to IFAD review and approval. The manual could be a stand-alone document or as a subset of the Project Implementation Manual.

(d) Procurement plan for the initial 18 months of project implementation listing out all procurement activities to be taken up by the project consolidated at the State level to be prepared and submitted along with the first AWPB. For the subsequent years of implementation, procurement plans covering a 12 month period will be sufficient. The procurement plan will be updated at least semi-annually or as required to reflect the actual project implementation needs. All procurement plans and its revisions will have to be no objected by IFAD. Any procurement undertaken which is not as per the approved plan will not be eligible for IFAD financing.

(e) IFAD will agree with DAC on prior review method combining value and types of procurement (critical procurement), which gives a better understanding on how procurement is being undertaken and to guide the procurement possibly in the early stages. The prior review threshold is indicated below.

146. After putting in place the above risk mitigation measures fully and effectively, the residual risk assessment is **Medium**.

147. The PMU Cell in the Directorate of Agriculture, while developing the Procurement Manual (separately) or part of the PIM will refer to the Government of India Task Force concurred Manuals and the Bidding documents and contract templates of other multilateral donors. IFAD do not prescribe any standard bidding document and would concur with the use of available templates adapted to project requirements, so long as they are consistent with IFAD Procurement Guidelines.

148. Procurement of goods under the rate contract of DGS&D will be considered as Local Shopping and these are to be undertaken within the Local Shopping thresholds prescribed by IFAD in its Letter to the Borrower. It is to be understood that procurement under DGS&D process will not be considered as National Competitive Bidding.

Procurement Plan

149. As provided in appendix I, paragraph 1 of IFAD's Procurement Guidelines, IFAD review of and no objection to the consolidated procurement plan is compulsory and the 18 month procurement plan and subsequent annual procurement plans submitted by the PMU, APDMP must include as a minimum:

i) A brief description of each procurement activity to be undertaken during the period and name of the implementing agency responsible for the procurement.;
ii) The estimate value of each procurement activity;
iii) The method of procurement to be adopted for each procurement activity and;
iv) The method of review IFAD will undertake for each procurement activity indicating either post review or prior review.

150. Any changes and amendments to the procurement plan shall be subject to IFAD's No Objection.

151. Due to the nature of IFAD financed projects, there is a high degree of involvement of communities in the procurement activities. Communities would be empowered to undertake procurement as a service provider or an implementing unit through GP water sub-committees or FPOs under a legal framework (Grant Agreement) for procurement below a threshold indicated in IFAD's Letter to the Borrower.

152. Considering the procurement capacity assessment, IFAD prior review threshold for review of documents leading to award of contract will be established at USD 100,000 equivalent and above for procurement of goods and works and at USD 50,000 equivalent and above for procurement of consultancy services. Prior review will be required for all single source selection. Suggested thresholds and procurement methods are indicated in Appendix 8. IFAD is also piloting a web-based

No Objection Tracking System in selected projects. When it is introduced across the projects, this system will also be applicable to APDMP.

153. The Directorate of Agriculture has expressed the need to engage WASSAN, a Non-Governmental Organization, who is supporting the Government of Andhra Pradesh in some of its projects/schemes, on Sole Source Selection basis as the Lead Technical Agency for APDMP. At the wrap-up meeting of the final design mission, the State submitted a Government Order appointing WASSAN as LTA. The mission reviewed the technical and financial proposal of the LTA and incorporated its provisions in the design and costing of the present project.

Good governance framework

154. All procurement for goods, works and services financed from resources funded or administered by IFAD require bidding documents and the contracts to include a provision requiring suppliers, contractors and consultants ensure compliance with IFAD zero tolerance to anticorruption policy and to permit IFAD to inspect their accounts, records and other documents relating to the bid submission and contract performance, and to have them audited by IFAD-appointed auditors.

155. As part of the robust e-governance policy and framework of Government of Andhra Pradesh, SPMU of APMDP will disclose the following minimum documents either in its Project Website or Directorate of Agriculture Website: (i) Procurement plan and its revisions, (ii) Procurement manual, (iii) invitation for bids for goods and works for all NCB contracts, (iv) request for expression of interest for selection/hiring of consulting services, (v) contract awards of goods, works and all consultancy services, (vi) list of contracts following Direct Contracting or Single Source Selection (SSS), (vii) short list of consultants, (viii) contract award of all consultancy services, and (ix) action taken report on the complaints received. In addition, the PMU Cell will also publish any information required under the provisions of suo-motu disclosure as specified by the Right to Information Act and the decisions of the State Information Commissioners applicable to project implementation.

156. Procurement related supervision for post review procurement actions will be done along with the annual Supervision Mission or Implementation Support/Follow up Missions fielded by IFAD.

157. More details on procurement processes are in Appendix 8.

E. Supervision

158. The project would be directly supervised by IFAD. During the start-up phase of the project, IFAD will attend in the state-level start-up workshop and participate in discussions on the project approach and strategy. This is likely to involve the leader of the project design missions and a financial management specialist. The latter specialist will also provide implementation support to train project financial staff. Other implementation support in the first year of the project may include assistance with setting up the M&E system and drawing up training plans for the various components of the project. It is envisaged that the first supervision mission will take place towards the end of the first year of operations. It will include specialists in water conservation, agronomy, livestock and financial management. Once project implementation gets underway missions may include farmer institution and marketing specialists.

159. In addition to a Mid-Term Review in project year 3 or 4, IFAD and the Government of Andhra Pradesh agreed to carry out First Main Review (FMR) of project implementation no later than 24 months from entry into force of the financing agreement. The FMR will review project progress and relevance of the implementation processes. In addition, the FMR will review and, where needed, revise project budgets and allocation of funds. In particular the amount that was allocated for RIDF funding of the project (around USD 16.5 million) far exceeds the USD 6.2 million that the cost calculations in this report. This is because GoAP and NABARD agreed, prior to the final design mission, that RIDF would fund "visible infrastructure" (i.e. items that are eligible for RIDF funding) in 60 clusters, leaving the other 270 clusters to be funded by IFAD, GoAP and convergence. It was agreed at the final design mission wrap-up meeting that the same unit costs and quantum of works

would apply to all clusters. As IFAD funds were needed to finance the major part of other items (training, management, facilitation etc.) in all 330 clusters, IFAD funds for visible infrastructure in 270 clusters were limited, resulting in less of this work being done than had been envisaged. This reduced the per cluster amounts that RIDF could finance.

160. Given this situation, GoAP and NABARD may wish to increase the number of clusters where RIDF funding can be utilised. A revision of the RIDF allocation could allow RIDF to fund visible assets in 160 clusters with a contribution of USD 16.48 million. This is assuming the same quantum of funding per cluster as is currently assumed (USD 103,000/cluster for visible assets). IFAD funds of around USD 75.5 million could then be used for visible assets in the 210 clusters where there would be no RIDF funding, and all other costs (training, facilitation management etc. - USD 145,000 per cluster) across a total of 370 clusters. This would expand overall coverage from 165,000 to 185,000 households, and reduce the cost per household. Alternatively there could be some upward revision in the per cluster expenditure on visible assets, although the design mission considered that, for most items, current levels of expenditure were adequate and in line with the expected outcomes (spending more would not generate significantly higher.

Table 1: Potential reallocation of RIDF and IFAD funds

	US$'000	Clusters	
RIDF	16,480	160	visible assets
IFAD	21,630	210	visible assets
IFAD	53,493	370	all other work
total IFAD	75,123		
Total RIDF	16,480	= INR 115.36 crore	

161. The full scope of the FMR is described in appendix 6.

F. Risk identification and mitigation

162. There are a number of risks associated with the project. Key risks are identified in the logframe and summarised in the table below.

Table 2: Risks and Risk Mitigation

Risk (R) / Assumption (A)	Risk before mitigation	Risk reduction Approach	Residual Risks
Goal level:			
Continued economic stability ensures an expanding market with reasonable prices for farm products (A);	Low	If needed, re-focus on basic food crops which will always be in demand even in an adverse economic climate	Very low
Effective coverage of Gvt social safety net programmes (PDS)	Low		
Development Objective level:			
Climate change and increasing labour cost means rainfed areas of southern AP can no longer compete with more favoured part of India(R).	High	Project interventions aim to increase productivity and resilience of rainfed agriculture to climate change. If, despite this, rainfed agriculture still finds it difficult to compete, then activities can be re-focused on more resilient livestock and towards limited areas of irrigated horticulture.	Medium
Climate resilient production systems: component level risks:			
PoP are well documented and their inputs and labour requirements are affordable	Medium	Adaptive research to test alternative technologies to fill any gaps in current technologies.	Medium to low
Control of wild animal damage by the community (A)	Medium (in some places)	Support for barriers (fences etc), community guarding and advocacy for policy change	Low
Migration of sheep flocks reduces as grazing improves, allowing provision of supporting services(A)	Medium	GPS tracking of migrating herds and demonstration of mobile night shelters will deliver some services to migrating flocks .	Low
FPOs continue to be a major part of policy for the agricultural sector (A)	Low	Business plans for FPOs create a pathway to sustainability regardless of policy change.	Low low
Drought proofing via NRM and governance component level risks:			
Economic and other pressures mean communities fail to reach agreement on, and	Medium	Build strong community ownership for local groundwater demand management, reinforced by legal sanctions .	Low

Risk (R) / Assumption (A)	Risk before mitigation	Risk reduction Approach	Residual Risks
enforce, sustainable water resource management (R)			
Effective convergence with MGNREGS and other state programmes for soil and water conservation and rangeland development (A)	Very low	Risk is more that convergence funding will displace project funding - so need timely flow of project funds and efficient convergence	Very low
Management and lesson learning component level risks			
Champions for drought and climate change mitigation identified and lobby to replication of APDMP approaches (A)	low	Effective engagement with stakeholders by the project management	low
Project able to engage experts who can prepare high calibre documents and events (A)	low	Engage experts via institutions, or via LTA or international TA agencies. Utilise IFAD' learning network	very low

163. An important risk at the development objective level is that climate change and increasing labour cost means that farming in the rainfed areas of southern AP can no longer compete with more favoured parts of India. This relates to the high climate change risk rating for the project. Climate change forecasts are that rainfall in this already dry area is likely to be further reduced and become even more erratic. With much of the rest of India forecast to receive a little more monsoon rainfall, there is a real risk that rainfed farming in the project districts will become uneconomic in the face of growing opportunities in the non-farm sector (as well as better farming conditions in other parts of India). Although there is not much evidence to date of crop land being abandoned, this is reported to be happening in the dry zone of the neighbouring state of Tamil Nadu. APDMP will address this risk by taking a number of measures to make rainfed cropping more resilient and productive - and so maintain its viability in the face of climate change. If, despite this, rainfed farming becomes unprofitable in the most difficult locations, the project can re-focus its efforts on livestock (small ruminants are the most resilient of all farm activities), while limited areas of high value horticulture will continue to be irrigated and have considerable potential to become more productive and profitable.

164. Another significant risk is that the package of practices for rainfed agriculture are either not well documented or not within the labour or financial resources of farmers. In particular soils badly need organic matter to improve their water holding capacity and structure. The project aims to increase the supply of organic through green manures grown in fields and along field bunds. There is a risk that farmers will not find it worthwhile to put sufficient resources into production of organic matter, but other interventions aimed at improving crop productivity (supplementary irrigation, integrated soil fertility management and improved germplasm) will increase the volume of crop residues (and so organic matter) available for composting, mulching or incorporation.

IV. Project costs, financing, benefits and sustainability

A. Project costs

Assumptions

(a) Project Period: seven-year period starting in April 2017.
(b) Contingencies: price: 5 percent per year domestic, 2 percent international, physical - zero for grants, subsidies and MGNREGS works, 5% on all other items
(c) Exchange Rate: constant rate of INR 70.00 to USD 1.00.
(d) Taxes and Duties: 12.5 percent on works, 5 percent on goods, inputs and services

165. Based on current 2016 prices, total baseline project costs are estimated at USD 139.2 million (INR 9,742 million). Contingencies add a further 9 percent, to make a total cost of USD 151.8 million (INR 11,486 million). A summary is in Table 3, with further details in Appendix 9.

Table 3: Project Costs by Component

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMF

Components Project Cost Summary	(INR '000) Total	(US$ '000) Total	% Total Base Costs
A. Climate Resilient Production Systems			
Crop production systems	3,916,400	55,949	40
Livestock Production Systems	500,388	7,148	5
Farmer Organisations	1,432,850	20,469	15
Field Facilitation	1,219,569	17,422	13
Subtotal Climate Resilient Production Systems	7,069,208	100,989	73
B. Drought Proofing through NRM and Governance	2,145,549	30,651	22
C. Lesson learning and Project management	527,736	7,539	5
Total BASELINE COSTS	9,742,493	139,178	100
Physical Contingencies	362,082	5,173	4
Price Contingencies	1,381,180	7,546	5
Total PROJECT COSTS	11,485,756	151,897	109

B. Project Financing

166. The proposed financiers for the Project are IFAD, RIDF (NABARD), the Government of Andhra Pradesh, NREGA, RKVY (along with other government schemes) and beneficiaries. IFAD will finance about USD 75.5 million (about 50 percent of total project cost), RIDF funding will be USD 6.2 million, the government counterpart funding will be about USD 15.0 million equivalents (including taxes and duties and staff salaries for the staff seconded from the government(, the beneficiaries USD 10.27 million equivalents. Taxes and duties account for USD 5.5 million equivalents.

167. IFAD will finance all expenditure types within investment costs. NREGS will support the cost of labour for works only, whereas RKVY (and other government schemes) will cover for costs of works and goods, input and services for visible infrastructure in 60 village clusters. Beneficiaries will receive grants and inputs on a co-sharing basis and provide labour for works when required as well as contributing to the equity capital in FPOs Project Components by Financier are shown in Table 4 below.

Table 4: Financing Plan by Component

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT
Components by Financiers
(US$ '000)

	IFAD		RIDF		GOAP		NREGS		RKVY		Beneficiary		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. Climate Resilient Production Systems														
Crop production systems	30,375	48.9	3,505	5.6	6,369	10.3	19,190	30.9	-	-	2,689	4.3	62,128	40.9
Livestock Production Systems	6,728	84.8	556	7.0	497	6.3	-	-	-	-	156	2.0	7,937	5.2
Farmer Organisations	10,208	45.3	1,398	6.2	1,246	5.5	-	-	2,886	12.8	6,778	30.1	22,516	14.8
Field Facilitation	16,678	85.0	-	-	2,943	15.0	-	-	-	-	-	-	19,621	12.9
Subtotal Climate Resilient Production Systems	63,989	57.0	5,459	4.9	11,055	9.9	19,190	17.1	2,886	2.6	9,623	8.6	112,202	73.9
B. Drought Proofing through NRM and Governance	6,149	19.6	721	2.3	884	2.8	23,102	73.8	-	-	455	1.5	31,312	20.6
C. Lesson learning and Project management	5,293	63.1	-	-	3,090	36.9	-	-	-	-	-	-	8,384	5.5
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0

C. Summary benefit and economic analysis

A. Beneficiaries

168. The Project is expected to benefit a total of about 165,000 households and 643,500 people. The beneficiaries include men and women from smallholder households. Women headed and other disadvantaged households would be especially targeted under the project. It is assumed that almost 80% of all households in a GP cluster will wish to participate in at least one project activity (see calculations in Attachment 1 of Appendix 4). Table 5 shows the projected number of households that will be in each of the crop system farm models and in the livestock models.

Table 5: Number of participating households

	Project Year							
	1	2	3	4	5	6	7	Total
Red soil cropped households	0	4,480	18,200	41,440	64,680	87,920	92,400	92,400
Black soil cropped households	0	1,920	7,800	17,760	27,720	37,680	39,600	39,600
Livestock households	198	4,008	15,700	31,910	43,103	44,000	44,000	44,000
Total benefited households	198	10,408	41,700	91,110	135,503	169,600	176,000	176,000

See Annex-D for details.

B. Financial analysis

169. Benefits have been calculated based on two cropping system farm models (red soils and black soil - each for an average sized farm of 1.62 ha, reflecting the different cropping patterns on these soil types. Overall 70% of farms are on red soils and 30% on block sols) For livestock models have been drawn up for 16,500 sheep rearing households (30 breeding ewes), 16,500 sheep fattening households (15 ram lambs fattened per year), 10,890 backyard poultry households (6 hens) and 112 backyard poultry breeder units. Results of these models are summarised in Table 6

Table 6: Summary results of financial models

Farm or Activity models	Income (INR)	Input Cost (INR)	Labour (INR)	FIRR (%)	NPV (INR)
-Red soils agricultural farm	94,302	37,387	20,500	2.05 a/	101,680
-Black soils agricultural farm	131,306	39,334	41,120	2.00a/	233,070
-Backyard poultry unit(5 bird unit)	130,000	2,925	2,625	200%	53,094
-Breeder farm unit (1,000 chick unit)	99,500	72,200	17,500	10%	67,522
-Sheep fattening unit (20 sheep unit)	113,400	87,330	14,000	34%	63,596
-Sheep breeding unit (30+1 ram unit)	247,275	192,394	54,600	22%	165,039

a/ BCR
NPV estimated at 12% discount rate on incremental costs and benefits streams.

C. Economic analysis

170. Economic benefits from changes in agriculture and livestock production systems have been calculated as the difference between the 'without project' and 'with project' situation at economic prices, considering the expected investments in the project area, and taking into account the phasing-in of investments.

171. Key assumptions in these calculations are:

a. A twenty year analysis period has been assumed, including the project investment period.
b. Tradable agricultural inputs and outputs are valued at their border prices as of May 2016.
c. Economic costs are net of duties, taxes and price contingencies, production inputs, etc. All costs directly associated with the incremental production are included in full, including incremental farm inputs and labour.
d. Standard conversion factors (SCF) of 0.85 have been applied to both traded and non-traded items for adjusting financial prices
e. The economic analysis includes only incremental benefits and including attributable benefits from all project supported interventions;
f. Time required for the full development has been assumed to be 9 years;
g. Modest changes in cropping patters are assumed such as reduction in irrigated paddy area and area under cotton but the key assumptions have been adoption of appropriate agronomic practices;
h. The analysis employs an Opportunity Cost of Capital (OCC) at 10%[14].

[14] This is based on the average yields of long-term bonds of GOI

172. Cost-benefit analysis method was used for the economic analysis of the project and using three indicators to assess the overall performance of the project. These are (i) economic internal rate of return (IRR), (ii) net present value (NPV), and (iii) benefit cost ratio (BCR). These were estimated using a 20 year incremental cash flows of benefit and cost streams. Accordingly the overall Project IRR is 19%. The estimated NPV for a 10% discount rate is INR 4,606 million and the BCR of 1.24. A positive NPV under the current Opportunity Cost of Capital (OCC) of 10% and even at a 20% discounted rate indicates that the project investments are robust.

Table 7: Summary of economic analysis

Scenario	Base case	Cost Increases by		Benefits down by	
		10%	20%	10%	20%
NPV (million INR) at 10% a/	4,606	2,689	772	2,228	-149
IRR % b/	19%	15%	11%	15%	10%
BCR discounted at 10% c/	1.24	1.13	1.03	1.12	0.99

a/ The NPV is a very concise performance indicator of an investment project: it represents the present amount of the net benefits (i.e. incremental benefits less incremental costs) flow generated by the investment expressed in INR (a single value with the same unit of measurement used in the accounting tables). The Net Present Value is the sum of a 20 year discounted net cash flows.

b/ IRR is defined as the discount rate that zeroes out the net present value of flows of costs and net present value of flows of benefits of an investment. The IRR was computed using incremental net benefits streams for 20 year period. As IRR rankings can be misleading, and given that the informational requirements for computing a proper NPV and IRR are the same except for the discount rate, it is always worth calculating the NPV of a project. There are many reasons in favour of the NPV decision rule (see Lev, 2007).

C/ a/ The BCR was estimated using (i) the discounted incremental cost streams for a 25 year period and (ii) discounted incremental benefits streams for the same life period. The incremental costs and incremental benefits streams were discounted using a 10% discounted rate. The BCR is independent of the size of the investment, but in contrast to IRR it does not generate ambiguous cases and for this reason it can complement the NPV in ranking projects where budget constraints apply. Being a ratio, the indicator does not consider the total amount of net benefits and therefore the ranking can reward more projects that contribute less to the overall increase in public welfare.

173. Sensitivity analysis of the project performance indicators has been carried out in order to test the robustness of project investments and benefits streams. The NPV of net benefit streams discounted at varying rates indicate that discounting at 20% yields negative NPV. If benefits are delayed by two years, (in effect, if the project's production activities take longer to become established), then the IRR declines to 13% with a NPV of INR 1,793 million. The decline in benefits is more sensitive to the project than increases in costs. Likewise, the sensitivity analysis of BCR indicates that the project is more sensitive to decline in benefits than increases in costs.

174. **Summing up**: Sensitivity analysis confirms that the Project remains moderately robust both to decreases in benefits and increases in costs. Nonetheless, the project is more sensitive to decline in benefits than increases in costs. Decrease in benefits may be brought about by a decline in output prices, or a failure in achieving projected yields or outputs. It is noted that the project area often experiences natural calamities such as droughts and therefore there are possibilities of decline in benefits happening more often than costs. Switching values[15] indicate that the investments are worthy even if costs increased over 24% and benefits declined by 19%. As the proposed investments are targeted at the households that are prone to frequent natural calamities and who largely depend upon rainfall for crop production, the resulting base case IRR of 19% is considered more than justified.

175. Other economic benefits that have not been quantified, include the carbon sequestration from the re-vegetated rangeland and the rise in groundwater levels resulted in energy saving in pumping of irrigation water. Further details of the financial and economic analysis are in Appendix 10.

D. Sustainability

176. Project interventions should be sustainable. Improved agricultural practices, if found by farmers to be useful and profitable will be sustained provided inputs and markets are available. As already

[15] Switching values are yet another measure of sensitivity analysis They demonstrate by how much a variable would have to fall (if it is a benefit) or rise (if it is a cost) to make it not worth undertaking an option.

mentioned in the section above on risks, it will not be easy to ensure that all Farmer Producer Organisations are fully self-sustaining by the end of the project, however there is every likelihood that continuing support will be available from other sources. In addition many of the supporting services that the project will establish can be operated as businesses by individuals or small informal groups.

177. Groundwater demand management will be sustained as Water sub-Committees are embedded in the Gram Panchayat local government structure as well in the HUNs that are registered as Societies. Nevertheless, in the absence of strong support from government policy, the committees will need to demonstrate their effectiveness if water management is to be sustained and groundwater recharge improved. Linked to this it will also be important to sustain groundwater sharing networks - and provision has been made to establish a user maintenance fund. Likewise farm ponds will need to maintained - desilting and linings repairs. Making the pond owner(s) responsible for doing the actual lining work will, hopefully, build a sense of ownership leading, along with the usefulness of these assets, to a willingness to maintain the ponds.

Appendix 1 : Country and rural development context background

Country background

1. India is now the third largest economy in the world, having grown at a robust 7.5 per cent per year between 2004 and 2013, placing it in the top 10 of the world's fastest growing nations. India is a diverse country of 1.3 billion people from several ethnic groups, speaking several languages and more than 1,000 dialects, identifying themselves in more than 5,400 castes and tribes, following six major religions, and an area of 3.28 million km^2 covering 20 different agro-ecological zones. India has achieved the first Millennium Development Goal (MDG 1) by halving the proportion of people living on less than $1.25 a day. The country's economic and human development is one of the most significant global achievements of recent times (World Bank, 2013) and between 2005 and 2010, 53 million Indians were lifted out of poverty.

2. Although rural poverty has decreased by 14 percentage points, India remains at the bottom of the group of middle-income countries with more than 400 million people still living in poverty, representing 33 % of the world's poor people. Hence, poverty remains a major issue, with 23.6% of the population living on less than USD 1.25 per day and nutritional levels are unacceptably low, with 29.4% of children underweight. The economic growth has also increased the inequalities and segmentation between different socio-economic groups. Inequalities vis-à-vis disadvantaged groups such as the scheduled castes, scheduled tribes, and women persist. Structural inequalities have kept entire groups trapped, unable to take advantage of opportunities that economic growth has offered. While much progress has been made in education, health, maternal mortality, and fertility, gender inequality remains high.

Agriculture sector

3. Agriculture along with fisheries and forestry represented 17.9% of Indian GDP in 2014, industry 24.2% and services 57.9%. In recent past, growth in household income and consumption, expansion in the food processing sector and increase in agricultural exports have facilitated the growth in the agriculture sector in India. The agricultural system is a mixed crop-livestock farming system in which crop production is combined with the rearing of livestock, which supplements the farm incomes by providing employment, draught animals, and manure. From an economic and monetary contribution stand, livestock has gradually taken over and is now more in value than the food grain crops. The State of India's livelihood report 2015, reports that 51% of rural households depend on agriculture and non-agricultural manual labour in a context of mixed performance of the agricultural sector.

4. In the past, the agricultural revolution has transformed the nation from chronic dependence on grain imports into a global agricultural nation that is now a net exporter of food. India's agricultural performance has been remarkable over the past decades, the country is now the world's largest producer of milk, pulses, and spices, and has the world's largest cattle herd (buffaloes), as well as the largest area under wheat, rice and cotton. It is the second largest producer of rice, wheat, cotton, sugarcane, farmed fish, sheep & goat meat, fruit, vegetables and tea. The country has some 195 million ha under cultivation of which some 63 percent are rainfed (roughly 125m ha) while 37 percent are irrigated (70m ha).

5. Over time, the share of agriculture in India's economy has progressively declined to less than 17% due to the high growth rates of the industrial and services sectors. The decreasing contribution of agriculture to GDP is a cause of concern because of its impact on the millions of livelihoods as agriculture remains vital to India's economic and social cohesion because (i) nearly three-quarters of India's families depend on rural incomes, (ii) the majority of India's poor live in rural areas and (iii) the country's food security depends on increasing the production of cereal crops, fruits, vegetables and milk to meet the demands of a growing population with rising incomes. There is an important gap in India's performance because of the mismatch between achievements in output and productivity.

While India has made significant progress in agriculture over the past decades, the sector continues to suffer from structural gaps including fragmented land holdings, irrigation problems and overdependence on monsoon, lack of regulation and legislation of the seed systems and low productivity among others.

6. The agriculture situation needs a strong and renewed attention for different reasons. First, at micro level, farmers continue to be vulnerable to monsoon failures and are not benefiting from their efforts, leading to increased distress and their inability to cope with the pressures on their livelihoods. A number of factors contribute to these pressures: (i) increasingly small land holdings means it is difficult to scale up production to earn more; (ii) falling prices for farm produce - with record production, farmers are victims of their own success; and (iii) risks and uncertainty regarding the physical factors of production (rainfall, temperature, pests, diseases) and markets/prices.

7. At the macro level, the fast changing international agricultural trade competition requires agriculture to be more efficient. At present the most urgent challenge is for India to enhance the agricultural productivity, competitiveness, and rural growth by i) raising the agricultural productivity per unit of land; ii) promote socially inclusive strategy around farm as well as non-farm employment for rural poverty reduction and iii) promote coherent and integrated food security mechanisms and policies. Given the scarcity of fertile lands, India has to raise the productivity per unit of land and increase the productivity through a greater diversification of crops, especially higher value crops, promote a value chain approach which will help address challenges ranging from extension services to marketing issues. India needs to reverse the chronical underfunding of infrastructure and operations, invest in world class research-development and new technologies and strengthen the connection between research and extension, or between these services and the private sector. Public extension services are struggling and offer little new knowledge to farmers.

8. Over the recent years, there has been a paradigm shift in the agriculture sector with the average farm size falling from 2.28 hectares in 1970-71 to 1.15 hectares in 2011-11 and a rise of non-farming sources which are now the main source of income for almost one third of farmers. This dynamic calls for rural development strategy that must benefit the poor, landless, women, scheduled castes and tribes through a combination of farm and non-farms incomes. This is an urgent need in rain fed agriculture states such as Andhra Pradesh which has been one of the front-runners in reaping the benefits of green revolution and plays an important role as the country third largest producer of rice and groundnuts and second in cotton and sunflower.

9. **Rain-fed agriculture**. India has the largest area under rain-fed farming in the world. Rain-fed areas tend to be poorer and marginalized. About 42 per cent of cropped areas under rice comes from rain-fed farming; for pulses the proportion is 77 per cent, for oilseeds 66 per cent and coarse cereals 85 per cent. It is estimated that, even after achieving the full irrigation potential, nearly 50 per cent of the net cultivated area would remain dependent on rainfall and 40 per cent of the additional food grain supply would have to come from rain-fed areas.

10. The continued low-productivity of rain-fed agriculture at such a large scale, ends up dampening the overall growth rate of agriculture in India. It also causes high variability to annual food production, which adversely affects the poor and vulnerable population in particular. The government on the other hand, has to maintain huge stocks of food grains to smoothen the consumption of the population in case of erratic monsoon rains. As of January 2015, the government was carrying a huge food stock of 61.6 million tonnes, as against the stipulated norm of 21.4million tonnes on 1 January every year. Recognizing this problem, and the importance of rain-fed agriculture in ensuring food supply, the National Rainfed Area Authority was established in November 2006.

11. **New trends of the rural development sector**. The country is in the midst of a massive wave of urbanization as some 10 million people move to towns and cities each year in search of jobs and opportunity (World Bank, 2015). At present, rural India comprises 69 percent of the country's population, but its share in the total national income is less than 17 percent. Despite its impressive economic growth India's rural-urban transformation may result in larger disparities in welfare levels-

between the rich and the poor, and between rural and urban areas. Consumption inequality is on the rise, with widening disparities between urban and rural areas. Disparities in human development indicators, especially as they relate to socially excluded groups are also pronounced. The challenge for India will be to develop policies and programs to ensure that a large part of the population-especially the most vulnerable-is not left behind. India's spatial transformation also requires the effective development of the rural economy through the expansion of farm and non-farm employment and income opportunities. Rural incomes have not grown apace with urban incomes, and job creation in the non-agricultural sector has been slow in rural areas.

12. The rural space is not well connected to cities, resulting in weak value chains for agricultural products and an insufficient creation of off-farm employment. Although half of the Indian population derives its income from agriculture-related activities, agricultural output has grown below government targets.

12. Rural Development remains India's most important factor for economic growth as well as a strategy for poverty alleviation in India. In order to increase the growth of agriculture, the Government has planned several programs. Being the nodal Ministry for most of the development and welfare activities in the rural areas, the Ministry of Rural Development plays a pivotal role in the overall development strategy of the country. Rural development in India has witnessed several changes over the years in its emphasis, approaches, strategies and programmes. At present there are significant trends happening in India's rural sector among which the transformation of the rural labour markets:

- A significant rise in wages of agricultural labour and of rural labour in general driven by the rising demand for labour emanating from the growth in agriculture as well as overall GDP. The Mahatma Gandhi National Rural Employment Guarantee Programme (MGNREGA) is believed to have contributed significantly to raising the rural wages, especially agricultural wages, by improving the bargaining power of rural labour.
- The emergence of the rural non-farm sector as an important source of output and employment contributes to the well-being of the rural poor. Non-farm wage income is less variable than income from farming which is subject to weather-induced fluctuations. Small and marginal farmers will be receiving a larger proportion of their income as wage income and remittances from non-farm sources when compared to the medium and large farmers.
- The agriculture sector is more and more feminine as a consequence of male migration, the management of farms by women will increase among marginal, small and medium size farms should be regarded as an opportunity as well as a challenge. Opportunity, because it enables empowerment of smallholder women who have greater familiarity with enterprises like dairying and horticulture which are going to be the major sources of farm income. Challenge, because women lack property rights on land, farming becomes an additional responsibility for them apart from household work, their lower literacy level and lack of experience in dealing with agricultural support systems, including extension services, which are male dominated.

13. **Rural development schemes**. There are several important policies, strategies and acts that provide the framework for agriculture, forestry, rural development and growth, and which are central to IFAD's efforts in India. The GoI has over the years, implemented flagship programmes across the country to increase to livelihood potential, especially in rural areas. Among these, the Mahatma Ghandi National Rural Employment Guaranty Scheme, the National Rural Livelihood Mission, the National Urban Livelihood Mission and the Food Security Program under the National Food Security Act and the National Mission for Sustainable Agriculture.

- **National rural poverty reduction strategy:** The 12th Five-Year Plan (2012-2017) focusing for "faster, sustainable and more inclusive growth" aims to raise agriculture outputs by 4% and bring down poverty by 10 percentage points by the end of the 12th Plan and generate 500 million new jobs in non-farm sector. The agriculture growth would stress on expanding irrigation, improving water management, bridging the knowledge gap, fostering diversification, increasing food production to ensure food security, facilitating access to credit and enabling access to markets.

The 12th Five Year Plan further aims to address the critical mid-term assessment of the 11th Five Year Plan (2007-2012) that underscored the urgency of increasing capital formation and investments in agriculture, as well as of improving access to water and good quality seed, replenishing soil nutrients, expanding agricultural research and extension, reforming land tenancy systems and facilitating agricultural marketing.

- **The Mahatma Ghandi National Rural Employment Guarantee Scheme.** The scheme launched in 2005 was to boost low skills employment opportunities in rural areas by providing 100 working days to all households that demand jobs. Over 270 million workers enrolled for job but only 33 percent of the job seekers are considered as active, meaning had gone at least for one day of work under the scheme. In 2014-2015, 248.39 billion rupees were paid as wages to 62.2 million persons from 41.1 million households but the beneficiaries were active only 36 days and had an average incomes of 6000 rupees (SOIL, 2015). This low rate performance in some states calls for questioning the performance of the scheme which needs to be revamped and rethought in the light of obvious limitations. The demand based scheme suffers from the lack of awareness of Gram Panchayat (GP) which plays a critical role in the scheme implementation and weak planning at GP level. The Government remains committed to ensure job opportunities to poor Indians by improving the efficiency and the delivery mechanism of the scheme.
- **National Rural Livelihood Mission.** The Mission aims at creating efficient and effective institutional platforms of the rural poor enabling them to increase household income through sustainable livelihood enhancements and improved access to financial services. The programme aims at building strong institutions for the poor particularly the women to allow them unleash their innate capabilities. At present, the programme covered 250 lakhs HHs and 21,7 lakhs of SHGs in 1,3 lakhs village organizations. The total amount of credit mobilised is 63,950 crore.
- **National Mission for Sustainable Agriculture (NMSA).** The mission has been set up for enhancing agricultural productivity especially in rainfed areas focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation. NMSA derives its mandate from Sustainable Agriculture Mission which is one of the eight Missions outlined under National Action Plan on Climate Change (NAPCC). NMSA architecture has been designed by converging, consolidating and subsuming all ongoing as well as newly proposed activities/programmes related to sustainable agriculture with a special emphasis on soil & water conservation, water use efficiency, soil health management and rainfed area development. The focus of NMSA will be to infuse the judicious utilization of common resources through community based approach.
- **National Rainfed Area Authority (NRAA)**. The Government, NRAA has issued Common Guidelines for Watershed Development. These were followed by the Integrated Watershed Management Programme since 2008, which emphasizes capacity-building, M&E, learning and social audit. It introduces a livelihoods perspective from the very inception of the project, with a special emphasis on families without assets. (see annex on recent government initiative)

National institutional context

14. **Government agencies**. The central government is responsible for national policy, coordination and monitoring, and the state governments are responsible for projects and programmes execution. Among other delegations of authority, the states are responsible for primary and secondary education, the health-care system, agriculture and rural development. IFAD funded projects are implemented by state governments under the relevant departments, such as planning, finance, rural development, agriculture, forestry, tribal welfare, women and child development. Project implementation often requires effective coordination among several departments and effective flow of funds from state to district, block and village level. The role of district magistrates is crucial, since their commitment and proactive approach may result in effective convergence with central- and state-level programmes so as to enhance the impact of development interventions.

15. **Civil society organizations (CSO)**. CSOs are regular partners in all IFAD supported operations. They are responsible for social mobilization and grass-roots institution-building. Civil society in India ranges from charitable organizations to service NGOs to vibrant representative organizations that give voice to their constituencies. Of particular importance to IFAD-supported efforts are the commitment, experience and innovation that NGOs contribute – gaining the confidence of communities. For decades, farmer producer organisations were functioning under cooperative legal form with Govt interference, low transparency, low market linkage skills related issues. Ten years ago, the GoI encouraged the establishment of Producer company similar to cooperatives. The producer company formation was slow to take off because of lengthy and stringent process. Since 2009-10, the Small Farmers Agri-business Consortium (SFAC) and the National Bank for Agriculture and Rural Development (NABARD) were given the mandate by Ministry of Agriculture to support formation of PCs under different programmes of the Ministry. SFAC has complementary schemes for equity augmentation, credit guarantee fund etc. and provides finances to civil society organisations like NGOs to form and hand hold PCs for 3 years. NABARD works with resource NGOs to form PCs and provides one third of the funding for formation that SFAC offers. The logic being farmers who are already mobilised under water shed management programme will be largely forming PCs. Both experiences show that farmers producers organizations need long term support to be viable with a systematic approach to institutional and organizational, access to finance and delivery of inputs and outputs to support their members. So far, very few organizations are considered credit worthy and hence banks have been reluctant to finance them[16] (further information in working paper 7).

16. **Rural financial institutions**. Microfinance has “gone to scale” as a sector in attracting private-sector investment and equity. However, in terms of taking financial inclusion to the needy, there is a long way to go. Information and communication technology (ICT), particularly innovative mobile telephony applications, are playing an increasingly important role in reducing transaction costs and including people in banking processes. The sector is rapidly evolving beyond microfinance in addressing the needs of agriculture and rural enterprises, providing financial services to facilitate value chains and post-harvest value addition, and offering a variety of insurance products. Private-sector involvement in rural development is increasing rapidly, partly due to corporate efforts in social responsibility, but also to recognition of the business potential in rural areas. This has resulted in innovative efforts to provide market information, source products, extension services, agricultural inputs and market access to rural producers, broadening employment opportunities and promoting viable and sustainable market-based solutions.

[16] Section mostly sourced from SOIL 2015.

Annex 1 : Agriculture and rural development in Andhra Pradesh

1. The agriculture sector is the principal source of livelihood for over 62 percent of the total population in Andhra Pradesh (AP) contributing 27% to its income in the State GDP of 2014/15 (AP Agriculture Action Plan 2015/16). Distress in agriculture seriously impinges on human development, particularly in Anantapur, Chittoor, Kadapa, Kurnool and Prakasam districts, the 5 districts constituting the project area of APDMP. Considering these facts, it is very important for the state to concentrate on development of rainfed area to utilize the natural resources optimally in sustainable manner so as to provide livelihood and economic stability to farmers.

2. The geographical area of AP is 160.20 lakh ha, of which, the net sown area constitutes 65.61 lakh ha (41%) and the gross sown area is 81.20 lakh ha. The state receives an average normal rainfall of 966 mm annually. Canals and groundwater are the major sources of irrigation. Small and marginal farmers constitute about 80% of agriculture land holders, together cultivating 54% of area.

3. Nearly 57% net sown area is under rainfed agriculture. The area is drought prone which is characterised by inadequate and erratic rainfall coupled with high evapo-transpiration rate, and the soils are eroded. Rainfed agriculture is risk prone activity, mainly due to its dependence on climatic situations and recent extreme climate change events are creating panic situation to the farmers. To minimize the risks of aberrant climate, it is necessary to provide agriculture based income generating opportunities and sustaining the rainfed agriculture through optimum utilization of natural resources and resources created through various interventions.

4. Irrigation development in the dryland districts is poor and mostly groundwater based. Food production in Andhra Pradesh (AP) has become increasingly dependent on groundwater, with 40 % of its irrigation needs met through groundwater. In blocks/ mandals where major surface water irrigation projects do not exist, the groundwater extraction has reached critical levels that need distinct moderation. Further, extraction of groundwater for cash crops (fruits, flowers, vegetables, spices, etc.) oil seeds, and commercial use (packaged drinking water, beverage, seed production, private nursery etc.) is on the rise. In addition, rural and urban drinking water supply is largely groundwater based. Groundwater is also the primary water resource for most towns and cities.

5. While food production and rural drinking water supply is becoming more and more groundwater-centric, there is still no overarching policy governing groundwater as a critical economic resource. With its level declining sharply, groundwater linked irrigation has become an unviable source for many small farmers. Of the 670 mandals in AP, 42 are categorized as semi-critical, 7 critical and 41 over-exploited by the Groundwater Estimation Committee (GEC) 2010-11. Anantapur, Chittoor, Kadapa, Kurnool and Prakasam districts are witnessing a sharp decline in groundwater levels. It is also impacting on their livelihood system, food security and nutrition. In Chittoor and Anantapur groundwater levels have reached a critical point, wherein well-failure is a common occurrence. Drilling in the districts have become expensive as depths go up to 1000 feet on average[17]. As much as 90 % of drilled wells fail or do not yield any water; and in Anantapur district 95 % of the drilled wells reportedly fail. Further information on the water sector is available in WP 2.

6. Soil nutrient availability in many rainfed lands tends to be low, and slope terrain and patterns of rainfall and runoff contribute to erosion. High temperature, and low and erratic precipitation often makes soil moisture availability inadequate and techniques to improve water availability (such as water harvesting) are expensive. Majority of the areas in the districts of Anantapur, Chittoor, Kadapa, Kurnool, and Prakasam have an arid agro-ecology characterized by high evapotranspiration and low number of rainy days. The resultant low moisture availability period and frequent dry spells in these districts pose severe limitation to cultivation of crops. In addition the soils have great limitation in terms of physical and chemical properties, which has serious implication for crop cultivation. Maximization of production in soils requires identification of various constraints limiting production or to overcome/reduce the ill effects of the same through suitable management practices. Low

[17] This increased the energising and pipeline costs to up to 6.5 lakh rupees.

awareness amongst farmers on the negative effects of soil erosion and loss of fertile layer of soil seriously affects productivity. This is further detailed in WP 3.

Annex 2: Recent Government Initiatives

Given the importance of the agriculture sector, the Government of India, in its Budget 2016–17, planned several steps for the sustainable development of agriculture.

- Budget 2016-17 proposed a series of measures to improve agriculture and increase farmers' welfare such as 2.85 million hectares to be brought under irrigation in allocating , US$ 42.11 billion grant to gram panchayats and municipalities and 100 per cent village electrification targeted by May 01, 2018.
- The government has already taken steps to address two major factors (soil and water) critical to improve agriculture production. Steps have been taken to improve soil fertility on a sustainable basis through the soil health card scheme and to support the organic farming scheme 'Paramparagat Krishi Vikas Yojana'. Other steps include improved access to irrigation through 'Pradhanmantri Gram Sinchai Yojana'; enhanced water efficiency through `Per Drop More Crop'; continued support to Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the creation of a unified national agriculture market to boost the incomes of farmers.
- The Government of India recognises the importance of micro irrigation, watershed development and 'Pradhan Mantri Krishi Sinchai Yojana' and has allocated US$ 777.6 million for it. The GoI stresses the need for states to focus on micro irrigation, watershed and groundwater management and to allocate adequate funds to develop the agriculture sector, take measures to achieve the targeted agricultural growth rate and address the problems of farmers.

In collaboration with donor agencies, the State Government of Andhra Pradesh is implementing the following projects that would improve drought resilience :

Name of project	**Status**	**Main areas of intervention**	**Areas of complementarity**
World Bank funded Andhra Pradesh Rural Inclusive Growth Project	On-going (state wide)	Targets the most disadvantaged communities in State of AP, and proposes inclusive rural transformation with better access to social services, increased agricultural productivity and more inclusive value chains	Sharing knowledge on : package of practices, value chain studies, formation and support to FPOs. Collaboration on : expanding the membership of the FPOs established by APRIGP in the APDMP supported clusters. Coordination at district and state levels.
World Bank funded project on development of tank irrigation	In design phase (state wide)	Targets the rehabilitation of tank irrigation schemes with larger focus on improved agricultural productivity and agribusiness development	Sharing knowledge on package of practices, value chain studies, formation and support to FPOs. Collaboration in including APDMP supported clusters in agribusiness development

Name of project	Status	Main areas of intervention	Areas of complementarity
			Coordination at district and state levels
GIZ and MGNREGA collaboration on landscape approach to integrated natural resources management	On-going (Anantapur district)	Testing of approaches and development of training manuals on landscape based approach to NRM. Increased efficiency in implementation of MGNREGA schemes in pilot areas of Anantapur	Sharing knowledge on convergence with MGNREGA and inclusion of lessons learned from landscape based NRM approach in the rehabilitation of Common Property Resources and Grasslands, as well as in rainwater harvesting
ICRISAT supported Public Private Producer Platforms	On-going (state wide)	Broker partnerships between private companies and FPOs with support of the Governmemt	Collaboration in expanding the membership of the FPOs in the APDMP supported clusters and participation of smallholders in improved supply/ value chains. Coordination at district and state levels
Green Climate Fund supported Projects , with support from UNDP	At concept note stage (not yet submitted to GCF)	Additional investments in climate change mitigation and adaptation for the agricultural sector taking the on-going and future investments of the state (including APDMP) as the baseline	Sharing knowledge on package of practices, water management approaches and in advocacy related to groundwater management

Appendix 2: Poverty, targeting & gender

A. Introduction

1. Nearly 10.96% of rural population in undivided Andhra Pradesh remain below poverty line as per estimates of 2011-12[18]. Andhra Pradesh has been one of the pioneers in the country in having systematically structured model of rural poverty eradication interventions. Towards this end, the Society for Elimination of Rural Poverty (SERP) was established by the Government of Andhra Pradesh (GoAP) as a sensitive support structure to facilitate poverty reduction through social mobilization and improvement of livelihoods of rural poor in the state. SERP is an autonomous society of the Department of Rural Development, GoAP, implementing Indira Kranthi Patham (IKP), a statewide community driven rural poverty reduction programme to enable the poor to improve their livelihoods and quality of life through their own organizations. SERP has done inventive works in addressing rural poverty such as women empowerment through SHGs, SHGs bank linkage, land access to the poor, community managed sustainable agriculture (CMSA), community institutions building (SHGs and their federations, VOs and *Mandal Samakhyas*), and *Sthree Nidhi* - a credit cooperative federation to supplement credit flow to SHGs.

2. ***Major poverty alleviation programmes in Andhra Pradesh***. The GoAP's major initiatives to address rural poverty, essentially implemented through SERP and generally women-focused, are the followings:

- *Bangarutalli – Maa Inti Mahalakshmi* is to take care of the girl child in every household from her birth till she completes her graduation. Fixed financial assistance from the government support the family for the girl child thereby supporting the family to indirectly overcome poverty.
- *SADAREM* – A programme for issuance of Disabled Certificate by which a family identified with a "Person with Disability" (PwD) gets a monthly social security grant from the government to augment the household income to support the PwD.
- *Sthree Nidi* **–** a credit cooperative federation of the GoAP and *Mandal Samakhyas* to supplement credit flow from banking sector that provides timely and affordable credit to the poor SHG members as strategy for poverty alleviation.
- *KRuSHE* – a programme promoting rural entrepreneurship in farm and non-farm livelihoods (such as traditional art and crafts) for rural SHGs for drought proofing the households.
- Community Managed Health and Nutrition – a programme to support rural SHGs and village organisations, and also create awareness on health and nutrition services including infant care, etc. through trained Health Activists (HA) and Community Resource Persons (CRP).
- *Abhaya Hastham* – a pension and insurance scheme of the GoAP for the rural and urban SHG women to provide income security in their old age.
- *Unnathi* – a programme for augmenting rural livelihoods through Integrated Watershed Management Programme (IWMP).
- *AABY* – community managed micro insurance – a scheme to protect the family members of an SHG member from financial risks, in the event of her death, to safeguard the institution of SHG from repayment burden, when a borrowing member dies.
- *Bhoomi* – a programme for land access for the poor.
- *Community Managed Sustainable Agriculture* (CMSA) – promoting integrated farming system in rain fed areas to augment family income, as well as developing new tools and equipment for reducing drudgery of women farmers.
- *NTR Bharosa* – welfare programme of the GoAP to provide pension to most needy and vulnerable people in rural areas.

[18] Press Note on Poverty Estimates, 2011-12. Govt of India, Planning Commission, July 2013

3. ***Main causes of continuing rural poverty in the state***. The main causes of rural poverty include: (i) lack of or inadequate productive land assets, (ii) engagement of a substantial portion of the labour force as unpaid family workers and/or poorly paid farm and other labour, (iii) low productivity and profitability in agriculture and limited alternative opportunities; (iv) women's relatively low engagement in the productive labour force and lack of remunerative or productive employment, (v) high rate of rural youth unemployment, (vi) malnutrition and disabilities, (vii) prevalence of rural indebtedness; (viii) lack of access to markets; (ix) continuing rural illiteracy particularly among women; and (x) events of disasters caused by, and impact of, climate changes such as repeated drought and depleting ground water.

B. Poverty situations in the project districts

4. The four *Rayalaseema* districts of Ananthapuramu, Chittoor, Kadapa and Kurnool together with parts of Prakasam district, proposed for Andhra Pradesh Drought Mitigation Project (APDMP) are the five major drought-prone water-distressed areas. Many of the mandals in these districts have been declared as drought-affected in 2015 by the GoAP. Majority of the people in these districts live in rural areas (71.9% in Ananthapuramu, 70.5% in Chittoor, 66.0% in Kadapa, 71.6% in Kurnool, and 80.4% in Prakasam)[19]. The literacy rate ranges from a low of 60.0% in Kurnool to a high of 71.5% in Chittoor (male literacy being a low of 70.1% in Kurnool to a high of 79.8% in Chittoor; female literacy having a low of 49.8% in Kurnool to a high of 63.3% in Chittoor) against the state overall average literacy rate of 67.4%. The sex ratio in the five districts ranges from a low of 981 in Prakasam to a high of 997 in Chittoor district against the state average of 996.

5. **Land holding in the project districts**. Based on classification of GoAP, nearly 80% farmers are marginal and small farmers in project districts (Table 1), owning land below 4.93 acres. Most of the marginal and small farmers are poor households, potential target groups, predominantly depending on rainfed agriculture particularly the marginal farmers. Prolonged drought has also affected better of farmers as majority of the bore wells became dysfunctional and increasing depletion of groundwater resources. Continuing drought situation could affect all categories of farmers and seriously undermine the progress made in rural poverty reduction in these parts of the state.

Table 1. District-wise, category-wise Land holdings 2011 Census

District	Marginal Farmers (below 2.47 acre)	Small (2.47 to 4.93 acres)	Semi-medium (4.94 to 9.87 acres	Medium (9.88 to 24.7 acres)	Large (24.71 acres and above)	Total in each district
Anantapur	258950	243 528	175 194	45 853	4 426	727951
Chittoor	455190	144 431	54 981	11 511	1 069	667182
Kadapa	241721	123 474	62 290	12 948	873	441306
Kurnool	282405	187 698	112 419	46 266	4 114	632902
Prakasam	378940	170 081	93 392	26 048	2 092	670553
All Total	**1 617 206 (51.5%)**	**869 212 (27.8%)**	**498 276 (15.8%)**	**142 626 (4.5%)**	**12 574 (0.4%)**	**3 139 894**

(Source: District Statistical Hand Book of Anantapuramu, Chittoor, Kadapa, Kurnool and Prakasam, 2014)

6. **Rural households by wealth ranking**. Most rural households being agriculture dependent, they are directly affected by the drought conditions prevailing in the region. As part of the pre-design mission, a study carried out by BIRDS (May 2016)[20] from 20 sample villages from 16 mandals in the five districts showed different layers of poverty in the districts based on wealth ranking of the households into four different categories of rich, middle income, poor and poorest on the basis of assets (Table 1). It is fairly alarming to note that nearly half of the sample households (50.84%) are poor and poorest categories out of average sample of 949 households from the five districts, as per the study. Field visits by the mission in all the five districts corroborated these findings very well as in many cases agricultural productivity declined due to drought and depleting groundwater resources. Furthermore, nearly 27.72% of the households are from the vulnerable categories, being either women headed, households with PwD or migrated households.

[19] See the District Statistical Hand Book 2014 of these districts published by Chief Planning Officer of respective district.
[20] Poverty and Gender Analysis Study Report of Ananthapur, Chittoor, Kadapa, Kurnool and Prakasam districts of Andhra Pradesh State. Bharati Integrated Rural Development Society (BIRDS), Nandyal, May 2016.

Table 1. Poverty analysis based on wealth ranking in 5 districts (BIRDS 2016)

District	Total No of HHs surveyed	Wealth Ranking (% of HHs by wealth ranking)				% of HHs composed of			
		Rich	Middle income	Poor	Poorest	Women headed	Migrated	PwD	Normal
Anantapur	1027	27.3	38.0	16.3	18.4	13.4	3.7	6.2	76.7
Chittoor	246	9.3	49.1	26.4	15.2	14.6	7.3	10.9	67.2
Kadapa	831	4.9	49.4	32.7	13.0	9.6	22.1	9.1	59.2
Kurnool	1710	5.8	24.6	61.3	8.3	2.5	13.2	3.0	81.3
Prakasam	933	4.0	33.4	51.8	10.8	6.9	11.6	4.5	77.0
Average total	949	10.26	38.90	37.70	13.14	9.40	11.58	6.74	72.28

(Explanation: **Rich** – *10 acres land, bore well, tractor, livestock, own house;* **Middle inco**me – *5 acres land, irrigated or dryland, own house, livestock;* **Poor** – *Landless, small house, petty business, small ruminants;* **Poorest** – *Landless, migrated, daily wage;* **Women headed** – *a household head is woman, generally widow**.;*** **Migrated** – *a family who migrated to the village and settled or a family having members migrated out.;* **PwD** – *a household having a person with disability and* **Normal** – *normal household (not women-headed, PwD or migrated).*

7. **Poverty among SC and ST.** The average percentage of SC population in the five districts (18.14%) is slightly higher than the state average of 17.1%, but lower in the case of ST being 3.3% in five districts against the state average of 5.3% (Table 2). Interestingly, while average literacy rate among the SC population in the five districts are slightly lower (59.8%) than the state average (64.5%), the sex ratio too is lower for SC population which is 999 for average of five districts against the state average of 1007. Among the ST population however, the average literacy rate both for male (60.2%) and female (43.0%) are slightly higher than the state average of 56.9% for male and 40.9% for women. The sex ratio among the tribal population in these districts (average being 973) is much lower than the state average of 1009 for tribal population.

Table 2. SC and ST population in percentage with literacy rate and sex ratio in the five APDMP districts

Districts	Scheduled Caste (SC)					Scheduled Tribe (ST)				
	% of SC population	Literacy rate			Sex ratio	% of ST population	Literacy rate			Sex ratio
		Total	Male	Female			Total	Male	Female	
Ananthapur	14.3	56.3	64.9	47.7	994	3.8	55.0	65.4	44.2	962
Chittoor	18.8	66.3	74.7	58.0	1017	3.8	52.7	59.4	46.0	996
Kadapa	16.2	61.2	72.2	50.3	1007	2.6	48.8	57.4	39.9	967
Kurnool	18.2	55.3	65.9	44.6	993	2.0	55.0	65.2	44.6	970
Prakasam	23.2	59.7	69.5	49.9	983	4.4	47.1	53.7	40.4	971
Total average	**18.1**	**59.8**	**69.4**	**50.1**	**999**	**3.3**	**51.7**	**60.2**	**43.0**	**973**
Andhra Pradesh	**17.1**	**64.5**	**71.7**	**57.4**	**1007**	**5.3**	**48.8**	**56.9**	**40.9**	**1009**

(Source: District Statistical Hand Book 2014 of Ananthapuramu, Chittoor, Kadapa, Kurnool and Prakasam)

8. Table 3 shows **the poverty situations among the SC** population in the five districts as reflected in terms of percentage household without assets, income (from agriculture, livestock and wage) and expenditure (on education, food and assets creation). The percentage of households without land, livestock and own house is slightly lower than the average SC household without these assets in the entire state. Similarly, percentage of household reporting income only from daily wage (51.6%) is higher than the state average of 49.9%. In terms of expenditure on food, the state percentage of 29.2% is higher than the average of the five districts with only 22.4%. Between the districts, Prakasam showed that only 5% and 0.8% of the household have income from agriculture and livestock, respectively. Consequently, the district also indicated high percentage of households (76.8%) dependent on daily wage.

Table 3. Poverty status of SC Households (based on assets, income and expenditure)

Districts	% of SC HHs without			% of SC HHs having income from			% of SC HHs spending on		
	Land	Livestock	Own house	Agriculture	Livestock	Wage	Education	Food	Assets
Ananthapur	63.9	82.7	7.6	16.3	2.5	36.4	10.7	25.4	5.5
Chittoor	77.4	70.1	6.6	5.9	7.0	54.4	15.1	22.6	3.4
Kadapa	79.6	83.1	6.4	9.6	2.2	44.9	9.9	26.6	3.2
Kurnool	77.5	86.4	8.0	15.9	1.6	45.5	15.4	20.0	1.1
Prakasam	93.7	91.5	7.9	5.0	0.8	76.8	4.4	17.6	0.3
Total average	**78.4**	**82.8**	**7.3**	**10.5**	**2.8**	**51.6**	**11.1**	**22.4**	**2.7**
Andhra Pradesh	**87.4**	**87.1**	**9.8**	**11.5**	**2.3**	**49.9**	**9.1**	**29.2**	**2.7**

(Source: SERP Poorest of Poor Household Survey 2012-13)

9. The poverty situations of **ST households** in the proposed project districts are shown in Table 4. In contrast to the SC households, the average percentage of ST households from the five districts without land (77.6%), livestock (81.6%) and own house (8.2%) are higher than the state average for ST population on these indicators (Table 4). Similarly, high percentage of the households depend on income from daily wage (total average of 52% for five districts, against the state total average of 37.5%). Between the districts, Prakasam has least ST households having income from agriculture (0.8%) and livestock (0.5%), again reflecting high percentage of households (52.1%) dependent on daily wage. Both Tables 3 & 4 showed that very high percentage of SC (78.4%) and ST (77.6%) are landless in the five districts, reflecting the severity of poverty among these two categories of communities.

Table 4. Poverty status of ST Households (based on assets, income and expenditure)

Districts	% of ST HHs without			% of ST HHs having income from			% of ST HHs spending on		
	Land	Livestock	Own house	Agriculture	Livestock	Wage	Education	Food	Assets
Ananthapuramu	58.9	78.8	5.9	37.3	2.4	23.6	12.5	24.8	2.6
Chittoor	79.8	75.7	8.4	6.1	6.4	52.6	10.6	28.3	4.0
Kadapa	78.0	84.0	7.8	7.9	2.5	47.3	8.4	29.1	2.0
Kurnool	76.7	77.4	9.5	9.1	2.1	51.5	16.9	16.5	2.7
Prakasam	94.8	91.4	9.5	0.8	0.5	85.6	3.9	11.5	0.1
Total average	**77.6**	**81.5**	**8.2**	**12.2**	**2.8**	**52.1**	**10.5**	**22.0**	**2.3**
Andhra Pradesh	**72.8**	**74.5**	**7.0**	**28.2**	**2.2**	**37.5**	**9.4**	**27.4**	**2.2**

(Source: SERP Poorest of Poor Household Survey 2012-13)

C. Targeting and Target groups

10. ***Project area***. The project will focus on the five most drought-prone districts in the State of Andhra Pradesh: Ananthapuramu, Chittoor, Kadapa, Kurnool and Prakasam. Annual rainfall is highest in Chittoor district with 877 mm, and lowest in Ananthapuramu with 543 mm; 30% of the mandals[21] in these districts have overexploited their groundwater. The national statistics indicate that poverty in these districts is estimated at 8 to 15 %, however the findings of the poverty and gender analysis (BIRDS, 2016)[22] showed that the incidence of poverty would exceed 30% and is much larger in villages dominated by scheduled castes and scheduled tribes. Nearly 80% of smallholders farming households' earnings from farm and off-farm activities are equivalent or less than the rural consumption line of US$22 per capita per month according to the study. This highlights the severity of poverty and vulnerability of farming households in the project area.

11. ***Targeting strategy***: The project will adopt a two-step targeting strategy. ***First***, the project will adopt ***geographic targeting*** by focusing on the villages that are most acutely affected by water scarcity within the 30% of mandals most impacted by groundwater depletion. ***Second***, the project will adopt a ***socio-economic targeting*** approach based on the poverty analysis of wealth ranking undertaken by BIRDS (2016)[23] as well as socio-economic categories prevailing in the project districts. The target group categories will therefore include all categories of farmers and landless including the SC & ST and vulnerable households such as women-headed households. Gender focusing on women would be integrated across the categories. For each category and subcategory of farmers, a tailored package of support will be provided based on their vulnerability and needs. Based on the latter, the farmers would benefit from crop-livestock development, rainwater harvesting (at field levels), soil and water conservation techniques, and improved water management systems thereby laying the foundation for groundwater-recharge planning. Activities related to crop and livestock extension services, demonstrations of sustainable agriculture practices and farmers' organizations will be common to all groups of farmers.

12. The project area covers 330[24] GP out of 5117 in the 5 districts; it will adopt a saturation approach in these GPs by targeting all farmers. It is estimated that 80% of farmers of the project area (the 330 GPs) will participate in the project activities. The social economic targeting approach will identify and support in each cluster the 100 poorer farmers which will represent 33000 poor farmers.

13. ***Geographic targeting***. Within each of the five project districts, there are mandals that are least developed having lower Mandal Domestic Products (MDP) based on Gross Value Added (GVA) in agriculture, industry, services and per capita income (PCI). While each District Administration has identified 10 bottom most mandals based on lowest overall MDP, the number of the poorest mandals for prioritizing geographical targeting are much higher as provided by the District Administration (25 in Kurnool, 20 in Prakasam, 17 in Kadapa, 13 in Ananthapuramu and 11 in Chittoor). Incidentally, these poorest Mandals are also in the list of drought Mandals declared by AP Government during 2015. Priority mandals would be those bottom mandals identified as the poorest and having least MDP, and not covered under on-going World Bank funded Andhra Pradesh Rural Inclusive Growth Project (APRIGP)[25]. The list of suggested priority mandals are given in the annex. This list is being further refined by the Department of Agriculture.

14. ***Socio-economic targeting***. The *target group* (Table 5) will include all farmers who rely on rainfed agriculture and groundwater-based irrigation. Most smallholder farmers relying on rainfed agriculture cultivate less than 3-5 acres and have 1-2 standard livestock units. Their cropping systems include red gram, Bengal gram, millet, groundnut and pigeon pea; off-farm income can represent up to 50 per cent of farm income. Groundwater-based farmers also tend to cultivate average of 5-9 acres and hold average of 2-3 livestock units; their cropping systems include rice, groundnut, millet, pigeon

[21] A mandal is an administrative unit in Andhra Pradesh equivalent to Block in other states of India. In a mandal there are several GP (Gram Panchayats) and each GP will have average of 5-6 villages.

[22] *Poverty and Gender Analysis Study Report of Ananthapur, Chittoor, Kadapa, Kurnool and Prakasam districts of Andhra Pradesh as part of Preparatory Mission of the Mitigating Droughts and Farmers Distress through Climate Resilient Agriculture*. Bharti Integrated Rural Development Society (BIRDS), Nandyal, Kurnool, May 2016.

[23] Ibid

[24] Some of *these will be outside of the target area in terms of drought, surface irrigation and poverty.*

[25] APRIGP covers 13 districts 150 mandals, including the proposed five APDMP districts of Ananthapuramu, Chittoor, Kadapa, Kurnool and Prakasam.

pea and chillies, and in some cases cotton. Farmers owning 5 acres and above, categorized as *middle-income farmers*[26], relying both rainfed and ground water irrigation, cultivate cash crops such as cotton, chillies (Prakasam) and groundnut (Ananthapuramu) or horticulture such as mango or pomegranate or sweet lime/orange; also have few units of livestock, both dairy and/or small ruminants.

15. Based on water distressed drought situations (rain deficit and ground water depleting), the *better off farmers, categorized as rich farmers (BIRDS, 2016)* having agricultural land of over 10 acres and above, will be included as target groups particularly under component 2 (*Drought proofing through NRM and governance*). The richer and better off farmers are important element in the rural social fabrics of Andhra Pradesh as they create jobs for landless as agricultural labours (average of 140-180 days per year for minimum of 10-12 farm labours per 10 acres as per field assessment). The better off farmers are the vital elements in introducing new technologies, participating in seeds systems, FPOs, farmers field schools, etc. by which the smallholder farmers also immensely benefits. The better off farmers are the important link for overall farming knowledge systems as they are the critical mass availing majority of trainings on agriculture and allied activities, and in turn share the knowledge with smallholder farmers through the informal social systems within the village socio-cultural context.

16. Socio-economic target groups will also include *the landless*, majority of whom are agricultural labourers. The landless, synonymous with agricultural labourers, constitute about 20.19% in the five project districts, lowest being in Kadapa (17.92%) and highest in Kurnool district (25.59%) as per assessment in 2014[27]. Most landless households work as agricultural labourers, but sizable landless families also take up farming on leased farm land (could be about 30% of landless as per estimates by district authorities during field visits). Thus, there would be two distinct groups of landless, viz. those working as agricultural labourer with few small ruminants, and those who farm as tenant farmer on lease agricultural land, also having few livestock, mainly small ruminants. Even though the GoAP has made provision of Loan Eligibility Card (LEC) for tenant farmers to avail bank loans, the overall percentage of LECs remain negligible (often the land-owner farmers could be bank loan defaulter and hence second loan is not given for the same plot of land when cultivated by tenant farmers). Majority of the landless households are from the social categories of SC and ST, also corroborated during the field visits. The lease rent represents 30% of produce in case of irrigated land (and 20% for rainfed crops). Such tenancy arrangements are endorsed in writing and the tenancy period can go up to one year.

17. *Women* will form important section of the target group, largely building on the principles of IFAD's gender equality and women empowerment, as also existing state policy on inclusive women development. Nearly 95% of women in the state are already in SHGs. The SHG membership is a vital link to development programmes and entitlements for the women. However, APDMP will not promote women SHGs as the policy of inclusion of women in SHG is well entrenched in AP with SERP taking up the tasks for the entire state, besides World Bank funded Andhra Pradesh Rural Inclusive Growth Project is already working in SC and ST dominated mandals in which women SHGs are being formed and capacitated. The project will include women farmers in the proposed FPO and farmers institutions, and will also support crop-livestock development. Given this, the SC/ST will not be considered as a specific subgroup; instead the project will ensure their participation in all project activities as part of the social inclusion approach.

18. *Youth* is another important target group of APDMP, especially those already engaged in agriculture or the new ones interested and willing to be involved in commercially viable farming activities, ICT activities, water monitoring, small scale agribusiness (e.g. butchery or postharvest activities). Between 50% and 80% of APDMP livestock activities will involve young men and women as Pashu sakhi/mitra, breeder, paravets or fatteners. Because of the fragmentation of land, youth tend to cultivate smaller parcels of land or are landless but given their inclination to new technologies this group can be involved in FFS, and other community platform as change agents and facilitators. The project will facilitate youth participation in community water governance bodies and FPO and farmers institutions, as well as in CLICs. The GP Water Sub-committees will identify data collection assistants

[26] Poverty and Gender Analysis Study Report of Ananthapuramu, Chittoor, Kadapa, Kurnool and Prakasam Districts by BIRDS, Hyderabad, May 2016.
[27] Hand Book of Statistics 2014 of Ananthapuramu, Chittoor, Kapada, Kurnool and Prakasam Districts.

to collect hydrological and meteorological data for which preference will be given to youth who are mobile and will be more effective in collecting the hydrological data from various locations in the GP.

19. A matrix of package of activities per target group is proposed based on the constraints and opportunities of each group as can be seen from Appendix 4.

20. *Social inclusion strategy* will also encompass the *vulnerable* households among the farmers' communities such as women-headed households, households with person of disability (PwD) and migrated households. The study by BIRDS (2016) from 20 sample villages across the five proposed project districts showed fairly high prevalence of women-headed households (lowest with 2.5% in Kurnool to a high of 22.1% in Kadapa), migrated households (3.7% in Ananthapuramu to 10.9% in Chittoor) and PwD households (3.0% in Kurnool to a high of 10.9% in Chittoor). Many of these vulnerable households including women-headed and PwD households are also the landless and smallholder farmers.

Table 5. Matrix of target group categories

Target groups categories	Characteristics / Explanation
1. All categories of land-owning farmers	
(a) Marginal & Small farmers	Owning land 1-3 acres, rainfed; 1-2 units of livestock
(b) Middle income farmers	Land 5-10 acres; dryland rainfed and/or Irrigated with bore wells or tanks; average 2 units of livestock.
(c) Rich or better off farmers	Land 10 acres and above; own bore wells and tanks; own tractor, livestock
2. Landless	
(a) Wage labour (Poorest), mostly ST & SC	Landless, solely depend on wage labour such as farm labour
(b) Tenant farmer (Poor), mostly SC, fewer ST	Landless, tenant farmer or cultivate land on lease; or rearing small ruminants (sheep and goat); petty business.
3. Women	
(b) SHGs & JLGs	All women enrolled in SHGs and/or formed JLGs
(c) SC, ST / landless	Women from SC & ST and landless; social inclusion
4. Vulnerable households	Households having Person with Disability (PwD); SC & STs, BC / BPL households having high indebtedness; women-headed households; migrated households.

Targeting Matrix and Sequencing

21. Table 6 gives an idea of component/activity-wise primary target groups and likely percentage of outreach against the baseline (this will need to be harmonized with logframe as applicable). Sequencing of targeting would be carried out by involving the primary target groups in the proposed activities of the project under each component. Targeting strategy would be inclusive by providing opportunities for involvement to all categories of target groups as per suitability and interest of the target groups following engagement principle of free prior informed consent particularly when it comes to vulnerable groups specially the SC and ST.

Table 6. Matrix of components/activities and targeting strategy

Component / Sub-components	Key activities	Primary target groups
1. Climate resilient production system		
1.1 Climate resilient crop production system	• Supplementary irrigation through bore well water sharing and lined farm ponds. • Enhancing soil moisture and fertility. • Improved cultivation techniques including multiple cropping systems and revival of	- All categories farmers - Farmers owning bore well and non-bore well owning. - Priority for smallholders and marginal farmers including from

Component / Sub-components	Key activities	Primary target groups
	traditional Navadhanya (nine grain) cropping system. • Advice on crop and variety selection would be provided via CLICs (Climate Information Centres). • Limiting wild animal damage. • Seeds systems including seeds supply and treatment	SC and ST and tenant farmers. - Seeds system with smallholders or farmers owning about 5 acres of land. - At least 50% of seeds producers are women.
1.2 Developing livestock production system	• Support production of small ruminants (mainly sheep) and backyard poultry; • JLG for livestock (mainly sheep) • Support in draught animal for farm and manure production • Fodder development • Support for access to rural financial services for livestock including insurance. • Capacity building for paravets and Pashu Sakhi	- Landless households (HHs) & other vulnerable HHs JLGs, of which 50% are women. - All livestock owning households (small ruminants).
1.3 Strengthening farmers' organisations	• Farmer Interest Groups (FIG) • Village Farmer Association (VFA)/GP level farmer associations / MACs • Farmer Producer Organisations (FPO)	- All categories of farmers - All tenant farmers - Women farmers and women-headed farmers
2. **Drought proofing through NRM and governance**		
2.1 Groundwater governance	• Formation of Groundwater Management Committee/sub-Committee (GMC) • Capacity building/ awareness for groundwater monitoring and planning • Support in supplementary irrigation including bore well water sharing	- Land owning HHs / farmers - Bore well owning farmers - Tenant farmers - At least 40% women memberships in all committees
2.2 Soil and water conservation	• Rainwater harvesting and groundwater recharge (including some farm ponds, check dams and other nulla improvement works, and various types of bunding) via convergence with MGNREGS. • Invest in bore well recharge.	- Land owning farmers - Bore well owning farmers - Tenant farmers
2.3 Common property resources	• Regeneration of common property resources (CPR). • Securing CPR rights through entry into the Prohibitory Order Book (POB) maintained at the mandal level. • Investments for regeneration and revegetation of CPR though soil and water conservation and planting of fodder plants, along with supplies of livestock drinking water (partly funded though MGNREGS).	- Landless HHs including from SC and ST with memberships in livestock JLGs. - All HHs owning livestock particularly small ruminants. - At least 50% of women JLGs.

D. Women and Gender Issues in Project Areas and Target Groups

22. Women in Andhra Pradesh, including in the project districts, are generally 'empowered' thanks to the SHG movement that brought this 'women informed, women transformed' slogan over the past 15-20 years. Although nearly 95% of women are enrolled in SHGs, however, the drought situation in the project districts for several years now have put the rural women in challenging conditions particularly from the vulnerable households such as SC and ST, most of whom are landless or tenant farmer, and marginal and small farmers who depend on rainfed agriculture. Even women farmers from better off households who depend on bore well irrigated farming have been put in severe stressed conditions as more that 50% of bore wells are non-functional as the groundwater has dried up.

23. A recent study by for APRIGP (SERP, 2014)[28] showed that rural women including those from vulnerable communities such as SC and ST encounter various types of disadvantages such as early marriage, vulnerable adolescent girls, low nutritional status, low literacy rate, domestic violence, access to justice, limited access to resources and control over assets. BIRDS (2016) has undertaken a gender analysis in the project areas around agriculture, livestock, and access to resources including water, land holding and bank loan. Emerging from the study as well as from field visits, some of the key women and gender issues in project areas and in the target groups are briefly outlined hereunder.

Agriculture

24. **Seeds**. Traditionally, seeds skills and knowledge on selection, collection and preservation of seeds have been with women. Seeds handling has changed from women to men due to changes from food crops to cash crops (such as cotton), mixed crops to monocrop, and from native/local seeds to packaged seeds from seed corporations/agencies. By these changes, women became doubly disadvantaged: (i) loss of income from seeds based on traditional seeds exchange practices as returns were measured in double resulting in loss of cash in hand from women, and (ii) loss of knowledge on traditional seeds and crops.

25. **Purchase of inputs.** Men handle the purchase of fertilizers, pesticides and seeds etc. Most of them are not on cash payments but on loan against the crop from dealers directly for which there won't be proper voucher or receipt and billing or warranty provided. Therefore if there is loss of germination the dealer will not take any responsibility and farmers cannot make any claims as they do not have receipts. The BIRDS' study revealed thriving spurious and low quality seeds and pesticides. This has greatly impacted the women farmers.

26. **Marketing.** Both buying of seeds and agricultural inputs and selling of agricultural produce are handled by men; most often women are sidelined in decision making processes in such activities. Women are not much aware of the income from the sale of agricultural produce in majority of the households interviewed.

27. **Grain processing and post-harvest operations.** However, women play prominent role in grain processing and post-harvest operations of grading and storage. There are immense opportunity to assist women to reduce drudgery and also time saving devices.

28. **Agriculture tools and implement.** Most of the agriculture tools and implements are designed for men farmers but at field level women farmers also use these tools and implements. It is therefore imperative that the trainings and facilitation sessions for farmers should include women for better results.

Livestock

29. **Animal care.** In most households of the study areas, buying and selling and grazing of animals are done by men. However, care and management of animals at the household levels are with women. Preparation of feeds and fodder, as well as health care of the animals are often done by the women which add to immense physical workload. In the water-scarce households, the situation is further compounded. It is important that the veterinary extension services are made gender-friendly and more accessible by women. Establishment of fodder banks and drinking water tanks for animals is very essential in view of severe drought. These were the demands of the women during field interactions of the mission with the project target groups.

30. **Women and small ruminants**. With mounting agricultural distress, women are increasingly opting for small ruminants as livelihood options. Goats and sheep are the preferred livestock. Livestock based Joint Liability Groups (JLGs) have been promoted in all the districts through NABARD. While the small ruminant JLGs in Prakasam are promising, the JLGs for buffalo milk in Ananthapuramu is challenging with many becoming defaulter to bank loan. **Ram lamb** business (rearing and fattening of 3-4 months old sheep and selling the same for meat purpose at 8-10 months) is another option that women SHGs are taking up in Chittoor with profitable margins.

[28] Social Management Framework – Andhra Pradesh Rural Inclusive Growth Project. Society for Elimination of Rural Poverty (SERP), 2014.

Access to resources

31. **Access to farm implements, credit, line department and training**. BIRDS' (2016) study revealed that both men and women have differential access to these resources across the five districts. While 100% men had responded to having access to all the mentioned resources, only 50% of women said that they have access to all the resources. Generally women are seen to be less advantageous than men when it comes to access to these resources. While women see the need for more women-friendly tools and implements, even the trainings and capacity building programmes on agriculture (as more than 50% of participants are always women) should be sensitive to women's situations and needs such as venue, timing, topics and resource persons. The present project will enhance the participation and inclusion of women in all its interventions including improving access to resources.

32. **Land holding by women.** On an average, women hold about 25% of land in the five districts (ranging from 20% in Chittoor to 33% in Ananthapuramu and Prakasam). The mission interacted with Yanadi ST Community from Parameswaranagar habitation under Gadikota GP in Giddalur mandal of Prakasam district where the land has been given in the name of the women, every family having about 3 acres each for rainfed cultivation. Increasing women's access to land could significantly improve the restoration of food crops and revival of mixed crops as the women will have decision-making authority over such land owned by them in terms of crops and varieties to cultivate.

33. **Access to water.** BIRDS (2016) study outlined water in the project areas in the context of functional bore wells. From a sample of 16 villages in 4 districts, the study revealed that the functional bore wells were alarmingly low, being 44% in Ananthapura (68 out of 153 bore wells), 11% in Kadapa (38 out of 358), and 24% in Kurnool (50 out of 210). Field assessment indicated that non-functional bore wells coupled with decreasing water table have impacted both agriculture and livestock, women in particular feeling the burden as they have to manage domestic water needs including for the use of domestic animals. The project will include women in water governance, water auditing and budgeting, besides addressing the re-charge requirement of non-functional bore wells.

34. **Control and decision making on agriculture crops and income**. An assessment of control on crop cultivation, varieties to be cultivated and use of family income either by men and women in the household reflected skewed control mostly by men (Table 7). As food crops and mixed cropping system declined and non-food crops became dominant with packaged seeds coming from markets, decision making on crops became men's overwhelming responsibilities. Use of income too often shifted to men in most districts, except in Chittoor and Kadapa where both men and women tended to share equal responsibility.

Table 7. Percentage of men and women having control and decision making on crops and income

Districts	Control and decision making on (% of men and women)					
	Crop cultivation		Variety to be cultivated		Use of family income	
	Men	Women	Men	Women	Men	Women
Ananthapuramu	50	50	62	38	68	32
Chittoor	50	50	63	37	53	47
Kadapa	100	0	100	0	50	50
Kurnool	85	15	100	0	78	22
Prakasam	80	20	90	10	65	35

(Source: BIRDS, 2016)

35. **Access to loans**. Women as members of SHGs have fairly good access to loan from bank. Up to INR 500 000 (equivalent to INR 50 000 per member) is interest free (interest paid by the government). The women SHGs also have access to finance from *Sthree Nidhi* and Community Investment Fund (CIF) via the Mandal Samakhyas and Village Organisations (VOs). *Sthree Nidhi* Credit Cooperative Federation Ltd is the initiative of GoAP to supplement credit flow from banks to the women SHGs, while CIF is also to supplement credit needs of the women SHGs to diversify livelihoods. However, it was mentioned during field visits that for rainfed crop, the loan is only about INR 20 000 to 30 000 per household or per farmer; a tenant farmer can get up to INR 100 000 if he/she has Loan Eligibility Card (LEC).

Women and gender issues with respect to other socio-economic parameters

36. **Women-headed households**. Approximately 9.40% of households were found to be women-headed from the study done by BIRDS (2016) in the five project districts. Most of them being widows as evidenced from the field interactions, they are from poor households and therefore vulnerable. Some of them continue to cultivate the field owned by husband, but again most of these households that the mission interacted with were marginal and smallholder farmers. Majority of the women-headed households continue to bear the burden of loan taken by their husband or the family as informed during the field interactions.

37. **Women and Person with Disability (PwD)**. The study by BIRDS (2016) from the 20 sample villages of the five project districts showed that nearly 11.58% of households have person with disability (PwD). From field interactions it was evidenced that women from such households are in disadvantaged situations as often the burden of caring the disabled person/s are overwhelmingly the responsibility of women, being the mother or sister in most cases.

38. **Women and migrated households**. Women from households having migrated family members particularly the husband migrating for periodic wage labour to some other places put the women in additional burden to care for the households including small livestock and backyard agricultural fields. At least 6.74% of households have someone migrating from the family in the project districts (BIRDS, 2016). Many of these households are forced to migrate due to distressed situations, mostly in search of seasonal wage labour.

Gender mainstreaming in APDMP

39. Gender mainstreaming in APDMP will be guided by IFAD's *Gender Equality and Women's Empowerment Policy 2012*. Gender issues and concerns will be addressed in a cross cutting manner across all components and sub-components and in programme management (see **Annex 1 for Gender Checklist**). The programme will adopt a Knowledge management-centric approach to bring about more comprehensive learning to guide implementation, enabling poor rural women and men to improve their livelihoods and nutrition security, raise their incomes and strengthen their resilience. Additionally, APDMP will enable women and men to have equal voice and influence in rural community organisations and farmers' organizations and achieve a more equitable balance in workloads and in sharing of economic and social benefits.

40. The project's gender strategy will facilitate women's participation in: (i) water management committees and farmer-producer organisations (FPOs); (ii) demonstrations and extension activities on improved practices and less water-demanding and more nutritious crops; (iii) small-ruminant livestock development activities; (iv) initiatives to improve access to potable water and reduce workloads; and (v) farmers interest groups for specific livelihoods such as livestock. They will also participate and be included in the Farmers' Field School (FFS), Seeds Systems, etc. that the project proposes to promote. Experience shows that where self-help groups are active, women are ready to assume greater roles in their community; women are very aware about social entitlements and they demonstrate entrepreneurial skills. It is significant that the gender ratio in Andhra Pradesh has improved to 996 in 2011 compared with 978 in 2001.

41. **Lessons learned from IFAD projects on gender mainstreaming**. Although the project is not about gender empowerment, however, it is intended that women will be part of the inclusive interventions alongside the men to address disadvantages in rural situations in the project areas and thereby improve the overall household resilience to climate change. Therefore, it would be pertinent to briefly outline the various projects in India that have demonstrated encouraging results in enhancing gender equality and women empowerment.

- In Maharashtra, the Tejaswini project has brought about women's social and economic empowerment through the inclusive strategy of women SHGs and CMRC (Community Managed Resource Centres).
- Inclusion of both men and women in CBOs such as Natural Resources Management Groups (NaRMG) in NERCORMP and GSPEC in JTELP in Jharkhand with both men and women having equal rights to leadership and responsibilities have significantly improved women's participation in development planning, implementation, monitoring and auditing.
- In Tejaswini MP project, socially empowered men and women have taken up the cause of gender equality and women empowerment through its 'Shaurya Dal' in addressing justice for women; the

project has also enhanced the economic opportunities of women by re-introducing and scaling-up millets cultivation by the women farmers.
- Economic empowerment strengthened through women JLGs in PTSLP project in Tamil Nadu particularly by cultivating high value vegetables.
- In NERCORMP, the women via SHGs have formed apex organisation to promote savings and micro-credits among the women (an example is the UDWIN in Ukhrul district of Manipur).
- In MPOWER in Rajasthan, the women are active participants and often drivers of livelihoods particularly in livestock (small ruminants); all *Pashu Sakhis* are women providing extension support to households taking up goat rearing.
- All projects have gender mainstreaming strategy and use gender disaggregated data in all reporting formats.

Gender mainstreaming in project/programme management

42. APDMP will follow a Gender and Development (GAD) approach, focusing on equitable inclusion of both men and women in all FPOs and farmers organisations and institutions to be formed. GAD seeks to have both women and men equitably participate, make decisions and share benefits. It aims at meeting practical needs as well as promoting strategic interests of women and men and is in line with IFAD's Gender Equality and Women's Empowerment Policy. The PMU will have a Gender Focal Person, reporting to the Programme/Project Director, who will provide inputs on implementing the gender action plans and tracking results. The Gender Focal Person will be part of the programme management team, so as to provide inputs for decision-making on programme activities and to ensure that gender and social development issues are mainstreamed at various levels of programme activities. The Gender Focal Person will also be part of the M&E system so as to capture, monitor and follow-up on all on-going field activities and co-ordinate/facilitate all trainings on gender issues.

43. The project will develop the Gender Strategy and Action Plan for the programme (G*uidelines for preparing the Gender Strategy and Action Plan along with ToR for Gender Focal Person will be provided in* PIM*)*. The Gender Strategy and Action Plan will be based on the principles and strategies of IFAD's Gender Equality and Women Empowerment Policy 2012 to guide planning, implementation, monitoring and evaluation of the programme. Gender mainstreaming will be across all programme interventions and the organisational set up. The strategy will have gender check-list in all components/ subcomponents or activities of the programme.

44. Special efforts will be made to build the capacities of project staff for gender equity and social inclusion so that they understand the gender and social dynamics at project sites, and the project intervention paradigm. This will enable the staff to increase the participation of marginalized groups through programme implementation, to maximize outputs and outcomes. Some of the thematic training areas would include, *inter alia*, (i) gender and climate change; (ii) gender and livelihoods; (iii) gender and water governance institutions; (vi) gender and water management. Women's strength and potential to become change agents will be emphasised. Additional capacity building in skill development may be organised for the women on various aspects of agricultural production and livestock management including adaptation to climate change or climate-resilient farming practices. All data related to project components will be sex-disaggregated.

Gender integrated M&E system

45. The programme will develop a gender sensitive M&E framework. Some examples are outlined in Appendix 6. The baseline for the programme will cover information that will help the programme to monitor progress with a focus on gender and vulnerability aspects. Some of the aspects that can be captured will include: (i) main livelihood and income sources of men and women; (ii) expenditures by men and women; (iii) ownership and control over household assets by men and women; and (iv) leadership position in FPOs/FOs by men and women. The sample for surveys and studies will include carefully crafted parameters on women's proportional representation to programme coverage so that the information gathered is truly representative. RIMS+ Baseline Survey will also be design to capture sex-disaggregated information. Cost for all gender related activities will come from the overall programme management cost.

46. **Gender and vulnerability disaggregated reporting**. The project will design Reporting Formats to collect separate data for women and men. Staff engaged in collecting, reporting and

analysing data will be sensitized and trained accordingly. Some examples of gender and vulnerability disaggregated data could include:

- No of PwD and women headed households, and their memberships in FPOs and farmers groups on water, agriculture and livestock.
- Number and percentage of women and men as members in FPOs, farmer's organisation and water related organisations.
- Women and men as president or in leadership position in FPO and other farmers organisation.
- Women as a percentage of members of various farmers' groups and cooperatives;
- Women and men as a percentage of participants in all the trainings.
- Women and men as a percentage of programme staff, by level.

47. **Gender Sensitive Monitoring of Programme Outcomes**: The project will develop gender and poverty sensitive outcome indicators for monitoring across its activities/components. The indicators would be based on project logical framework. The results of these indicators could be verified through Annual Outcome Surveys and/or focused group discussion by M&E or programme staff visiting the fields or through specialised studies.

48. **Special studies and field verifications:** The project will also undertake at regular intervals some special qualitative studies with quantitative data as applicable to assess the programme influence/outcomes/impacts on some key areas or indicators. Some of these could be:

- Changes in livelihood and income patterns of men and women from smallholders.
- Changes in ground water regime and overall impacts on women and marginal farmers.
- Changes in division of labour between women and men.
- Changes in the leadership levels for women and men.
- Differences in access to, and control over, resources between women and men.
- Changes in decision making patterns between women and men at the household and community.
- Changes in women and men on knowledge of and access to their rights and entitlements.
- Changes in men's and women's attitudes, perceptions, practices, knowledge and feeling of empowerment and attainment of general wellbeing and happiness.

49. ***Gender and vulnerability Sensitive AWPBs***: The project will attempt achieving substantial results and impact by allocating adequate financial resources under different components/sub-components capable of benefiting the poor and poorest or vulnerable target groups/households.

50. ***IFAD's facilitation***. IFAD and the project will ensure that trainings on gender and social inclusion are organised periodically. IFAD will also ensure that specialist skilled in reviewing gender and poverty targeting issues is included in all Joint Review/Supervision missions. If required an expert may also be fielded for a specialised support on gender and poverty. The expert would assess the progress and performance of the project with reference to gender and poverty targeting, compare qualitative and quantitative achievements as per AWPB and overall project strategy, highlight key issues, achievements and constraints. The specialist would review the gender performance of all participating partner institutions as well. IFAD will follow-up to monitor the recruitment of gender-balanced project team at all level including the staff pf implementing partners.

E. Gender and Social Inclusion Targeting Strategy in Project Components

51. Table 8 (to be read with Annex 1 and Annex 2) briefly illustrates the various gender and social inclusion targeting strategy in the implementation of project components and activities. This table has been prepared based on mission deliberations and field assessment which may be further revisited during appraisal and/or implementation.

Table 8. Gender and social inclusion targeting in project components

Component & sub-component	Key activities	Gender and social inclusion targeting
1. **Climate resilient production system**		
1.1 Climate resilient crop production system	• Supplementary irrigation through bore well water sharing and	• All categories farmers via farmers' organisations will be included for support for bore well water sharing and lined farm ponds with particular attention that non-borewell

Component & sub-component	Key activities	Gender and social inclusion targeting
	lined farm ponds. • Enhancing soil moisture and fertility. • Improved cultivation techniques including multiple cropping systems and revival of traditional Navadhanya (nine grain) cropping system. • Advice on crop and variety selection would be provided via CLICs (Climate Information Centres). • Limiting wild animal damage. • Seeds systems including seeds supply and treatment	owning smallholders and marginal farmers including from SC and ST and tenant farmers from adjoining areas are included in water sharing mechanism. • Support for soil moisture and fertility enhancement will have special focus for marginal and smallholder farmers as well as SC and ST and other vulnerable households. • Improve cultivation techniques and crop diversification system will target all categories of farmers. • Advisory services on crop and variety selection will also cover all categories of farmers. • Smallholders and marginal farmers will be supported specially to reduce wild animal damage. • Developing seeds systems will target medium farmers with land holding of around 5 acres and above, but seeds treatment will cover all categories of farmers with focus on marginal and smallholders including tenant farmers, SC and ST. • At least 50% of participants in seeds systems will be women farmers.
1.2 Developing livestock production system	• Support production of small ruminants (mainly sheep) and backyard poultry; • FFS for livestock (mainly sheep) • Support in draught animal for farm and manure production • Fodder development • Support for access to rural financial services for livestock including insurance. • Capacity building for paravets and Pashu Sakhi	• Landless households (HHs) including from SC and ST and other vulnerable HHs (such as women-headed HHs, PwD) will be included in livestock JLG for small ruminants (mainly sheep) and backyard poultry based on their interest and capacity. • At least 40% membership in livestock FFS will be women. • Livestock owning households including from SC and ST (membership in livestock JLG) having small land will be included for support in fodder development • Smallholders and marginal farmers including from SC and ST and other vulnerable HHs having farm land will be supported for draught animals and manure production. • 100% women in livestock FFS should have access to rural financial services to support livestock including livestock insurance. • At least 40% of paravets and Pashu Sakhi promoted for small ruminants should be women, and all capacity building programme on livestock should have at least 50% women participation.
1.3 Strengthening farmers' organisations	Mobilisation of farmers and producer organisations: • Farmer Interest Groups (FIG) • Village Farmer Association (VFA)/GP lever farmer associations / MACs • Farmer Producer Organisations (FPO)	• Smallholders, marginal farmers, tenant farmers including from SC and ST and other vulnerable HHs owning farm land will be included in agriculture/crop based FIGs. • At least 40% membership in FIGs should be women farmers. • Livestock FFS/MACS will include landless HHs including from SC and ST and other vulnerable HHs interested in livestock (sheep) and backyard poultry. • At least 50% membership in livestock FFS/MACS should be women. • VFA/GP level farmers association/MACs / FPOs will have membership from all categories of farmers from a given village or GP including tenant farmers from SC and ST and other vulnerable HHs. • At least 40% VFA/GP/FPO membership should be women including equal representation in the executive committees.
2. ***Drought proofing through NRM and governance***		
2.1 Groundwater governance	• Formation of Groundwater Management Committee/sub-	• GMC will be formed by farmers owning bore wells irrespective of land holding sizes. • At least 40% membership in GMC to be held by women farmers.

Component & sub-component	Key activities	Gender and social inclusion targeting
	Committee (GMC) • Capacity building/ awareness for groundwater monitoring and planning • Support in supplementary irrigation including bore well water sharing and lined farm ponds	• All categories of farmers irrespective of land holding including tenant farmers and farmers from SC and ST and other vulnerable HHs, either owning bore well or not owning bore well to be included in the FWS. • Supplementary irrigation by bore well water sharing and lined farm ponds to include small and marginal farmers including farmers from SC and ST and other vulnerable HHs. • All capacity building activities will include all categories of farmers using groundwater and/or sharing bore well water. • At least 40% of participants in capacity building should be women.
2.2 Soil and water conservation	• Rainwater harvesting and groundwater recharge (including some farm ponds, check dams and other nulla improvement works, and various types of bunding) via convergence with MGNREGS. • Invest in bore well recharge.	• Will include all land owning farmers irrespective of land holding but with priority for small and marginal including SC and ST farmers, and vulnerable HHs. • At least 50% of MGNREGS beneficiaries should be women. • Priority for bore well recharge should be from the small and marginal including the SC and ST HHs and women-headed farming households owning non-functional bore wells.
2.3 Common property resources	• Regeneration of common property resources (CPR). • Securing CPR rights through entry into the Prohibitory Order Book (POB) maintained at the mandal level. • Investments for regeneration and revegetation of CPR though soil and water conservation and planting of fodder plants, along with supplies of livestock drinking water (partly funded though MGNREGS).	• Landless HHs including from SC and ST (membership in livestock JLG) will be included in the regeneration and development of CPR and/or in its committees. • At least 40% of the members in CPR should be women with an equal representation in the executive committees. • In all MGNREGS works, at least 50% beneficiaries should be women.
3. **Management and lesson learning**	• Programme management, establishment of PMU and DPMUs. • Procurement and engagement of project support organisations such as Lead Technical Agency (LTA) and Resource Organisation (RO). • Setting up of M&E and KM systems. • Capacity building of staff.	• Project will capture and document knowledge and good practice from programme implementation, especially related to climate resilience crop-livestock systems, water governance and FPOs. • All knowledge products will be shared with programme stakeholders and other to leverage policy support for broader climate resilient crop-livestock systems and water governance. • Issues affecting participation of vulnerable households and target groups including SC, ST, landless and women's participation and well-being will be included in all policy discourses and highlighted in reporting. • Staff capacity building will include gender and social inclusion sensitization. • PMU, DPMU, LTA and RO staffing should be gender-balanced.

ANNEX 1

IFAD's Key Features of Gender-sensitive design and Implementation

Gender Checklist	APDMP Design response
1. The project design report contains – and project implementation is based on - gender-disaggregated poverty data and an analysis of gender differences in the activities or sectors concerned, as well as an analysis of each project activity from the gender perspective to address any unintentional barriers to women's participation.	APDMP is a drought mitigation project. It may be mentioned here that inclusive women development in Andhra Pradesh have been well entrenched through their inclusion in SHGs (95% of women are members in SHGs); also SERP as a dedicated agency has been focusing on development of women as also poverty alleviation. However, the APDMP project design is based on the analysis of gender and poverty in programme areas conducted by an agency as pre-design study. Adequate measures have been put in place to ensure equal participation of women and men farmers in all activities. The various farmers groups such as FPOs, VFA, FIGs and cooperatives to be formed will have at least 40% membership of women. In fact, at least 50% participants in livestock activities would be women based on experiences in the state. Any committees to be established at the village level or group level will also have at least 40% participation of women with equal representation in the executive committees.
2. The project design report articulates – or the project implements – actions with aim to: *Expand women's economic empowerment through access to and control over productive and household assets;*	Notwithstanding over 95% of the women being in the SHGs over the past 15 years or more with several cycles of bank linkages, the economic empowerment of rural women particularly among SC and ST and a section of BC remain areas of concern. Only 30% of women in programme areas have land ownership; among SC and ST, landlessness is over 75% of the households. The project's interventions will further expand women's economic empowerment by including them in both crop and livestock interventions. Water governance for water sharing, crop diversification, seeds treatment, soil moisture and fertility enhancement activities will encompass the women. Small ruminant livestock activities will include women. Regeneration and management of CPR for grazing land development will include women. The women farmers will be supported for access to rural finances and crop/livestock insurances. Capacity building and knowledge services will encompass the women farmers.
Strengthen women's decision-making role in the household and community, and their representation in membership and leadership of local institutions;	Women will be included in all the community organizations or activity groups proposed to be formed or promoted such as Farmer Interest Groups (FIG); Village Farmer Association (VFA)/GP level farmer associations / MACs; Farmer Producer Organisations (FPO). Nearly 40-50% memberships would be formed by women with equal representation in leadership and committees. Women-oriented capacity building programme as well as leadership development programme would be dovetailed to enable women's more effective participation in decision-making processes both in the households and in the community and groups. The various farmers' groups and cooperatives will be facilitated to provide required space for women to be leaders and responsible positions. The programme will enable women to take active roles in decision-making processes of the community as members and/or leaders in the groups.
Achieve a reduced workload and an equitable workload balance between women and men.	A number of proposed activities in the project will reduce workload and ensure an equitable workload balance between men and women. Water sharing mechanism for improved availability of water among the households can reduce the workload of women. Similarly, regeneration and development of CPR will improve fodder availability and hence reduce women's workload of feeding animals at household level. Access to paravet services, improved night shelter for small ruminants, insurance coverage, availability of water for animals, etc. will reduce workload of the women and ensure a more equitable workload balance between men and women.

3. The project design report includes one paragraph in the targeting section that explains what the project will deliver from a gender perspective.	Yes, see the text under targeting.
4. The project design report describes the key elements for operationalizing the gender strategy, with respect to the relevant project components.	Yes, please refer to the table briefly outlining the gender mainstreaming and social inclusion strategy of the project; may also be read along with Appendix 6 indicating gender sensitive monitoring & evaluation.
5. The design document describes - and the project implements - operational measures to ensure gender- equitable participation in, and benefit from, project activities. These will generally include:	
Allocating adequate human and financial resources to implement the gender strategy	Adequate human resources in PMU with a Gender Focal Person, in LTA a Gender Expert recruited on a need basis , and in the Facilitating Agency, a Gender/Equity enabler have been provided in the design. The programme will also provide adequate financial resources for developing and implementing a gender strategy. The gender focal person at PMU will spearhead gender and women empowerment related activities with the assistance of the LTA.
5.2 Ensuring and supporting women's active participation in project-related activities, decision-making bodies and committees, including setting specific targets for participation	Equal participation and representation in all farmers groups / production groups and cooperatives will be ensured; many of the livestock activities would involve women as is being done in some districts.
5.3 Ensuring that project/programme management arrangements (composition of the project management unit/programme coordination unit, project terms of reference for staff and implementing partners, etc.) reflect attention to gender equality and women's empowerment concerns	The need to have a gender-balanced human resources at all level (PMU and DPMU of the project, LTA, RO, etc.) has been flagged. All project management staff will be capacitated to address gender issues in all project activities including in the M&E data and reporting system to fully capture the potential of women in the development discourse.
5.4 Ensuring direct project/programme outreach to women (for example through appropriate numbers and qualification of field staff), especially where women's mobility is limited	The design will put upfront for the government to consider equally qualified women candidates while filling in positions for the APDMP.
5.5 Identifying opportunities to support strategic partnerships with government and others development organizations for networking and policy dialogue	The programme will work with various line departments of GoAP such as Agriculture, Horticulture, Animal Husbandry, Rural Development, Water Resource Management, Irrigation and including district administration and other government agencies for coordinated efforts to reach the target households. This will ensure networking and policy dialogue processes.
6. The project's logical framework, M&E, MIS and learning systems specify in design – and project M&E unit collects, analyses and interprets sex- and age-disaggregated performance and impact data, including specific indicators on gender equality and women's empowerment.	These have been incorporated as part of project design; see in Appendix 2 and Appendix 6 of the Design Report for further references and details.

Annex 2

IFAD's Targeting Policy – Checklist for Design

Targeting checklist	APDMP Design RESPONSE
1. Does the main target group - those expected to benefit most- correspond to IFAD's target group as defined by the Targeting Policy (poorer households and food insecure)?	APDMP being a drought mitigation project, it will target all categories of farmers (classified according to land holding by GoAP; and by wealth ranking according to Gender & Poverty study by BIRDS 2016) having to respond to drought situation. Being groundwater management, the target groups will also include farmers owning bore wells or dysfunctional bore wells. Within the farmers groups, special focus would be the smallholders (classified as marginal farmers owning below 2.47 acres and small farmers owning between 2.47 to 4.93 acres) or middle income farmers (owning about 5 acres of land) and better off farmers or rich farmers (owning 10 acres and above) as per wealth ranking (BIRDS 2016) together with the poor (tenant farmers) and poorest (landless daily wage households). Due to long prevailing drought conditions and depleting groundwater resources, even the middle income and better off farmers are in distressed conditions and have potential to become critical.
2. Have target sub-groups been identified and described according to their different socio-economic characteristics, assets and livelihoods - with attention to gender and youth differences? (Matrix on target group characteristics completed?)	The target sub-groups have been identified and described according to their different socio-economic characteristics and assets in the section under poverty. The project sub-target groups will include vulnerable households – SC, ST, women-headed, household having PwD, migrated households and all women in general. The sub-group will also include landless household dependent on agriculture/farm labour or any other daily wage and landless households taking up tenant farming on leased land usually on annual basis. Large number of smallholder farmers and middle income farmers have dysfunctional or non-functional bore wells (up to 70% in some cases) who would be supported in both bore well recharge activities and crop-livestock production system.
3. Is evidence provided of interest in and likely uptake of the proposed activities by the identified target sub-groups? What is the evidence? (Matrix on analysis of project components and activities by principal beneficiary groups completed?)	A matrix showing the evidence of interest in and likely uptake of proposed intervention by different target group categories provided (see Table 6; may be read with Table 8). This is based on design mission's assessment during field visits in all the five districts. (This may be revisited during appraisal and/or during implementation).
4. Does the design document describe a feasible and operational targeting strategy in line with the Targeting Policy, involving some or all of the following measures and methods:	
4.1 ***Geographic targeting*** *– based on poverty data or proxy indicators to identify, for area-based projects or programmes, geographic areas (and within these, communities) with high concentrations of poor people*	The project will work in five districts: Ananthapuramu, Chittoor, Kadapa, Kurnool and Prakasam with prolonged spelled of drought where 539 mandals have been declared as drought-affected in 2015. The project will prioritize the least developed mandals or poorest mandals having lower Mandal Domestic Products (MDP) based on Gross Value Added (GVA) in agriculture, industry, services and per capita income (PCI). While each District Administration has identified 10 bottom most Mandals based on lowest overall MDP, the number of the poorest Mandals for prioritizing geographical targeting are much higher as provided by the District Administration (25 in Kurnool, 20 in Prakasam, 17 in Kadapa, 13 in Ananthapuramu and 11 in Chittoor). These poorest mandals are also in the list of drought Mandals declared by AP

	Government during 2015. The project may avoid those mandals where Andhra Pradesh Rural Inclusive Growth Project (APRIGP)29 is working. The list of suggested priority mandal will be provided in relevant WP.
4.2 ***Direct targeting*** *- when services or resources are to be channelled to specific individuals or households*	For direct targeting, appropriate selection criteria have been set out either based on target groups such as climate-resilient crop-livestock production for smallholders including vulnerable HHs from tenant farmers, women headed HHs, households with PwD, migrated HHs. These categories of HHs as well as the landless HHs interested in small ruminant livestock will be directly targeted. Smallholders having borewells will be targeted for recharge and water-sharing mechanism. All better off farmers having borewells will also be supported for recharge activities including water harvesting and soil moisture-fertility enhancement activities particularly in capacity building through FPOs.
4.3 ***Self targeting*** *– when goods and services respond to the priority needs, resource endowments and livelihood strategies of target groups*	A mechanism for self-targeting would be for access to financial services including insurance and also inclusion in the FPOs and farmers organisations. Smallholder households and better off households in a selected village including vulnerable HHs would be facilitated to be included into any of the farmers groups based on their aptitude and inclination either for agriculture or livestock rearing (small ruminant and backyard poultry) as practical approach to self-targeting. Every willing household would also be encouraged to undertake diversification by planting diversified crops as practical approach to climate change adaptation. The poor or poorest households among them would also be encouraged to self-target for backyard poultry or small livestock rearing. The participating HHs would be provided necessary input support, capacity building, and credit and market linkages as demonstration to wider climate resilience.
4.4 ***Empowering measures*** *- including information and communication, focused capacity- and confidence-building measures, organisational support, in order to empower and encourage the more active participation and inclusion in planning and decision making of people who traditionally have less voice and power*	Empowering measures will be ensured by inclusion of men and women from smallholder poor and poorest households including from SC and STs in the various farmers' groups/producers groups or cooperatives that the project will promote; by capacity building programmes these target groups would be oriented to actively participate in group activities and leadership positions. Traditionally these categories of target groups have less voices and negotiating power in social discourse. Participatory processes will be employed to seek participation of the these categories of HHs.
4.5 ***Enabling measures*** *–to strengthen stakeholders' and partners' attitude and commitment to poverty targeting, gender equality and women's empowerment, including policy dialogue, awareness-raising and capacity-building*	The project design of APDMP includes all enabling measures to strengthen stakeholders' and partners' attitude and commitment to poverty targeting, gender equality and women's empowerment. The enabling measures are integrated in the planning and M&E systems at various level of the programme management. Besides lessons from various IFAD projects in the country, SERP has models of enabling measures but will also include appropriate capacity building activities for the project staff and implementing partners. The leaders in FPOs and FOs will be trained adequately.
4.6 ***Attention to procedural measures*** *- that could militate against participation by the intended target groups*	The programme design has put in adequate procedural measures to ensure participation of target groups from the poor and poorest households. This includes their inclusion in various farmers' groups/producer groups including CIGs and JLGs. The LTA and RO participating in the implementation of the project components will ensure in putting in place all the procedural measures needed to access the project benefits as also to be included in the FPO, FGs, etc.

[29] APRIGP covers 13 districts 150 mandals, including the proposed five APDMP districts of Ananthapuramu, Chittoor, Kadapa, Kurnool and Prakasam.

4.7 ***Operational measures*** *- appropriate project/ programme management arrangements, staffing, selection of implementation partners and service providers*	The project will be managed by Department of Agriculture (DoA) of GoAP. The PMU will be housed in the DoA and supported by LTA at the state level and facilitating Agencies in the district level. The GoAP in general has been one of the pioneers in the country addressing rural poverty and empowerment via SHGs targeting the women. GoAP has created a specialised agency called SERP as vehicle for poverty reduction and women empowerment programme. The staffs selected for APDMP together with the staffs from districts and implementing partners would be appropriately oriented to IFAD's targeting policies and gender empowerment issues during the technical start-up as well as during supervision mission/implementation support mission.
5. **Monitoring targeting performance**. Does the design document specify that targeting performance will be monitored using participatory M&E, and also be assessed at mid-term review? Does the M&E framework allow for the collection/analysis of sex-disaggregated data and are there gender-sensitive indicators against which to monitor/evaluate outputs, outcomes and impacts?	The design specifies use of participatory M&E and collection and analysis of gender disaggregated data. Both Appendix 2 on Poverty, Targeting and Gender and Appendix 6 on M&E provide outlines for gender sensitive monitoring to be undertaken by the project. Target groups related information would be generated at baseline and monitoring targeting performance would be done during subsequent Annual RIMS Report (with sex-disaggregated data), Annual Outcome Surveys, FMR, as well as during the Mid-Term Review (MTR) and Endline Survey. Periodically, APDMP will also undertake specific evaluation studies on specific target groups and/or targeting effectiveness as would be outlined during the implementation supports and supervision missions. It may be mentioned that poverty targeting (by identifying the most vulnerable and extremely poor households for direct and specific interventions) is the policies of GoAP as evidence through its interventions via SERP and other programmes. The project M&E indicators will include specific target group interventions.

Appendix 3 : Country performance and lessons learned

1. In 2015 the independent IFAD Office of Evaluation (IOE) carried out the second country programme evaluation (CPE) of the India portfolio. The CPE found that IFAD's intervention paradigm continue to be very relevant and has positive impact in terms of household assets and income, human and social capital, innovation/ scaling up and moderately satisfactory in other domains. Consistent with present and past COSOPs, projects targeted the lagging states and geographic areas characterised by lower rainfall patterns, low fertility of soils or degraded natural resources base and poor infrastructure (e.g. poor quality of roads, lack of electricity, potable water).

2. Overall, the intervention paradigm with disadvantaged groups is valid as IFAD-funded projects focus on particularly disadvantaged groups among the rural poor, and include the scheduled tribes, castes, women and the landless as their target group. This approach helps tackle four structural issues: (i) material disadvantages (in terms of health, education, economic production); (ii) socio-cultural exclusion (e.g. discrimination and bias); (iii)increasingly difficult access to natural resources and agricultural land; and (iv)absence of public institutions(e.g., limited presence of state technical services as well as local government bodies).

3. In terms of outreach, approx. 1.6 million households have been reached from 2011 to 2015. Impact surveys show that IFAD funded projects are reducing poverty, with increased income and ownership of assets, increased food security, improved housing, better access to water and hygienic sanitation, and women's empowerment. The allocation of IFAD lending funds for India significantly increased during the period of this COSOP, with the result that IFAD loans range in size from USD 50-90 million. The efficiency of the programme has also improved. Recent projects have adopted a saturation approach to targeting to reduce transaction costs in service delivery. Larger loan sizes combined with this saturation approach has also increased efficiency. Efficiency in loan administration has improved significantly with an increase in loan disbursements compared to previous years, and reduced time in processing withdrawal applications. Opportunities to further improve the implementation of IFAD projects include regular follow-up training on M&E and financial management.

4. IFAD has accumulated considerable experience in India with a host of lessons emerging from its implementation experience. These lessons cover a range of issues regarding the best approach to deal with social and economic inclusion, empowerment, partnerships, targeting, sustainability and impact. Some of the key lessons learned by the overall IFAD programme in India include

5. Targeting. The targeting of disadvantaged groups in remote areas combined with a ''saturation approach'' is a valid intervention paradigm. The project will therefore cover all farmers in the 330 GP, with the expectation that 80% of them will be involved in the project activities. The saturation approach helps avoid portfolio dispersion at the national level and at the sub-state level. New project designs that have adopted the saturation approach are likely to demonstrate greater management efficiencies too. The gender dimension followed the same thematic/sub-sectoral priorities as in the rest of the programme.

6. Community empowerment and community institution building. The portfolio tackled four structural issues: (i) material disadvantages (in terms of health, education, economic production); (ii) socio-cultural exclusion (e.g. discrimination and bias); (iii) increasingly difficult access to natural resources and agricultural land; and (iv)absence of public institutions(e.g., limited presence of state technical services as well as local government bodies). Combining interventions to cater to basic need, community empowerment and agricultural production is an important asset. Indeed without tackling basic needs, people would not be healthy to undertake additional productive activities (e.g. growing crops, rearing livestock).Without easy access to potable water, women would have little time to engage in savings and credit activities. Similarly, without building community and group trust, it would be hard to ensure timely repayment of group loans or collaboration between members of a producers' groups (members would start side-selling rather than selling in bulk at agreed prices).Building social capital reduces risks of collapse of groups engaged in economic activities. The APDMP will build on the social capital that already exists at community level, in the form of SHG, village organizations and federations to build awareness about the project approach and expected results.

7. Leveraging government resources through Convergence. Strengthening the linkages with public programmes and collaboration with sub-state and local government entities (also known as "convergence") with public programmes is particularly relevant in a Middle Income Country like India where government investments for developmental activities are big and where IFAD finances play a catalytic role . All projects approved since the 2010 CPE have considered this aspect in the design (ILSP, JTELP, LAMP, OPELIP). The convergence approach has enhanced the policy engagement opportunities at different level from central to state government and boosted the scaling-up landscape. Convergence is key in the delivery of the current project which is cofinanced with funds from NREGS (42,3 percent of project cost) and RKVY (1,9 percent).

8. Rain-fed agriculture focus. The country programme helped raise agricultural productivity and viability of rain-fed agriculture. This is important even beyond the IFAD-funded portfolio, given national constraints of low rain-fed agricultural productivity, water resource management and transition to low-carbon economy. A particularly relevant example is of private sector partnership between cotton farmers of Vidarbha (in CAIM project) with Better Cotton Initiative; promotion of SRI and SWI techniques for enhancing production of rice and wheat; large scale adoption of the Broad Bed and Furrow technique for soil and water conservation etc. Additionally IFAD projects have focussed both on diversifying crops by promoting high value , short duration crops as well as broad-basing the livelihoods opportunities through on and off farm activities to help farmers deal with the weather shocks. In the APDMP, given the severe constraints in terms of water, soil fertility, labour, the focus will be on production systems that are less water demanding but have good market value, on protective irrigation, on improved seed varieties, on soil fertility management, and integration with livestock (sheep and poultry).

Past and current Scaling Up opportunities

9. A major cross-cutting theme in the COSOP was the importance of scaling-up successful rural development interventions. Some of the most recent examples of scaling-up in the country programme are highlighted below:

- ILSP: In December 2011, the IFAD EB approved a loan of USD 90 million to scale up successful rural development initiatives in the State of Uttarakhand;
- JTELP: In September 2012, the IFAD EB approved a new project designed to scale-up successful tribal development initiatives in the State of Jharkhand;
- OTELP: In 2011, and as a result of the success of the IFAD programme in Odisha, the State Government agreed to allocate significant additional national funding to scale up OTELP across larger areas of the State. This has added a further 70,000 HHs to the OTELP programme, and brings the total OTELP coverage to 126180 HHs. A supplementary IFAD loan of USD 15 million was approved in December 2013 to support this process.
- OPELIP: In 2013, the State Government of Odisha requested IFAD to assist them with the scaling-up of OTELP activities to the PVTG districts of Odisha. A new project – OPELIP – will be approved by IFAD's Board in 2015 for this purpose.
- LAMP: In 2012, the State Government of Meghalaya requested IFAD to assist with the scaling-up of successful elements of NERCORMP and MLIPH across the State of Meghalaya. A new project – LAMP – has been approved in April 2014 for this purpose.
- TRWEP: The 2018 State Vision Document for Madhya Pradesh foresees scaling-up of TRWEP across the entire State. IFAD has been requested to assist the State Government through the provision of an additional loan of USD 15 million.
- TRWEP: On 19th February 2014, the Chief Minister of Madhya Pradesh organised a major meeting where he announced the scale-up of the Shaurya initiative (undertaken in the Tejaswini project), for the entire state. The government also signed an MoU on the occasion, with UNWOMEN who would be providing technical assistance to the state government in the scale up process. Over 3000 Shaurya members had gathered. In addition to the Chief Minister, the State Minister for Women and Child and Minister for Higher Education were also present along with very senior bureaucrats.
- NERCORMP: In January 2014, NERCORMP III was launched, as a six year project funded exclusively by Government of India, to expand NERCORMP activities to two new states (Arunachal Pradesh and Manipur) , to benefit over 58,850 households in 1177 villages with an investment of USD 90 million.

- CAIM: In June 2015, the Government of Maharashtra issued a Government Resolution (GR) to scale up CAIM strategies in the two most drought affected districts of Yavatmal and Osmanabad which have the highest incidence of farmers' suicide in the State. CAIM approach relies on convergence led implementation for soil and water conservation, financial inclusion, sustainable agriculture techniques, and market linkage activities. The project has a strong focus on developing robust community organisations in form of village development committees, SHG, Community Managed Resource Centers and Farmer Producer Companies.

Annex 1: India Country Programme – Key Statistics and Achievements

Active Country Programme as of 30 June 2016

On-going IFAD financed projects	Approval Date	IFAD Loan USD	Effective Date	Disbursement rate
Orissa Tribal Empowerment and Livelihoods Programme (2 loans)	23 Apr 2002	19,996,000 15,000,000	15 Jul 2003	
Tejaswini Rural Women's Empowerment Programme (2 loans)	13 Dec 2005	39,448,000 15,000,000	23 Jul 2007	85%
Post-Tsunami Sustainable Livelihoods Programme for the Coastal Communities of Tamil Nadu (2 loans)	19 Apr 2005	14,958,000 15,000,000	09 Jul 2007	78%
Women's Empowerment and Livelihoods Programme in the Mid-Gangetic Plains	14 Dec 2006	30,169,000	04 Dec 2009	
Mitigating Poverty in Western Rajasthan Project	24 Apr 2008	30,361,000	11 Dec 2008	55%
Convergence of Agricultural Interventions in Maharashtra's Distressed Districts Programme	30 Apr 2009	40,101,000	04 Dec 2009	39%
North-Eastern Region Community – phase II	17 Dec 2009	20,000,000	12 Jul 2010	97%
Integrated Livelihood Support Project	December 2011	90,000,000	1 Feb 2012	23%
Jharkhand Tribal Empowerment and Livelihood Project	September 2012	51,000,000	4 Oct 2013	8%
Livelihood and Access to Markets Project	April 2014	50,000,000	9 Dec 2014	3%

2016 results on overall outreach

Name	Beneficiary HHs (SAR target)	Total persons (SAR target)	Actual beneficiary HHs reached 2015	Individuals receiving project services	Source
NE Region	23,000	131,000	20,826	124,956	RIMS 2015
Orissa Tribal	75,000	338,000	203,981	954,396	RIMS 2015
Tejeswini MH	1,120,000	6,160,000	938,336	4,694,980	RIMS 2015
Tejeswini MP			190,441	1,047,426	RIMS 2015
PT - Tamil Nadu	230,000	1,150,000	131,587	103,692	RIMS 2015
WELP MGP	108,000	540,000	52,786	149,887	RIMS 2014
MPOWER	86,880	474,670	80,030	470,432	RIMS 2015
CAIM	286,800	1,430,000	280,656	601,695	RIMS 2015
ILSP	143,400	717,000	147,756	153,312	RIMS 2015
LAMP	191,070	1,000,000	2,947		RIMS 2015
JTELP	136,000	510,000	18,526	92,631	RIMS 2015
OPELIP	62,356	311,780	1,604,173		GRIPS

Appendix 4: Detailed Project Description

A. Logic of the planned interventions

1. **Rationale behind the interventions** Progress towards the development objective of "strengthening the adaptive capacity and productivity of agriculture in the rainfed zones of 5 districts in southern AP" would be driven by changes brought about by APDMP in the four key agricultural sub-sectors. These changes are:

   (a) Rainfed cropping becomes more productive and resilient
   (b) Tree crops and profitable and tolerant of drought
   (c) Irrigated horticulture becomes more water efficient and productive
   (d) Livestock production becomes more productive and less risky

2. The rationale for supporting farmers in these four sub-sectors is as follows:

(a) Rainfed crops

- These crops are the most vulnerable to drought and climate change
- Most farmers do not have access to irrigation and only grow rainfed crops
- As a result the income of such farmers is highly variable, and this group are the poorest farmers. Even farmers with significant areas (over 5 or 10 ha) of rainfed land are often poor and forced to undertake labouring work to support their families.

(b) Tree crops

- A number of types of fruit trees (such as mango) only require limited irrigation for 2-3 years after planting
- Trees, being deep-rooted, can survive drought
- Rainfed fruit trees can generate significant income, and so offer farmers with little or no irrigation a way of substantially increasing their income in a way that rainfed crops do not.
- A huge area of mango trees have recently been planted on small and marginal farms (61,000 ha were planted in Chitoor district alone) with support from a government employment generation programme (MGNREGS). Although there is a consensus that there is little scope for further large-scale planting, opportunities exist for low-cost interventions to provide small farmers with market access and improve the care (and so productivity) of their trees.
- Trees can be planted along the contour, naturally defining small terraces. Thereby runoff is slowed down, erosion is decreased and soil moisture increased.

(c) Irrigated horticultural crops

- The horticultural sector is more valuable than rainfed crops in rainfed areas. In the predominantly rainfed Anantapur district, the total value added for horticulture is 2.5 times that of all field crops. Therefore to have a significant impact on overall farm income, it is important to work with the horticultural sub-sector.
- Horticulture is labour-intensive and generates considerable employment for landless households (and for rainfed farmers).
- The project area is well located to supply the major cities of Hyderabad, Chennai and Bangalore, while the dry climate gives it an advantage for off-season production of crops such as tomato. The area is the major tomato production hub in India.
- Irrigation means horticultural crops are less at risk from climate change than rainfed crops as increasingly unpredictable rain can be stored in the aquifer.
- This group are the most distressed farmers and are vulnerable to suicide – due to high investment in borewells and micro-irrigation equipment and in high value irrigated crops, with the risk that wells will run dry before harvest. Farmers compete with their neighbours to extract limited supplies of groundwater. APDMP needs to engage with these farmers in order to manage groundwater resources sustainably.

(d) Livestock (small ruminants, mainly sheep, also poultry)

- This is the most climate change resilient agricultural sub-sector – grazing animals such as sheep are mobile and so are able to utilise vegetation resulting from sporadic rainfall; and at times of severe drought, they can be sold or fed on purchased feeds.
- There is big potential for increased productivity of sheep from better health care, feeding and husbandry.
- Current areas of common property rangeland have big potential for improvement, and can support many more grazing animals.
- Improvement of this rangeland also increases recharge of the aquifer – and so benefits irrigated crops.
- Overnight penning of sheep allows to addition of organic matter to crop land.
- Sheep, particularly fattening of ram lambs, is an important activity for landless households and women, as does backyard poultry.

Expected outcomes from the interventions

(a) Rainfed crops

3. Interventions for rainfed crops will be based on two major thrusts:
   - To make soils more resilient to drought and productive[30]
   - To grow rainfed crops that are better adapted to drought and more profitable

4. Soil improvement will aim to increase the availability of moisture and to bring fertility improvements. Soil moisture will be increased via the provision of supplementary/protective irrigation for kharif crops to bridge gaps in the monsoon. This irrigation will come from the sharing of borewells between the well owners and other farmers (scaling up an existing DoA scheme) and from new farm ponds. The ponds will be lined to hold sufficient water for about 10-14 days to irrigate between half and one hectare of land. Data from the agricultural research station in Anantapur district shows that the pond should be refilled from sporadic rains about three times during the monsoon season, allowing this number of irrigations to be made.

5. The capacity of the soil to retain moisture will be improved by increasing the amount of organic matter that the soil contains. Organic matter is now very low, and the often thin red soils dry out rapidly. Organic matter will come from improved systems of composting, along with green manures grown in fields and along field bunds. Apart from these measures, other interventions aimed at improving crop productivity (supplementary irrigation, integrated soil fertility management and improved germplasm) will increase the volume of crop residues available for composting, mulching or incorporation.

6. The moisture status of soils would also be improved by deep ploughing every three years to a depth of 40-50 cm. This could be via chisel ploughing at varying distance according to the slope (thereby slowing runoff). This would increase water infiltration and help plants root more deeply. In addition shallow tillage in the off-season captures moisture from pre-monsoon showers and helps control weeds. It has resulted in 20% yield increase in sorghum in AP.

7. Better use of available moisture is made by sowing of crops as quickly as possible after rains. Another potential cultivation technique is conservation agriculture (CA) - sowing crops directly into the stubble of the previous crop without ploughing. This has been shown to conserve moisture and improve soil structure. However, apart from rotations with paddy, CA has not yet caught on in India, and research will be needed to develop CA systems for rainfed crops in the project districts[31].

[30] Increasing available soil moisture from 150 mm to300 mm doubles the yield of pulse crops (Sinclair, TR., Vadez, V. 2012. The future of grain legumes in cropping systems. Crop Pasture 63: 501–512).

[31] Another cultivation technique to conserve moisture is the broad bed and furrow (BBF) system. This has been successful for soyabean in the CAIM project in Maharashtra, and has been reported by ICRISAT to increase yields by four or five times. However feedback from the project area suggest than many of the vertisols are too thin to use this method.

8. Increased organic matter will also contribute to increasing soil fertility. Soils in the project districts generally have adequate levels of phosphorous and potash, but are low in nitrogen, sulphur, boron and zinc. An Integrated Soil Fertility Management approach will identify deficiencies in soil health and fertility and address these deficiencies via organic and/or inorganic amendments and treatments. These could include organic and inorganic nutrients, and seed treatment with plant growth-promoting bacteria.

9. Improving the adaptability of rainfed cropping includes providing farmers with information on a better choice of drought adapted crops (including mixed cropping systems) along with information on weather, markets and other factors to help them make that choice. Better germplasm - new drought-tolerant and more productive varieties, along with access to good quality seed - will also help farmers to grow crops that are better suited to the environment of the project districts. One risk factor that needs to be taken into account is that wild animal damage limits the choice of crops at some locations. The project will support measures to control this damage - using lessons from other IFAD projects - and this issue is now being taken up by Government as a policy matter.

10. Many of the crop varieties now grown have low yield potential under low moisture scenarios. Selecting suitable crops and varieties capable of maturing within actual rainfall period will help in enhancing production. In other words, crop varieties for dryland areas should be of short duration, and able to be harvested within the period of rainfall or when there is sufficient residual moisture in the soil profile for post-monsoon cropping.

(b) Tree crops

11. Although tree crops are naturally adapted to survive drought, given the need to prioritise interventions and focus on priority areas, less emphasis has been placed on tree crops in the project design and no specific tree crop interventions have been planned. However once implementation starts, support for tree crops may be identified as a priority in some clusters, in which case the project may provide this support.

12. In particular the project could aim to improve market access and productivity, for trees that have already been planted. As already mentioned, a large number (some millions) of mango trees have recently been planted by small and marginal farmers with support from MGNREGS. As these come into production, producers will need support for market access, and to maintain and improve the productivity of these trees. Further planting of mangos would seem unwise, given the risk that recent planting may well saturate the market. There are a number of other fruit trees, including a number of indigenous fruits[32], that can also be grown under rainfed conditions, but the market for these fruits is more limited, and experience shows that extensive planting can saturate local markets. The project will therefore not provide direct support to expand the planting of new trees.

13. The project will, in general, not support irrigated tree crops such as oranges and bananas. However in situations where there is effective groundwater demand management, limited planting of trees that are relatively water-efficient, and for which there is a good market, just as pomegranate, could be encouraged. This can be supported by existing government programmes, including MGNREGS and the National Horticultural Mission with technical advice from the project (via FFS, CLICs, FPOs etc.).

(c) Irrigated horticulture

14. Horticulture, in terms of its economic contribution, is the most important farm sub-sector in the predominantly rainfed farming zones (i.e. areas that have no significant amount of irrigation from surface water resources) of the project districts. With proximity to growing metropolitan markets, horticulture offers farmers opportunities to generate significant amounts of income (tomato growers said their net income was in the order of Rs200,000 to Rs900,000 per acre).

[32] A research station in Anantapur district was growing guava, sapota (achras sapota – a brown sweet plum), amla (anola), jamun (syzygium cimini), and custard apple (annita squamosal).

15. There are real risks that, if the project promotes improvements for irrigated horticultural crops, then this will provide an incentive for farmers to expand the area (or for more farmers to take it up), resulting in more unsustainable exploitation of groundwater. For this reason it is proposed that interventions for irrigated horticulture be limited to locations where there is effective groundwater demand management. Interventions would seek to make better use of irrigation water by reducing losses from pests and diseases and increasing productivity. Although most growers already use drip irrigation, there may be potential to make drip systems more water-efficient. There are a number of potential interventions to improve crop production practices (such as IPM to control pests more effectively using less pesticides) and produce crops that are more in tune to market needs (so avoiding periods of supply gluts and low prices).

(d) Livestock

16. The project districts have a large and growing population of small ruminants (mainly sheep) that graze common property rangelands and fallow crop land. In contrast, in much of the drier part of the project area (such as Anantapur district) the population of large ruminants (cattle and buffalo) has declined due to increasing scarcity of fodder (especially water to grow irrigated fodder crops and cereal crop residues). Crop cultivation has become increasingly mechanised with less use of draught animals - although mechanisation is not so easy where fields are studded with rocky outcrops.

17. There are significant opportunities to improve the productivity of small ruminants. This involves two key areas of interventions - increasing feed resources, and improving the health, husbandry and genetic potential of animals using these feed resources. Regarding feed resources, the key entry point is common property rangelands. About 13% of AP is wasteland held under the Revenue Department[33]. This common property rangeland (CPR) can be regenerated/ vegetated to make a wide range of contributions to the local economy in terms of food, fodder, wood and non-timber forest products with benefits in terms of animal production and ecological services for resource conservation, recharge of groundwater and sustainability of agro-ecological systems, including crop pollination. Of direct impact for livestock, each hectare of CPR is expected to provide an extra 4 tons of fodder and 250 m^3 of water with a local rainfall of 500mm.

18. There are already good examples in the project area of such regeneration alongside formation of community organisations (organised as Mutually Aided Cooperative Societies - MACS) to manage these resources. The carrying capacity of these improved rangelands considerably exceeds the current numbers of animals using them, but ultimately MACs may have to reach agreement to limit livestock numbers. Alongside development of CPR, the productivity of small ruminants would be improved - primarily via the provision of community animal health services to reduce losses, and dissemination of improved husbandry techniques , There are well proven models for community animal health care and improvements in animal housing and breeding. The project will also introduce new types of drought resistant fodder plants, such as thornless cactus, examples of which are now being grown on research stations. APDMP would also support development of backyard poultry.

Supporting services and access to finance

19. APDMP will, where needed, develop support services and producer organisations. Further details of these are in the component descriptions below. A review has been made of access to rural finance (see Working Paper 7), and it has been concluded that access to financial services for farm household, especially credit, is at a satisfactorily high level in AP compared to many other parts of the country. Overall, there is adequate credit flow for crop loans with average outstanding ranging between INR 43,000 and INR 87,000 per hectare of net sown area. Tenant farmers have difficulties in accessing bank credit, but these are likely to be resolved via a new government initiative. In the project districts between 85 %to 95% of women are members of SHGs and able to access loans from a range of sources on attractive terms.

[33] Excludes common property held under Forestry Department.

20. The proposed project interventions of inputs and technology for crops and vegetable farming are likely to improve farmers' incomes and improve their ability to manage debt. For horticulture plantations and farm equipment, the farmers avail subsidies of the state Government and access the balance needed from banks. For small ruminants, the major investment is likely to be purchase of animals for fattening. This will be targeted at women, for whom loans from self-help groups are available. Given high credit intensity at individual and group levels in the state and low interest rates charged, project supported measures to access additional credit are not warranted.

B. Component 1: Climate resilient production systems

21. This component aims to increase the resilience of crop and livestock production systems to drought and climate change, and provide farmers (individuals and small groups) with information to improve soil fertility practices, diversify cropping systems, and improve livestock productivity. It includes the following sub-components:

Subcomponent 1.1: Improved crop production systems
Subcomponent 1.2; Improved livestock production systems
Subcomponent 1.3: Strengthened producer organisations
Subcomponent 1.4: Field Facilitation

Sub-component 1.1: Improved crop production systems

22. This subcomponent will support the building of resilient and more productive cropping systems. Further information is in Working Paper 3. The sub-component will include the following activities:

(a) Climate Information Centres
(b) Extension service provision
(c) Integrated soil fertility management
(d) Protective irrigation
(e) Support to adaptive research

Climate Information Centres (CLIC) will be established in each village cluster. They will be equipped with an internet-connected computer, and audio-visual equipment, and staffed with a Facilitator/Manager via the Facilitating Agency for a four year period. CLICs have been successfully implemented in a number of projects - such as the ACIAR funded ACCA project. For APDMP CLICs will have the following functions:

- Provide farmers with easy access to the extension systems, research institutes and other agricultural support agencies - through contact names and phone numbers and via on-line information sources. Information provision would include weather forecasts, market price data, technical information on crop and livestock production (such as pests and diseases) and new production technologies.
- Create and maintain a reliable and easily accessible data base to supplement and strengthen the local knowledge base. Local knowledge would include information on local soils and water resources (with this information being shown on local maps), along with information on weather collected at the cluster weather station. For livestock, awareness would be raised about local animal diseases and their control This information will be disseminated in various formats - posters, booklets, videos and cop calendars.
- Develop, make available tools for analysing information and build capacities to use the same for decision making at the farm level. This includes tools to help make decisions regarding crop selection when the start of the monsoon is delayed. Although a crop such as groundnut can be more profitable if planted in June and July, delayed sowing incurs significant yield penalties, and alternatives such as millet, green gram and pigeon pea may then be the optimal crops.
- Support the use of ICT tools by farmers, including mobile phone based information and advice systems. A number of these systems already exist and farmers would benefit from

guidance on which services best meet their needs - as well as providing feedback to service providers.

- Create a system that connects with and strengthens the informal networks and extends the networks to socio-economically weak and disadvantaged groups within the farming community. The CLIC would organise farmer meetings on topics such as soil health and fertility - at which results from soil testing and mapping would be disseminated and discussed.

23. Further information on the role of CLICS in supporting crop production are in Working Paper 3. Regarding water and weather related information CLICs would work closely with the GP Water Management Committees in providing a repository of meteorological and groundwater data that would ultimately be shared with the respective line Ministries. Further details on this are in Working Paper 2. It is envisaged that CLICs would be absorbed into FPOs, with the CLIC either becoming the office of a cluster level FPO (such as a MACS) or a branch office for a larger FPO covering a number of clusters.

24. **Extension service provision**: a number of initiatives would be supported including:

(a) Farmer Field Schools (FFS) will be the main means of building capacity of farmers. A three layer approach will be used: (i) master trainers (preferably FAO certified) will implement ToT courses for staff of project FAs and extension line department (ATMA, DoA and DoH) (ii) these trained staff facilitators in turn train farmers in season-long FFS; and (iii) two of these trained farmers then become facilitators for further FFS in the following season. On average one staff facilitator will be trained for each GP cluster and will themselves facilitate two FFS per season (or year). In subsequent seasons they will continue to cover two new FFS, while the farmer facilitators will each handle one FFS. After one year of facilitation, it is expected that FFS will continue to meet with only minimal external support. The cost of FFS and ToT is shown in Annex 2 of Working Paper 3. With 25 farmers meeting 12 times, the cost and amounts to Rs1,743 per farmer for a staff-facilitated FFS and Rs978 for a farmer-facilitated FFS. FFS continuing to meet without direct facilitator support will be supported to the tune of Rs3,000 per FFS per year. In total 350 out of the 400 project farmers in each cluster will have an opportunity to attend an FFS.

The curriculum of the FFS will include general guidelines on crop agronomy (including ISFM - integrated soil fertility management), and awareness on climate, climate change, water/irrigation issues, with the decision on specific crops and technologies being left to the participating farmers and the Facilitating Agency. Given the market orientation of agriculture in the project area and the nutritional value of the alternative production systems proposed, the curricula of the FFS will include 2 modules on managing farming as a business and on nutrition. In year one of project implementation the Lead Technical Agency and the District Facilitating Agencies can define a portfolio or basket of options/opportunities that are likely to work under the agro-ecological and socio-economic conditions of the target group. The FFS will have a business focus through addition of a Farming as a Business module, to support the investment in and commercialisation of agriculture.

(b) Exposure visits: Farmers (an average of 60 per cluster) involved in climate-resilient agriculture would also get the opportunity to go on exposure visits to see interesting innovations and examples of good practice. Some of these could be combined with training courses.

(c) Community Resource Persons: Crop development would be supported by Community Resource Persons (CRP). Project budgets include provision in each cluster to pay CRPs for 400 person-days of their time. CRPs would be trained by District Facilitating Agencies. The CRP model has been useful and effective in CAIM and other IFAD-supported projects, proving a link between farmers and the staff of project and extension agencies. In APDMP CRPs would assist in implementation of initiatives such as groundwater sharing, seed multiplication, composting and green manuring, machinery hire centres and information sharing. They will also assist in organising Farmer Field Schools.

25. **Integrated Soil Fertility Management** will include:

- Soil testing and mapping: a simple soil testing kit would be purchased for each cluster - operated via the CLIC. Established soil laboratories would be identified and contracted to carry out more detailed tests and confirm the results from soil testing kits. Together, these tests, along with feedback from farmers, and identify limitations and deficiencies in soils. This would be linked to the creation of soil maps for each cluster. These maps would be recorded in a GIS system and enable recommendations to be drawn up to address deficiencies in soil health and nutrients. This information would be used to create soil health cards for individual farmers - building on an existing programme sponsored by GoI. This focus on soil health will aim to help farmers avoid unnecessary applications of NPK fertilisers and adopt more precisely targeted applications of micro-nutrients and other amendments such as gypsum. For example foliar application of micro-nutrients to groundnuts has been shown by Kadri Research Station to increase pod yield by 20-25%, while ICRISAT trials of micro-nutrients in farmers' fields in project districts increase pod yields by 12% to 36%.

- Plant growth-promoting bacteria such as rhizobia and phosphate solubilizing bacteria, have potential benefits for various crops including rice, sorghum, chickpea and pigeon pea. The project will support the development of a bio-input production and marketing enterprise in each cluster (see sub-component 1.3). This enterprise, if linked to a supply of good quality bacteria, could multiply and sell these growth promoted bacteria, along with other bio-inputs.

- Biomass composting systems would be supported via funds to build 50 compost pits (covering 12% of farms in a typical cluster) of 6 m^3 surrounded by green manure producing hedgerow plants. Farmers would be given a subsidy to cover the cost of making two batches of compost.

- Green manure production in the fields and its incorporation into the soil would be supported by an incentive payment of INR 2500 per ha for 30 ha per cluster (5% of the area under rainfed crops). Bund plantation with plants such as Gliricidia Sepium would also add biomass via composting or green manuring, and would be supported for 100 ha per cluster (20% of the area of rainfed crops) via a payment of INR 22 per plant for 250 plants per ha (to cover seed dibbing and aftercare). Biomass plant nurseries would also be established in each cluster to produce 37,500 plants - sufficient for 25% of the rainfed area.

- Tank silt, a by-product of tank desalination, would be applied to 23% of the rainfed area (120 ha per cluster) at a cost of INR10,289 per hectare. This would be funded via MGNREGS convergence. Larger farmers may be able to fund this from their own resources, so this support could be specifically targeted at less well-off marginal and small farmers.

26. **Protective irrigation** will include:

- Lined farm ponds to provide supplementary/ protective irrigation to rainfed crops. On average 60 ponds will be dug in each cluster, primarily using convergence with MGNREGS to pay for the labour involved. In some locations the subsoil is very hard and stony and, to ensure that ponds are deep enough, provision has been made in the project budget for 25% of the earth to be excavated by machinery (at a unit cost of half of that of MGNREGS labour). The ponds would be lined to enable them to store water rather than being primarily a groundwater recharge structure. Lining with a soil-cement mix seems to be an economic method of providing lining, with project funds paying for cement and farmers contributing labour and water. The project may also test flexible plastic liners, which may provide a more water-tight lining, but are relatively expensive, need to be heat and UV resistant, and to be protected by fencing to prevent damage from animals. Each pond would aim to provide supplementary/protective irrigation on 0.5 hectare of land belonging to one or two farmers. Criteria to be applied to select a farm pond site to be developed will include: topographic location, proportionate harvested runoff (in relation to the size of the pond), and comparative water poverty of the farmer over his various plots.

- Sharing of groundwater would also provide supplementary/protective irrigation to rainfed crops. The APDMP intervention would be based on a current DAC project, involving the construction of a pipe network to link participating borewells and provide additional outlets for farmers who do not own borewells and extended to all users of the aquifer. This would be closely linked to water governance (Component 2.1). A major incentive for borewell owners agreeing to share water with non-owners is the agreement by non-owners not to sink their own wells and compete for the same water. Following the DoA process, participating farmers would contribute 15% of the cost, of which 5% would be deposited into a maintenance account that farmers would then add to as required. Project budgets include 40 ha of groundwater sharing per cluster, which typically would amount to four blocks each of 10 ha. Data from current schemes shows that 40 ha would involve about 100 farmers, two-thirds of whom would be non-borewell owners. Further information on groundwater sharing is in Working Paper 2

- Irrigation equipment: To provide farmers with a means of applying water from ponds and shared borewells, the project would support (along with contributions from farmers) individuals and groups of farmers to buy pumps, pipes, drip systems and sprinklers to use or to hire out. Calculations in Attachment 1 estimate that around 150 farmers per cluster will use this equipment.

27. It is assumed that currently 20% of crop land receives protective irrigation in the kharif (monsoon) season - 130 ha out of 648 ha of land operated by the 400 participating farmers in the average cluster. Lined farm ponds will enable another 30 ha (60 ponds x 0.5 ha) to be irrigated increasing this to 160 ha, which is 25% of the total crop area. It is also assumed that there is sufficient water in the rabi (dry) season to irrigate one third of the land that gets water in the kharif season - currently this amounts to 43 ha per cluster - 7% of the area that is cropped in kharif. With better water management and more rainwater harvested to recharge the aquifer, the area of rabi irrigated is assumed to increase by 20% to 52 ha per cluster. These projections are conservative. The groundwater sharing is assumed to only redistribute water and not to result in any overall increase in irrigation, and only a very limited increase in irrigation (9 ha per cluster in rabi season) has been attributed to improved water management and increased water harvesting and conservation. These calculations are in Attachment 1.

28. **Support to adaptive research** will test and promote new crops and technologies:

(a) Crop demonstrations would be used to promote new crops, new varieties and new cropping systems (such as mixed crops). Demonstrations may also include new types of soil amendments. When testing new varieties, a Farmers Participatory Variety Selection approach can be used. The APDMP budget includes funding of INR 5000 for approximately 14 demonstrations per cluster - or one per FFS.

Specific improved technologies include intercropping of groundnut with red gram. This reduces risk as pigeon pea is more drought tolerant than groundnut. Some intercropping is already done, with one row of red gram to 15 of groundnut (1:15), but an intercropping ratio of 1:7 has been found to generate an additional income of Rs3,000.ha. Another option, and an alternative to cotton (which has suffered in droughts) is intercropping bajra (pearl millet) with red gram in the ratio of 4:1. Mung bean and foxtail millet can also be intercropped with red gram, both in the ratio of 7:1.

Chick peas have potential where residual moisture is available in the rabi season, particularly in parts of Prakasam and Kurnool districts. Drought tolerant and short duration (100 day) varieties include such as NBG-119 (Kabuli), JAKI 9218 (Desi), JG-14 (Desi; heat tolerant) and NBEG-47 (Desi; mechanical harvester compatible).

Groundnut is the major crop in the project area. Unfortunately some farmers are still growing the variety TMV 2 which was released in 1940s or some old varieties. Kadiri Research Station has released a number of new varieties such as Kadiri Harithandhra and Kadiri

Anantha which are both drought resistant and other high yielding, drought tolerant and insect resistant varieties are in the pipeline. Varieties such as ICGV 91114, K-6, Narayani and Dharani can increase pod yield by 14-20%.

The productivity of red gram can also be enhanced via improved varieties . For red soil, PRG 176, TS 3R, Maruti, PRG 158, Laxmi, ICPL 161 and ICPL 88039 do well; whereas for black soil Asha (ICPL 871119), BRG 1, BRG and BSMR 736 are good. Hybrid seed for pigeon peas are becoming available which can lift yield by 30% to 40%.

Hybrid millet is also available, but pearl millet ICTP-8203 (Dhanshakti) is open pollinated and drought tolerant and short duration cultivar, can be tried. Sorghum varieties that can be recommended for drought prone districts include, CSH 22SS, CSV 19SS, SSV 84 and NTJ 2.

(b) Adaptive research will be supported with the project having a pool of funds available to enter into MoUs with established research agencies (such as universities, ICAR institutes and CGIAR centers) for specific innovation sub-projects and to provide technical back-stopping.

One potential topic for research sub-projects include the application of conservation agriculture to rainfed cropping systems (see Working Paper 3). CA has the potential to improve the resilience of cropping systems to drought through conserving soil moisture and building up soil organic matter - at the same time it can reduce production costs and the carbon footprint of agriculture. FAO has a CA initiative that can link with ICARDA and ICAR work on this topic.

Another important priority for applied research is the development of strategies for pest and disease control in the context of climate change. Climate change adds an extra layer of complexity to plant protection as it can unpredictably effect the abundance of insect pests and diseases along with their natural enemies. The introduction and spread of plant pests and diseases among food crops has significant consequences for farmers, the seed industry, policy-makers and the general public. Disease and pest management systems will need to rapidly adopt to these changes. Drought not only leads to production losses in chickpea and pigeon pea but also contributes to outbreaks of several pests and diseases. With increased temperature and more frequent moisture stress, rhizoctonia blight is becoming more intense and viruses, rusts, blights are dominating in warm but dry zones (Sharma et al., 2013). Higher incidence of dry root rot (Rhizoctonia bataticola) occurs in chickpea varieties that are resistant to Fusarium wilt when temperatures exceed 30°C (Sharma et al., 2016). Over the last decade epidemics of Phytophthora blight of pigeonpea (Phytophthora drechsleri f. sp. cajani) is attributed to high but intermittent rainfall.

Finally, evolutionary plant breeding (tested in the context of the uplands of Uttarakhand) by Bioversity and ICRISAT, can be adapted in the context of the project area. The approach of evolutionary plant breeding is already being implemented in several countries including Iran, Afghanistan, Ethiopia, Jordan, Syria, Georgia, Italy and France for several cereal and vegetable crops (including rice, wheat, barley, tomato, zucchini, etc) . The principle is to ensure diversity within the one crop (besides the diversity in the farming and cropping systems). This is done whereby several land races, improved varieties, genetic material from the national or international genebanks are mixed in a scientific way (supported by breeders), then planted by farmers who are trained on how to select at the end of the season the most resilient and productive seeds, mixed, then planted again. This will allow for adaptation of the crop continuously with the changing weather, ensures that the farmers have a good yield (yields within 2-3 years are comparative or higher than the local varieties) and that the farmers have seeds. The mixture harvested has been shown to be of higher nutritional value and taste, and in the field it is hardly affected by pests, diseases or weeds, hence less need for pesticide application (organic farming). This approach has been tested in the harshest conditions of soil and rainfall and has proven highly effective.

Sub-component 1.2: Improved livestock production systems

29. This sub-component will support the improvement of the productivity and production of small ruminants (particularly sheep) and backyard poultry. There is already significant support for the dairy sector from the NDDB/World Bank National Dairy Development Project, and dairy production has expanded significantly in the state (including in project districts such as Chitoor), and there are concerns that growth in production is outstripping demand. To be efficient milk production requires green fodder – making significant demands on irrigation water (so there has been a downward trend in the number of cattle and buffalo in much of the project area). For these reasons the project will not directly support milk production, but the sector will benefit through project investments in grazing and fodder; and from animal health activities. These interventions will also support draught animals – which are still an important source of farm power in parts of the project area, as well as producing manure.

30. This sub-component will therefore focus on small ruminants (mostly sheep) and backyard poultry. Andhra Pradesh is the major producer of small ruminants in India, and the five project districts have the largest numbers of these animals in the state. The principal entry point is the regeneration of common property rangeland (see sub-component 2.3 below). Improved grazing resources will alleviate the shortage of grazing and mean that flocks no longer have to migrate at times of fodder scarcity. This is turn means that it is feasible to provide access to improved health services and other production support as flocks are now static and can be easily located.

31. The subcomponent is grouped around four areas of intervention:

(a) Support to sheep production
(b) Support to feed and fodder
(c) Support to backyard poultry
(d) Capacity building

32. Support to sheep production The key agent in supporting sheep producers (and also backyard poultry) will be the Pashu Sakhi. These community livestock facilitators are usually women from the communities that they serve. Pashu Sakhi will receive extensive training over a three year period in a series of short courses organised by District Facilitating Agencies (DFA) - with at least some training provided by specialists agencies (such as Goat Trust of Uttar Pradesh). Training would cover fee based services and inputs including vaccination, first aid services and castration, feed inputs like blocks and mineral mix, chaffing fodder, weighing animals and providing market information. Pashu Sakhi would be expected to generate income via the provision of animal health and production services (such as weighing animals before sale) and project budgets include training for an average of 2.4 Pashu Sakhi per cluster - a total of 800. To cement links between Pashu Sakhi and about 50 DoAH paravets, the latter would be trained to supervise and support Pashu Sakhis. Selected DoAH mobile climics would get additional equipment for disease diagnosis.

33. Both Pashu Sakhi and paravets would be equipped - including animal health kits and tablet computers, while paravets would also be provided with a travel allowance. Vaccination schedules would be informed by weather forecasts - so adjusted for early or late start of the monsoon - and cover for migrating herds would be ensured via GPS tracking of chip identifiers. Around 100 cold chains with solar powered refrigerators and ice boxes would be provided to keep vaccine in good condition up to the point of use. Pashu Sakhis would use FAMACHA cards, an eye colour testing system, to estimate extent of worm infestation in individual animals, and so screen out those that do not need treatment. This has been shown to dramatically reduce the cost of treatment, while improving flock performance and reducing the risk of drug resistance. Low cost methods such as foot baths would reduce the incidence of foot rot and spread of FMD. Unless there is a market premium for rams, Pashu Sakhi would also castrate male lambs, resulting in increased growth rates and allowing sales before the onset of drought.

34. Alongside this support from pashu sakhi and paravets, the livestock production systems sub-component will support: (a) demonstrations of improved night shelters (12 per cluster) for small

ruminants to reduce lamb mortality; (b) sheep breed improvement to produce high quality rams involving selected sheep breeders with nucleus flocks to produce elite rams, and ram exchange events (the latter to avoid in-breeding); and (c) fodder development including fodder nurseries (an enterprise for a project household), subsidies on fodder seeds and planting materials, and demonstrations of new types of fodder to complement the grazing in rehabilitated CPR. Fodder chopping machines (chaffers) would be provided as an enterprise to reduce waste of fodder. Silage making (using plastic bags) could be introduced as an enterprise - with some farmers growing fodder such as millet and making silage for sale. Sheep would be weighed before sale - this now rarely happens and it appears that buyers offer prices based on an under-estimate of weight of about 15%. Weighing is another fee-earning service to be provided via Pashu Sakhi.

35. Support to backyard poultry would provide funds to establish 10,890 backyard poultry units (each with five hens) and along with 110 poultry breeder units (the latter being another household enterprise). This will be based on a very promising model that is being implemented in the north of AP with support from WASSAN[34] . Five hens will be provided on a one time basis set up a backyard unit to enable them to produce 50-60 saleable birds annually. The project will also provide facilities such as a night shelter for birds, equipment, chicks and feed for both backyard and breeder poultry units (see detail in Appendix 10: Economic and financial analysis). Small scale poultry breeding enterprise will supply the backyard units with birds. The WASSAN model has been selected out of a comparison with other models being implemented in AP. The model has resulted in: (i) an attractive profit which is more than 60% more than comparable options for same size operations; and (ii) the model is the most easy to implement and sustain. The poultry component will use locally available desi birds. Productivity will be enhanced with vaccination by pashu sakhi trained by the project, and feed supplementation comprising 30% of the diet, with the remaining based on scavenging. Low cost feed supplement from rice hulls, millet and azolla will be produced by the poultry keeping households.

36. This support will be targeted at resource-poor women, especially widows and women headed households as well as ST/SC landless households. A rapid market assessment was undertaken by the design mission in 8 local markets. Farmers receive INR 210-230 per desi bird from traders. The market is for desi birds weighing 1.0-1.2 kg and are about 4.5 to 5 months old. Traders sell majority (two-thirds) of their supply to local hotels/restaurants, with remainder to small-scale butchers and individuals. Traders receive INR 250 to 300 per bird. Traders indicated that they could at least triple their sales if they had the supply as there is a preference for desi birds by consumers on the basis of taste and perceived health benefit. There is a price premium for desi as the retail price of commercial broilers is INR 70 per kg, with prices fluctuating considerably based on supply; AP is one of the leading poultry producing states and nearly 70% of sales are outside of the state. There is also growing concern for overuse of antibiotics in the commercial broiler industry – antibiotics are regularly fed as a preventative measure.

37. Capacity building for livestock production would be via farmer field schools focusing on improved sheep and poultry production practices. A total of 1,650 FFS for around 37,000 livestock producers would be organised, facilitated by pashu sakhis, who would first receive specialised training. It will be useful to have FAO advise on the curriculum for these FFS. In addition 100 veterinary officers will be trained in project strategies and approaches and in livestock production related interventions. Capacity building will be backed up by access to information on production technology, service providers and markets via CLICs, and by opportunities for collective marketing via FPOs - see below.

38. Outreach It is anticipated that around 33,000 households keeping small ruminants and 11,000 backyard poultry raisers will benefit from these activities. Backyard poultry will be specifically targeted at the poorest women, such as widows/women headed households/ST and SC landless households, and over half of the small ruminant keepers will be fattening small numbers of ram lambs - an activity that is predominantly in the hands of women SHG members. Over 1,000 people, mainly women will generate income as service providers - including Pashu Sakhis, feed enterprises, and producers of

[34] more information is available at http://www.wassan.org/apdai/apdai_9.htm

improved rams. Although not targeted by project activities, households with large ruminants will benefit from improved grazing and fodder, and better access to health services. Further information on livestock development is in Working paper 4.

Sub-component 1.3: Strengthened farmer organisations

39. This sub-component will intervene in the following areas:
    (a) Support for Farmer Producer Organisations
    (b) Services to producers
    (c) Community Managed Seed System
    (d) Machinery hiring centres

40. **Support for Farmer Producer Organisations** (FPO). The project will work with and strengthen existing farmer organisations and create new organisations where needed. Existing organisations could include MACS (Multipurpose Agricultural Cooperative Societies) formed as part of watershed or development activities or for management of common property rangeland for livestock. In other locations, new FPOs may need to be formed. These could either be based on a village cluster of about 1000 ha and 500 farmers, or at a super-cluster level comprising, say, 10,000 ha, 3,000 farmers and 10 GP (about half of a mandal). Such larger FPOs could have a three tiered structure, with Farmer Interest Groups and a village level branch, and a headquarters. Further information on community Institutions is in Working Paper 7.

41. Farmer Interest Groups (FIGs). Where needed Facilitating Agencies (FAs) will mobilise the farmers into FIGs. These groups can be the focal points through which dissemination improved packages of practices, technology access, information sharing and mutual support will take place. These groups will be affinity based, and may, if they wish, undertake savings with these savings being either: (a) deposited in banks, (b) used for internal lending, or (c) used to purchase inputs. The groups will manage the accounts and book keeping on their own.

42. Village level FPOs / FPO branches - the FIGs will be mobilised at village/GP level into an FPO or into the branch FPO of a larger FPO as the super-cluster level. These FPOs / FPO branches will provide information services (eventually taking over operation of the CLICs established by the project), and manage custom machine hiring services and community seed multiplication units. Where needed they will aggregate produce for marketing by a larger FPO, supply organic and other inputs, provide animal veterinary services, manage common property rangeland, and manage business related credit on behalf of the FPO. The project will also provide training for the leadership and officers of FPOs at the GP cluster level. A sum of Rs 40,000 has been allocated per cluster each year for a three year period for FPO training.

43. Given the successful experience of village/GP level FPOs in the form of Mutually Aided Cooperative Societies (MACS) that was tested in AP for CPR management and provision of livestock services, this model will be promoted for livestock producers. The formation of MACS will be facilitated and this will require hand-holding for 3 years. The fundamental focus of such MACS will be to manage the common property (which might be 400 ha per MACS) for the benefit of the community. MACS will provide the focus for services and inputs delivery, promote integration and a farming systems approach to improve productivity, profitability and drought resilience, foster entrepreneurs and support access to markets. At these locations, crop producers would join the same MACS.

44. Forming of Farmer Producer Organisations at the super-cluster level – After six months of formation of FIGs, the concept of FPO will be seeded by the FA staff. Each FPO will cover 8,000 to 10,000 ha covering around 5,000 farmers, of whom 60% (3,000) are expected to become members of the FPO. About 40 FPO/FPCs are likely to be formed/supported under the project.

45. Activities – according to the needs of its members, the FPO will undertake the following:

- Productivity enhancement services – adoption of practices for improving productivity, water conservation measures, machinery hiring.

- Input services – seeds, fertilisers including production and sale of organic farming inputs, pesticides, livestock feed, veterinary services for animal rearing, The Resource Organisation (RO) will facilitate getting necessary licenses from the Agriculture Department to stock and sell inputs.
- Marketing of produce in local, regional and export markets. FPOs will forge market linkages with private sector companies, local mandis and large traders. Contract farming will be undertaken. There could be particular opportunities in the production and sale of organic crops. FPOs can also procure various commodities under the Minimum Support Price programme of the Government. For marketing of sheep and goats, FPO marketing committees would link producers with large terminal markets in Chennai, Hyderabad and Bangalore, and manage a supply chain to provide a constant supply of high quality, healthy sheep and goats of the age and size required by the buyer. To capture maximum prices, peak deliveries will target festivals and the wedding season.
- Value addition especially primary processing of grading, packaging and processing in commodities such as chilies, pulses, cereals, tomatoes, mangoes, etc.
- Act as business correspondent of banks for lending to tenant farmers.
- Financial services where absolutely needed for crops, livestock purchase, including facilitation for godown/ warehouse receipt financing where this is feasible. For tree fruits this could include loans to producers to enable them to avoid making sales in advance of harvest - as has been done for mango producers in Tamil Nadu by the IFAD supported PTSLP.
- Information sharing on crop insurance and livestock insurance, facilitation for insurance for non loanee farmers, facilitation for grievance redressal.
- Information sharing on prices of commodities, good practices in storage and warehousing.

46. Financial support. To support a total of 40 FPOs the project would fund the following:

- A set of office equipment, furniture and computers, along with a motorcycle
- Salaries and allowances for three staff (manager, sales and marketing, accounts clerk) for three years
- Legal expenses for establishment of the FPO
- Costs of mobilising farmer members (meetings and workshops)
- Training and exposure visits for members, directors and FPO staff
- Operating costs for three years, including office costs, premises rent and audit expenses
- Equity investment of a total of INR 2,000 per member, of which 50% would come from members and 50% from the project (IFAD).

Table 1: Cost of support for one FPO at the super-cluster level

		Physical quantities				Unit cost	Financial cost (Rs'000)			
	unit	year 1	year 2	year 3	total	Rs'000	year 1	year 2	year 3	total
Office equipment and furniture	sum	1			1	100	100	-	-	100
Legal etc expenses for establishment	sum	1			1	75	75	-	-	75
Motorcycle	number	1			1	40	40	-	-	40
Mobilisation of farmers into FPO	sum	1			1	50	50	-	-	50
Training and exposure visits for farmers	year	1	1		2	50	50	50	-	100
Training for directors and staff of FPO	year	1	1	1	3	100	100	100	100	300
Office/storeroom rental	month	12	12	12	36	8	96	96	96	288
Salary and allowances - manager	month	12	12	12	36	15	180	180	180	540
Salary and allowance - accounts clerk	month	12	12	12	36	5	60	60	60	180

Salary and allowances - sales & marketing	month	12	12	12	36	10	120	120	120	360
Office operating costs	month	12	12	12	36	10.5	126	126	126	378
Travel and marketing expenses	month	12	12	12	36	8	96	96	96	288
Legal and audit expenses	year	1	1	1	3	12	12	12	12	36
sub-total							1,105	840	790	
Equity investment	farmer	1500	1500		3000	2	3,000	3,000	-	6,000
Total cost										8,735

47. **Services to producers** to be provided via FPOs and other community service providers include:

- Market and value chain studies: although producers do not face major barriers in marketing their produce, produce prices could be improved if marketing systems were more efficient and production was more closely aligned to market demand. The project has provision to fund around 5 market or value chain studies to identify bottlenecks and feasible interventions to improve producer returns. It is anticipated that APDMP FPOs will be able to get considerable support for marketing initiatives by converging with other programmes - including the state level support to FPOs supported by ICRISAT.
- Collective marketing and related infrastructure: each cluster would get a set of equipment including weighing scales, moisture meters and tarpaulins. This would assist in marketing of crops such as groundnuts - it has been demonstrated that if producers know the weight and moisture content of crops that they sell, they will obtain 5% to 10% higher prices. Tarpaulins aid short term storage (there is adequate warehousing in the area for long term storage). This equipment could be operated via the FPO or CLIC, or rented to individuals via machinery hire centres.
- Organic input supply would be supported via the establishment of one organic input production and sales enterprises in each cluster - which would get capital support INR 75,000 each. In addition 100 farmers would get drums and other equipment to make organic preparations (INR 2,000 per farmer). Organic inputs include growth promoting bacteria such as rhizobia, phosphate solubilizing bacteria and other growth-promoting and antagonistic potential microbes such as *Pseudomonas fluorescence, Bacillus subtilis and Streptomyces spp*. These can be applied as seed treatments - and sometimes as sprays. Some plant extracts can effectively control a number of pests.

48. **Community managed seed system** would build on an existing programme for groundnut seed in Anantapur district. Based on the example of groundnuts, a seed production group in the cluster would be formed (it may have 50 to 60 members) and supplied with 14 tons[35] of foundation seed at a cost of INR 64 per kg, of which 33% is funded via convergence with the DAC seed programme and 67% by the farmers. This seed would be used to produce 112 tons of certified seed, with APDMP paying Rs1 per kg for bags and other consumables, and the farmers contributing a similar amount in labour for cleaning and packing. Seed certification costs have not been included, but would be paid by farmers. Seed producers would then sell this certified seed to other farmers (who would also be able to collect a 33% subsidy on the cost). APDMP would also provide INR 150,000 towards the cost of equipment such as a cleaner, grader, storage bins and weighing scales.

49. **Machinery rental centre** would be set up in each cluster, owning and hiring out field machinery - seed drills are in high demand to get crops sown as quickly as possible after the start of the monsoon, and chisel ploughs are needed for deep ploughing. Combined seed and fertiliser drills make more effective use of plant nutrients by placing fertilisers close to seed and where there is soil

[35] This is spread over 4 years - so only one ton may be provided in the first year, rising to 5 tons in the third and fourth years

moisture The centre could also rent out irrigation equipment as well as crop cleaning and drying machines. The cost of a set of equipment is estimated to be INR 1.5 million to be funded by the centre operators, convergence schemes and the project. The centre could be owned by an FPO or by a smaller group of farmers. If owned by an FPO it is expected that machines would be leased out to an individual who would then rent them out.

Sub-component 1.4: Field facilitation

50. The project would select and contract a number of experienced agencies to mobilise farmers and support project implementation at the cluster level for a period of 4.5 years. In each district (possibly two for Anantapur) a well-qualified technical agency would be selected as the District Facilitating Agency (DFA). This DFA who would form partnerships with around five smaller local Facilitating Agencies (FA) who each would support project implementation in 10 to 12 GP clusters.

51. Training of extension staff: An important part of the work of the DFA will be to build the capacity of FA staff, and also to train key farmers and community resource persons. In addition the DFA would provide (or arrange) training for staff of government line agencies. This would aim to update their knowledge and equip them to provide advice on adaptation to climate change. If suitable training courses are not available (from agencies such as the Water & Land Management Training and Research Institute and the Central Research Institute for Dryland Agriculture), then training modules may need to be drawn up with support from FAO or ICRISAT.

52. A description of their tasks is in Appendix 5 and a cost budget is in Table 2.

Table 2a: Field facilitation costs: District Facilitating Agency

Cost for one DFA	**unit**	**Total quality**	**Unit cost Rs'000**	**Total cost Rs'000**
Office set up costs	sum	1	400	400
Training courses for FA staff	person	60	10	600
Training course for government staff	person	60	15	900
Training courses for CRP	person	560	10	5,600
Training courses for farmers & community leaders	person	360	10	3,600
Workshops and meetings	event	80	5	400
Sample surveys and other data gathering	year	6.5	50	325
Salaries:				
Team Leader/Institutions Specialist	month	78	75	5,850
Water Management Specialist	month	78	75	5,850
Agronomist	month	69	75	5,175
Rangeland Specialist	month	69	75	5,175
Livestock Specialist	month	78	60	4,680
Process Monitoring Specialist	month	78	50	3,900
Training facilitator	month	75	50	3,750
Supprt staff	month	126	30	3,780
Travel and phone	p-month	651	10	6,510
Office running costs and miscelleneous	month	78	25	1,950
Office rent	month	78	12	936
Institutional overhead costs	10%			5,845
Total				65,226

Table 2b: Field facilitation costs: Facilitating Agency

One FA covering 10-11 GP clusters	**Unit**	**Total quality**	**Unit cost Rs'000**	**Total cost Rs'000**
Office set up costs	sum	1	120	120

IT hardware	sum	1	120	120
Salaries:				
Cluster Coordinator	month	54	60	3,240
Water Management Facilitator	month	54	30	1,620
Institutions Facilitator	month	108	25	2,700
NRM/Field Engineer	month	108	30	3,240
Agricultural Facilitator	month	54	25	1,350
Livestock Facilitator	month	54	25	1,350
Training Facilitator	month	54	25	1,350
Gender/Equity Enabler	month	54	20	1,080
Accounts Assistant	month	54	20	1,080
Community Mobiliser (needs based provision)	month	180	18	3,240
Travel and phone	p-month	720	4	2,880
Office rent (2 field offices)	month	54	12	648
Office running costs and miscellaneous	month	54	20	1,080
Institutional overhead costs	10%			2,510
Sub-total				27,608

Table 2c: Field facilitation costs: Calculation of total cost

	Rs'000
Total cost per FA over 4.5 years	27,608
Total cost for 5 FA	138,039
Average cost spread over 6.5 years	21,237
Total cost per LFA over 6.5 years	65,226
Average cost spread over 6.5 years	10,035
Total cost LFA+FAx5 per year	31,271
Total cost for one LFA+ five FA over 6.5 years	203,265
Total cost for six* LFA+30 FA over 6.5 years	1,219,587
* assumes 2 LFA for Anantapur, and one in the other 4 districts	

C. Component 2: Drought proofing through NRM and governance

53. This component aims to mitigate the extent of drought and make the agricultural more productive through investment in, and improved management of, common property resources (i.e. public goods). Further information regarding water resource management is in Working Paper 2. This component has the following sub-components:

Sub-component 2.1 Water governance
Sub-component 2.2 Water monitoring and conservation
Sub-component 2.3 Regenerating common property rangeland

Sub-component 2.1 Water governance

54. This sub-component will engage with all water users in each cluster to make rational choices regarding access and equity in water management based on: improving awareness of water resources availability; mapping different water users; budgeting water demand; establishing a monitoring network of all forms of water use; and carrying out water auditing. It is important to understand the links between surface water and groundwater in order to optimize groundwater

recharge and so curb the trend to overexploit groundwater. In order to build an understanding of the linkages between surface water and groundwater, a drainage basin approach will be used to define a Hydrological Unit (HU) that also includes the groundwater in that drainage basin. On average, one HU covers about 5 GPs and an area about 8,300 ha.

55. A Habitation Water Committee will be formed in each village, with representation from all types of water users. About 2 to 4 representatives from each habitation water committee will be nominated to the GP Water Sub-committee. These nominated members along with the elected members of the GP will form the GP Water Sub-Committee. The sub-committee will be chaired by the GP Sarpanch (the elected head of the GP), and the GP Water Sub-Committee with legal powers as integral part of the GP. Habitation Water Committees and GP Water Sub-committees will meet once in two weeks in the first year and monthly thereafter to review the hydrological and meteorological data collected, monitor water supply and demand, monitor the adoption of the HU management plan, and discuss strategies for effective implementation the plan.

56. All the GP Water Sub-Committees in an HU will form a Hydrological Unit Network (HUN). The HUN will be registered under the AP Societies Act, and will meet once every 3 months to review the implementation of water management plans by the GPs in the drainage basin and identify strategies for effective implementation of the plan.

57. Capacities of GP members and the water sub-committee members will be built along the lines of the Farmer Water School curriculum. Likewise, water management and climate change content will be incorporated into farmers' field schools (FFS) on crops and livestock. The capacity of GPs and of the various departments involved with water development will be strengthened on (i) drainage basin management to facilitate convergence between village development plans and the HU management plans; (ii) participatory approaches so that, at completion of APDMP, line departments are able to directly interact with GP water committees and HU Networks (HUNs).

58. Water Budgeting will be organized at the GP and HU levels to discuss water supply and demand, water balance and develop a HU management plan. Later, GP-level water management plans will be developed in line with the HU plan. The Water Budgeting (WB) exercise will be undertaken prior to each cropping season at the HU level. It will consolidate the data that GP Water Sub-Committees Data Collection Assistants, farmers, and CRPs collect on water supply and demand, and will involve the following steps:

- Resource inventory updating
- Estimation of water supply during November-May / June-October
- Estimation of water demand during November-May / June-October
- Computing water balance at the end of May / October
- Water budgeting workshop
- Water Management Plan adoption survey

59. The HU management plan will include demand-side and supply-side water management plans and proposes infrastructure development to increase or optimize supply as well as priority water demand management activities to decrease or curb water demand. The demand-side water management plans (DSWMP) will include detailed crop plans (i.e. crop types and extent), livestock plans (types and numbers), piped water supply plans, commercial and other uses in each GP. The supply-side water management plans (SSWMP) will focus on improving surface and groundwater availability as well as soil moisture. These plans will be developed through a consultative process that includes inputs from all users in the WB workshop. The HU and GP level management plans will be transformed into maps with assistance of the Andhra Space Applications Centre (APSAC) and displayed in the Climate Information Centres (CLICS) to create awareness on the water management plan.

60. One of the major activities taken up after the WB workshop is the Water Management Plan-adoption survey. This will include the monitoring crop-water use, water sharing arrangements, water

security, and the prevention of deepening/new drilling of bore wells. . Results of this survey will be shared in GP meetings and remedial actions discussed if needed.

61. APSAC is the nodal agency in the Ministry of Planning for all Remote Sensing and GIS applications APDMP will utilize the services of APSAC on water governance in the following ways:

- Maps to support to the training of GP Water Sub-Committee members
- Resource Inventory maps will be updated and validated by the GP Water Sub-Committees and displayed in the CLICs) to create greater awareness, and then aggregated at HU level.
- Water budgeting and Water Management Plan: Various maps of the HU on HU boundaries, subsurface lithology, soils, surface water structures, groundwater utilization and prospects, land use, livelihoods, and water users will be presented in the water budgeting workshop to guide the discussions. Later, the HU and GP level management plans will be transformed into maps and displayed in CLICs.
- Monitoring and Assessing Impact: APDMP will utilize satellite and remote sensing applications to consolidate data collected from individual GPs on water management plan adoption within a HU. This consolidation will assist in effective monitoring of the implementation of the HU water management plans and assess the effectiveness of individual GPs within a drainage basin in the implementation of the plan.

Sub-component 2.2 Water monitoring and conservation

62. This sub-component will comprise management interventions to monitor water supply and water demand and to increase water availability though investments in rainwater harvesting and groundwater recharge. This will include (a) local collection of information on water resources available and water demand to support local decision making; and (b) implementation of soil and water conservation infrastructure aimed at increasing groundwater recharge.

63. **Water supply and demand monitoring** will work with the line departments that are involved with at local level so as to encompass all elements required to a comprehensive water budget: water transfer, rainfall, surface water, surface water stored, soil moisture and groundwater available for water supply; water used by the various sectors (domestic, crops, livestock, industries and environment) for the water demand. It will create an opportunity for interactions between line departments and farmers, since farmers will be collecting new data that can be brought into the respective public systems. Water supply and demand data is critical for water budgeting, so a hydrological and meteorological monitoring network is an important element of the water governance. The hydrological monitoring network includes: monitoring borewell discharge, water levels in borewells, major and minor irrigation tanks, springs, water harvesting ponds, check dams, etc. in the GP. In each GP, two drinking water wells (say one well per village supplying water to the Piped Water Supply System) will be used as an Observation (OB) well. Likewise, 10 irrigation wells in the GP will be used as OB wells, with manual recording of water-levels and discharge by the well owners. Major irrigation tanks in each GP will be monitored for inflows, storage, measurements of losses and irrigated area. Wherever springs are present their flows will be monitored and irrigation command data collected. Water levels in all water harvesting ponds and check dams will be monitored. Likewise, current meters and gauging rods will be established for surface water supply measurement each mouth in each sub-basin. Community Weather Stations (CoWS) will be established for meteorological monitoring. The equipment to be procured for CoWS include: Stevenson Screen (small size), Thermometers (dry and wet), Thermometers (Max and Min), Open Pan Evaporimeter, Sun shine Recorder, Anemometer (wind velocity), Wind Direction meter, and Tipping bucket rain gauge.

64. Data on weather and hydrological parameters will be collected by data collection volunteers, and provision has been made to recruit and pay allowances to two persons in each cluster for a period of 4-5 years. Weather data will be collected daily, and water levels in borewells will be measured every fortnightly. Data on surface water resources will be collected periodically as and when the streams or canals flow and when surface storage occurs. In addition to this, data on crops sown and extent, crop plans and extent, water utilized by other commercial uses will also be collected

to estimate water use/demand. The project will identify creative ways of recognizing the efforts of the data collection volunteers. This will help sustain their interest in data collection. The data will be displayed on display boards in the CLICs and GPs and will be disseminated to other habitations in the GP using mobile apps to enable farmers to make informed decisions on agricultural crops, crop growing practices, and crop-water management—both collectively and individually.

65. At higher geographic scales, the knowledge of groundwater remains approximate, despite new exploration techniques generated in recent years. In order to complement groundwater knowledge, a pilot hydrological mapping of aquifers is proposed with technical assistance from the National Geophysical Research Institute (NGRI). This high resolution aquifer mapping involves airborne electromagnetic surveys complemented with ground investigations. The exercise will produce maps of the fractured pathways that control the groundwater movement to a depth of up to 300 meters in a weathered hard rock underground. This will provide precise information on groundwater prospects (volume and location), which will be useful to identify sustainable borehole sites for pumping, as wells as for effective recharge. The estimated cost of the pilot is USD 1 million to map an area of 391 km^2, approximately covering two mandals. A drainage basin of about 300 km^2 will be identified, so that the pilot mapping can be led on the area including drainage basin itself plus the complementing administrative area of the villages concerned with the basin.

66. Additionally, the hydrological mapping estimates various fluxes operating on the groundwater system in time and space to determine the health of the system. These fluxes can be modelled to in an interactive decision making tool, so that farmers and local communities can use such a model for informed management of the groundwater resource.

67. Based on (i) the improved knowledge of water resources available, (ii) the improved knowledge of water used by different sectors (beyond agriculture only), and (iii) a clearer water-demand at village and drainage basin levels, the Department of Planning will be in a better position to facilitate convergence of various programmes to develop the required infrastructure to secure water (surface water storage, groundwater recharge) and control erosion.

68. **Water conservation infrastructure** will aim to add to the supply of available water. Soil and water conservation activities will support the recharge of soil moisture and groundwater, and geographically targeted water harvesting activities will complement local water supply management. It will include some farm ponds (not lined as these are primarily recharge structures), check dams and other nulla improvement works, various types of bunds. This has been included in the project budget at 140 m^3 of earthworks per hectare for 25% of the cultivated land (about 26,200 m^3 per cluster), which would entirely be funded via convergence with MGNREGS. These works would be identified and planned as part of the initial participatory cluster planning - and in some locations may have been part of a planned watershed development scheme that was not fully implemented. In addition APDMP will invest project funds in about three borewell recharge structures per village cluster. A single structure is reported to benefit a number of boreholes in the vicinity.

69. An ICRISAT simulation model for Dhone in Kurnool district shows the potential impact of water harvesting structures amounting to 50 m^3 per hectare on groundwater recharge and consequent expansion in irritated areas. Results in Table 3 show that by capturing nearly 30% of total water runoff, the expected groundwater recharge more than doubled (64 mm compared to 26 mm). This enables the irrigated area to be increased by 2.5 times.

Table 3: Expected impact of rainwater harvesting interventions

Year	Rainfall (mm)	Runoff (mm)		Estimated Groundwater recharge (mm)		Potential irrigated area (%)	
		Before	After	Before	After	Before	After
Normal	679	87	41	19	58	7.5	23.4
Normal	595	112	64	22	64	8.9	25.5
Wet year	803	326	268	44	93	17.6	37.2

Dry year	472	74	48	17	39	6.8	15.6
Average	**637**	**150**	**105**	**26**	**64**	**10.2**	**25.4**

Sub-component 2.3: Regeneration of common property rangeland (CPR)

70. The entry point for small ruminant development is the development of common property rangeland. Better grazing resources on such common land have been shown to allow producers to stop flocks migrating (in the face of increasing drought) in search of seasonal grazing. Static flocks enable the delivery of animal health and other productivity enhancement services (Component 1.2) as well as the formation of Producer Organisations (Component 1.3).

71. About 13% of the land in AP is wasteland held by the Revenue Department[36]. Small rocky hills and other uncultivated land are widespread in the project area. The mission visited a number of areas where communities had been supported to regenerate and revegetate this land resulting in increased supplies of fodder and forest products, along with ecological services for resource conservation, recharge of groundwater and sustainability of agro-ecological systems, including pollination of food crops. Each hectare of regenerated CPR is expected to provide an extra four tons of fodder and 250 m^3 of water (for rainfall of 500mm), reducing the need for flocks to migrate to find grazing. The project would regenerate about 42,900 ha across the 5 districts, this works out as an average of 130 ha in each of the 330 village clusters, but in practice this may not take place in every cluster and calculations in Working Paper 4 are based on 100 clusters each with 400 ha of CPR. The rights of access to CPR are secured through entry into the Prohibitory Order Book (POB) maintained at the mandal level.

72. Investment in CPR regeneration would include soil and water conservation works, planting / sowing of fodder plants on about 40% of the area, and supplies of livestock drinking water (renovation of water bodies and construction of new ponds - about one per 40 ha of CPR). The total investment in CPR development amounts to Rs14,000 per ha, of which Rs12,000 will come from MGNREGS with a 5% contribution from users of the CPR. In addition to these physical works, a vital part of CPR development involves facilitation of communities to reach agreement on the managed use of CPR - including formation of user groups and producer organisations. This work has already been factored into the staffing and budgets of the facilitating agencies.

D. Component 3: Lesson learning and management

Component 3.1 Lesson learning

73. Results of the project, together with specially commissioned studies, with aim to inform development strategies and approaches for agricultural development in regions vulnerable to drought and climate change. Areas for such lesson learning include:

a) Water resources: the proposed hydrological survey will provide a basis for decisions regarding groundwater exploitation, recharge and management. The experience of community groundwater management involving GPs and water resource planning at the basin level will also inform state policies regarding water resource planning and management. In addition two studies have been identified:

- Groundwater Economy in Anantapur and Chittoor Districts: The study will identify strengths, weaknesses, opportunities and threats to bring about positive changes in the sector by moving from exploitation to management of the critical resource. The results of such a study will contribute to a common understanding between the administration and the private sector on the opportunities that lie in adopting better professional practices, and on the need for a better defined regulatory framework.
- Pilot Implementation of Registration of Wells in Anantapur: A study will register all borewells in Anantapur district to obtain the total count on all types of wells, with data on location, technical details, owners and water use information. A workshop will be organized in the Water Resource

[36] Excludes common property held under Forestry Department.

Department to: (i) discuss how this new evidence effects estimates of groundwater exploitation; (ii) share understanding on the existing procedure to register a well; and (iii) agree on one single improvement to bring to this procedure.

In order to bridge the operational gaps among the various ongoing initiatives, workshops will be organized annually on specific themes. An initial list of topics is: watershed management plans, water sharing arrangements, regulations around groundwater drilling, water reuse, water sector legislative framework. Such meetings will require preparatory studies to facilitate the discussions.

b) Crops: a wealth of data will be generated by the project M&E system, and the lessons emerging from this would inform development strategies regarding issues such as: (i) the viability of rainfed farming under conditions of climate change; (ii) interventions that are most effective for rainfed agriculture; (iii) marketing systems and producer support (including the impact of a range of subsidies and support mechanisms on farmer decisions); (iv) damage to crops by wild animals; and (v) areas of potential in horticulture.

Table 4: Lesson learning cost budget

	Unit	Total quantity	Unit cost Rs'000	Total Cost Rs'000
Lesson learning				
Assessment of groundwater economy	Sum	1	8120	8,120
Pilot registration of wells	Sum	1	5000	5,000
Other surveys and studies	Survey	7	800	5,600
Learning and dissemination workshops	Each	12	300	3,600
Total				22,320

c) Livestock - the project (with support from FAO) will support the development of a new curriculum for the training of paravets, and carry out studies to inform sector development. The latter would include calculation of carrying capacity and water recharge benefits of improved common property rangelands, leading to policies for community management of this resource. Other studies, along with the experience of community animal health services, could inform strategies for disease control and the veterinary treatment of animals, animal breeding and the use of subsidies to promote livestock development. Further ideas are in the livestock working paper.

d) Farmer organisations: the flexible approach to be adopted in the formation and support of farmer organisations will enable a number of different models to be compared and lessons learned regarding what works best and the factors that contribute to success.

Component 3.2 Project Management

74. The project management structure and management arrangements are described in Appendix 5. The project will be managed via a State Project Management Unit (SPMU), with District PMUs in each district. A Lead Technical Agency (LTA) will be contracted to support the SPMU and there is also provision for backstopping and specialised support from an international agency such as FAO. Field implementation supported by District Facilitating Agencies (DFA) who will form a consortium with small locally based Facilitating Agencies (FA).

75. The planned staffing and activities of the SPMU, along with its cost budget is in Table 5 while the cost of DPMUs is in Table 6. The cost of the LTA is shown in Table 7 - this includes all the work that would be included in the LTA contract amount, although additional training and consultancy could be added as required during project implementation. The cost of international TA from an agency has been estimated at USD 1 million, of which USD 200,000 would be contributed by FAO. The balance amount (USD 800,000 = INR 56 million) has been included in project budgets.

Table 5: Budget cost for State PMU

	unit	Total quantity	Unit cost Rs'000	Total cost Rs'000
Equipment				
Computers & printers	sets	28	50	1,400
Office furniture and equipment	sets	16	12	192
GIS system including printers	sum	1	700	700
Accounting software and customisation	each	6	200	1,200
sub-total				3,492
M&E, studies and consultants				
Enumerators and consultants for in house surveys	year	6	250	1,500
Baseline, mid-term and impact surveys	survey	3	2000	6,000
sub-total				7,500
MIS system				
MIS development,	sum	1	2000	2,000
MIS support	year	5	550	2,750
sub-total				4,750
Workshops, training, TA				
Short term consultants	month	9	80	720
Training courses for project staff	person	120	15	1,800
Workshops and meetings	event	80	20	1,600
Start-up workshop	event	1	500	500
Project completion workshops and reporting	sum	1	1000	1,000
sub-total				5,620
Audits	year	7	1000	7,000
Salaries - staff seconded from GoAP				
Additional Project Director/Chief Operating Officer	month	84	150	12,600
Agricultural Specialist	month	81	100	8,100
Livestock Specialist	month	81	100	8,100
Monitoring Officer	month	81	60	4,860
Administrative Manager	month	84	100	8,400
Accounts Officer	month	84	90	7,560
Accounts Assistant	month	81	60	4,860
sub-total				54,480
Salaries - contracted staff:				
Horticultural Specialist	month	81	100	8,100
Groundwater hydrologist/engineer	month	81	100	8,100
Gender and Equity Specialist	month	81	100	8,100
Planning and Monitoring Manager	month	84	100	8,400
Monitoring Officer	month	81	60	4,860
Procurement and Contract Specialist	month	81	100	8,100
Finance Specialist	month	84	100	8,400
Finance Support Officer	month	81	60	4,860
General support staff	month	312	25	7,800
Office Assistant	month	240	18	4,320
sub-total				71,040
Office running costs and miscellaneous				
Office rental	month	84	60	5,040
Vehicle leasing	month	312	30	9,360
Other travel and misc.	month	738	10	7,380
Office running costs and miscellaneous	month	81	80	6,480
sub-total				28,260
Total SPMU costs				182,142

Table 6: Total cost for five District PMUs

	unit	Total quantity	Unit cost Rs'000	Total cost Rs'000
Equipment				
Computers & printers	sets	80	50	4,000
Office furniture and equipment	sets	40	10	400
sub-total				4,400
Training, workshops and TA				
Training courses for project staff	person	70	15	1,050
Workshops and meetings	month	75	20	1,500
Short term consultants	month	9	80	720
sub-total				3,270
Salaries - staff seconded from GoAP				
Deputy Project Director	month	405	100	40,500
Assistant Project Director	month	780	75	58,500
sub-total				99,000
Salaries - contracted staff				
MIS Officer	month	405	40	16,200
Accounts Officer	month	405	70	28,350
Accounts Assistant	month	405	40	16,200
Administrative Assistant	month	405	40	16,200
General support staff	month	810	25	20,250
Office Assistant	month	261	18	4,698
sub-total				101,898
Office running costs and miscellaneous				
Office rental	month	420	40	16,800
Vehicle leasing	month	810	40	32,400
Travel and other costs	month	1590	5	7,950
Office running costs and miscellaneous	month	405	50	20,250
sub-total				77,400
Total DPMU costs				285,968

Table 7: Cost budget for Lead Technical Agency

	unit	Total quantity	Unit cost Rs'000	Total cost Rs'000
Lead Technical Agency				
Office set up costs	sum	1	500	500
Training courses for PMU and RO staff	person	140	15	2,100
Workshops and meetings	event	80	20	1,600
Salaries:				
Lead Advisor	month	81	150	12,150
Process Management Advisor	month	69	80	5,520
Capacity Building Planning & Coordination Advisor	month	69	100	6,900
Knowledge Management & Communications Advisor	month	81	90	7,290
IT Professional	month	81	90	7,290
Process M&E Team	month	162	80	12,960
Need based pool of technical and management experts	month	100	100	10,000
Secretarial (database, reports, communication)	month	216	40	8,640
Travel and phone	p-month	859	12	10,308
Office rent	month	81	20	1,620
Office running costs and miscellaneous	month	81	50	4,050
Institutional overhead costs	10%			9,093
Sub-total				100,021

E. Interaction between project components

76. The links between six key sub-components of components 1 and 2 are shown in Table 8. For example the extension services sub-component benefits: (i) climate-smart crop systems via the CLIC information services, farmer capacity building and training of extension staff in climate change adaptation; (ii) livestock production systems via development of community animal health services, training of livestock producers and training of animal health staff; (iii) water governance via the CLIC providing access to weather forecasts and other data; (iv) soil and water conservation via CLIC information network and exposure visits to see interesting examples of SWC; and (v) regeneration of CPR via CLIC information network and exposure visits to see interesting examples of CPR.

Table 8: Linkages between key sub-components

	1.1 Crop production systems	1.2 Livestock production systems	1.3 Farmer Organisations	2.1 Water governance	2.2 Water conservation	2.3 Regeneration of CPR
1.1 Crop production systems		Penning of sheep adds organic matter	Provision of seed, mechanisation, other input and marketing services	Water budgeting contributes to sustainable irrigation of crops	Recharge increases availability of water for irrigation	Bees in CPR pollinate crops
1.2 Livestock production systems	Crop residues for animal feed		Provision of livestock inputs and support for Pashu Sakhi Collective mark-eting of sheep.	Specific allocation of water for livestock in water budgets	Recharge increases availability of water for livestock	Grazing for livestock
1.3 Farmer organisations	CLIC evolves into local FPO. FFS and CRPs build community cohesion New cropping opport--unities create demand for FPO services	Increased prod-uction of sheep provides an opportunity for collective marketing.				
2.1 Water Governance	FFS increase awareness of need for water management. Pipelines and support for groundwater sharing. Water management plans publicised via CLIC.		FPO represented on GP water management committee		Collection of hydro and weather data Groundwater recharge	
2.2 Water Conservation & monitoring	Recharge via leakage from farm ponds CLIC disseminates groundwater and weather information.		FPO will become the focal point for groundwater and weather information, and will promote water conservation	Water budgets quantify ground-water recharge		Rainwater harvesting in CPR recharges aquifer
2.3 Regeneration of CPR			Community management of CPR requires FPO			

Each column shows the benefits from the sub-component named in the top row for other sub-components

77. A number of other sub-components cut across a number of focal areas and support a range of activities. For example within component 1, subcomponent 1.5, innovation and learning would support all aspects of component 1 (and support for innovation from FAO may also support the groundwater management activities of component 2). Sub-component 1.6, Field Facilitation, will contract Facilitation Agencies to support all aspects of village level implementation, both for components 1 and 2.

F. Phasing of Project Clusters

78. Drought mitigation requires a long term approach and the project would be implemented over a seven-year period. Given the large number of clusters, it would not be feasible to start work on all clusters in a single year, so the 330 clusters would be divided into four phases, each with a one year start-up period, four-years of intensive implementation, and between one and two of phasing out of support during which community institutions take over the supporting role. In the first year of project implementation, in addition to preparatory work for the first batch of clusters, state and district PMU staff will need to be recruited and the various NGOs and service providers selected and contracted. The phasing is summarized in the table below.

	Clusters	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
IFAD	90	Prepare	------- intensive implementation -----				----phase out --	
	150		Prepare	------- intensive implementation -----				-P-out
RIDF	170		Prepare	------- intensive implementation -----				-P-out

Attachment 1: Data on the project districts and key assumptions

Administrative divisions

	Anantapur	Chitoor	Kadapa	Kurnool	Pakasam	total
District	1	1	1	1	1	5
Mandal (sub-district)	63	66	50	54	56	289
Gram Panchayat	1,001	1,381	800	899	1,036	5,117
Villages (as per 2011 census)	949	1,540	933	897	1,058	5,377

Land Use (ha'000)

		Anantapur	Chitoor	Kadapa	Kurnool	Pakasam	total	State
Total area		1913.0	1515.1	1535.9	1765.8	1762.6	8492.4	16020.4
Forest		197.0	452.0	501.0	340.7	459.3	1949.9	3593.5
Barren land		166.4	152.7	221.8	127.3	153.5	821.8	1340.6
Non-farm uses		150.1	157.3	182.1	141.8	182.3	813.5	1982.4
Permanent Pastures		5.8	33.5	9.0	3.6	55.9	107.8	212.1
Miscellaneous trees		9.4	30.6	6.8	1.9	3.7	52.3	160.1
Cultivable waste		48.5	4.7	45.8	47.3	60.6	206.9	391.5
Non-current fallow		56.5	120.9	83.5	71.0	128.2	460.2	791.6
Current fallows		209.1	150.2	129.1	122.7	69.9	680.9	1087.5
Net sown area		1040.1	371.7	356.9	909.6	645.3	3323.6	6561.1
Sown more than once		67.4	45.3	62.0	92.1	45.8	312.6	1979.7
Total cropped area		1107.5	417.1	418.9	1001.7	691.1	3636.2	8540.8
Net irrigated 2013-14		130.5	147.0	136.0	231.2	242.0	886.7	2801.0
Percent of area								
Forest	% of total area	10%	30%	33%	19%	26%	23%	22%
Barren land		9%	10%	14%	7%	9%	10%	8%
Non-farm uses		8%	10%	12%	8%	10%	10%	12%
Permanent Pastures		0%	2%	1%	0%	3%	1%	1%
Miscellaneous trees		0%	2%	0%	0%	0%	1%	1%
Cultivable waste		3%	0%	3%	3%	3%	2%	2%
Non-current fallow		3%	8%	5%	4%	7%	5%	5%
Current fallows		11%	10%	8%	7%	4%	8%	7%
Net sown area		54%	25%	23%	52%	37%	39%	41%
Total area		100%	100%	100%	100%	100%	100%	100%
Sown more than once	% of net sown area	6%	12%	17%	10%	7%	9%	30%
Gross cropped area		106%	112%	117%	110%	107%	109%	130%
Net irrigated 2013-14		13%	40%	38%	25%	38%	27%	43%

Land holdings

		Anantapur	Chitoor	Kadapa	Kurnool	Pakasam	total
Number of holdings	marginal	258,950	455,190	241,721	282,405	378,940	1,617,206
	small	243,528	144,431	123,474	187,698	170,081	869,212
	small medium	175,194	54,981	62,290	112,419	93,392	498,276
	medium	45,853	11,511	12,948	46,266	26,048	142,626
	Large	4,426	1,069	873	4,114	2,092	12,574
	Total	727,951	667,182	441,306	632,902	670,553	3,139,894
percent of total number	marginal	36%	68%	55%	45%	57%	52%
	small	33%	22%	28%	30%	25%	28%
	small medium	24%	8%	14%	18%	14%	16%
	medium	6%	2%	3%	7%	4%	5%
	large	1%	0%	0%	1%	0%	0%
	total	100%	100%	100%	100%	100%	100%
Area (ha)	marginal	147,205	199,010	121,072	158,156	182,087	807,530
	small	358,835	203,304	176,991	267,721	242,517	1,249,368
	small medium	447,417	142,474	161,924	303,055	247,514	1,302,384
	medium	257,599	63,762	69,913	262,023	145,503	798,800
	large	66,954	17,756	12,499	59,131	29,887	186,227
	total	1,278,010	626,306	542,399	1,050,086	847,508	4,344,309
percent of total area	marginal	12%	32%	22%	15%	21%	19%
	small	28%	32%	33%	25%	29%	29%
	small medium	35%	23%	30%	29%	29%	30%
	medium	20%	10%	13%	25%	17%	18%
	large	5%	3%	2%	6%	4%	4%
	total	100%	100%	100%	100%	100%	100%
Average size of holding (ha)	marginal	0.57	0.44	0.50	0.56	0.48	0.50
	small	1.47	1.41	1.43	1.43	1.43	1.44
	small medium	2.55	2.59	2.60	2.70	2.65	2.61
	medium	5.62	5.54	5.40	5.66	5.59	5.60
	large	15.13	16.61	14.32	14.37	14.29	14.81
	total	1.76	0.94	1.23	1.66	1.26	1.38

Ag Census 2010-11

Population census

		Anantapur	Chitoor	Kadapa	Kurnool	Pakasam	total
Households 2011 population census	rural	700,000	737,000	478,000	639,000	692,000	3,246,000
	urban	268,000	303,000	228,000	248,000	168,000	1,215,000
	total	968,000	1,040,000	706,000	887,000	860,000	4,461,000
Farm holdings as % rural hh		104%	91%	92%	99%	97%	97%

This shows that there are almost as many farm holdings (operated farms, either owned or rented) as there are rural households. Although some holdings could be operated by urban households, it is known that a significant proportion of rural households are landless and are not involved in farm operation - although they may work as farm labourers. The National Sample Survey Organisation

(NSSO) 70th round survey of 2013 found, nationally, that the number of "active farmers" (i.e. producing products work over INR 3000 per year) were 83% of the number of holdings recorded in the agricultural census of 2010-11. The number of holdings in project districts have been adjusted by this factor, which results in 20% of rural households being classed as landless - this is in line with observations during the design missions.

Farm holdings after adjustment by a factor of 0.83 for active farmers

		Anantapur	Chitoor	Kadapa	Kurnool	Pakasam	total
83% active farmer as per NSSO	marginal	214,929	377,808	200,628	234,396	314,520	1,342,281
	small	202,128	119,878	102,483	155,789	141,167	721,446
	small medium	145,411	45,634	51,701	93,308	77,515	413,569
	medium	38,058	9,554	10,747	38,401	21,620	118,380
	large	3,674	887	725	3,415	1,736	10,436
	total	604,199	553,761	366,284	525,309	556,559	2,606,112
Holdings as % rural hh		86%	75%	77%	82%	80%	80%
Average size of holding (ha)	marginal	0.68	0.53	0.60	0.67	0.58	0.60
	small	1.78	1.70	1.73	1.72	1.72	1.73
	small medium	3.08	3.12	3.13	3.25	3.19	3.15
	medium	6.77	6.67	6.51	6.82	6.73	6.75
	large	18.23	20.01	17.25	17.32	17.21	17.84
	total	2.12	1.13	1.48	2.00	1.52	1.67

Number of farmers per Gram Panchayat

Project area		5 districts	per GP
number of farmer	marg+small	2,063,727	403
	other	542,385	106
	total	2,606,112	509
Farm area ha	marg+small	2,056,898	402
	other	2,287,411	447
	total	4,344,309	849
Number of gram panchayats		5,117	

Farm size classification	**ha**	**size - ha**
marginal	<1	
Small	1 to 2	
small-medium	2 to 4	
medium	4 to 10	
large	over 20	

ASSUMPTIONS - typical GP		Ha per GP	
	total area	1660	
Of total	cultivated	750	45%
	waste etc	910	55%
	total	1070	100%
Of cultivated	irrigated	150	20%
	rainfed	600	80%
	total	750	100%
Of irrigated	kharif only	100	67%
	kharif+rabi	50	33%
	total	150	100%

	Irrigated ha	% of total
kharif	150	20%
rabi i	50	7%

Assumptions per GP cluster

	Marg.+ small	Other farmers	total farmer	landless	total hh
Total farm area ha	402	447	849		
Number h'holds	403	106	509	127	637
% of total hh	63%	17%	80%	20%	100%
Area/farmer ha	1.00	4.22	1.67		
Participating farmers					
participation rate	80%	73%	79%	79%	79%
no farmers	323	77	400	100	500
total area ha	322	326	648		
Area/farmer ha	1.00	4.22	1.62		
Area irrigated now					
kharif only	43	44	86	2/3 of irrigated	
kharif+rabi	21	22	43	1/3 of irrigated	
total irrigated ha	64	65	130	20% of total	
Rainfed only now	257	261	518		
Irrigated % kharif	20%	20%	20%		
Irrigated % rabi	7%	7%	7%		
Total area now ha	322	326	648		
Future additional irrigation					
No of farm ponds	48	12	60		
farm pond area	24	6	30	Ha	
g-w sharing	0	0	0	Zero as assume this is a water re-distribution	
total ha	24	6	30		
Area irrigated future					
kharif only	63	45	108		
kharif+rabi	26	26	52		
total irrigated ha	88	71	160		
Rainfed only	233	255	488		
Irrigated % kharif	27%	22%	25%		
Irrigated % rabi	8%	8%	8%		
Total area future	322	326	648		

Small and marginal farmers benefit from a larger increase in the area under irrigation than medium and large farmers as it is assumed that new farm ponds are distributed equally across all categories of farmer, and are not weighted in favour of those with more land.

Attachment 2: Assumed average area per farm (ha)

Average per farm	Small and marginal farmer		Overall average farmer	
	Now	Future	Now	Future
Irrigated				
kharif only	0.13	0.19	0.22	0.27
kharif+rabi	0.07	0.08	0.11	0.13
total irrigated	0.20	0.27	0.32	0.40
Rainfed only	0.80	0.72	1.30	1.22
Total area ha	1.00	1.00	1.62	1.62

Cropping pattern	Small and marginal farmer				Overall average farmer			
Hectares	present		Future		present		future	
	kharif	rabi	kharif	rabi	kharif	rabi	kharif	rabi
Red soil								
GN+RG irrigated	0.20		0.27		0.32		0.40	
GN+RG rainfed	0.80		0.52		1.30		0.90	
G-nut irrigated								
Sorghum rainfed			0.20				0.33	
Tomato irrigated		0.07		0.08		0.11		0.14
Fallow		0.93		0.91		1.51		1.48
total acres	1.00	1.00	1.00	1.00	1.62	1.62	1.62	1.62
Black soil								
cotton rainfed	0.40	0.40	0.24	0.24	0.65	0.26	0.39	0.39
Fallow	0.40	0.13	0.48	0.19	0.65	0.60	0.83	0.26
Chick pea		0.40		0.48		0.65		0.83
Sorghum rainfed								
Paddy irrigated	0.20		0.10		0.32		0.16	
Maize irrigated			0.17				0.24	
Tomato irrigated		0.07		0.08		0.11		0.14
total acres	1.00	1.00	1.00	1.00	1.62	1.62	1.62	1.62

The overall average farm has been used for project economic and financial analysis. It is assumed that 70% of farms are on red soil and 30% on black soils.

Participation in livestock production

	total hh	landless hh*	Farm (crop) hh	* includes farm households who do not participate in crop production activities of APDMP		
Sheep rearers	50	34	17			
Sheep fatteners	50	34	17			
Backyard poultry	33	33				
Total	133	100	33			
Overall participating households		Households				
Crop producers only		367				
Livestock producers only		100				
Crop and livestock producers		33				
Total households		500				

Attachment 3. Participation in project activities

Coverage of project activities		per GP cluster	
Participatory planning	households	637	all households in the village/GP. Specific information gathered on the poorest households and their priority needs
CLIC	farmers	-	90% of participating hh use these services
Community Resource Persons	person-days	400	support activities such as demonstrations, seed system, hiring centres etc CRP work can be a source of income for a poor household or a woman.
FFS - crops	farmers	350	14 FFS x 25 farmers. Marginal and small farmers are nore likely to want to attend FFS. Larger farmers may feel thay they lack the time.
Crop demonstrations	farmers	14	one per FFS. Can be located on the land of a small farmer
Exposure visits	farmers	60	Project guildelines will specifiy inclusion of poor and women farmers
Compost bins / making	farmers	50	Project guildelines will specifiy inclusion of poor and women farmers
Soil tests	farmers	400	tests for all participating farmers
Tank silt application	hectares	120	20% of rainfed area. Priority for smaller farmers.
Green manure promotion	hectares	30	5% of rainfed area also crop rotation and mixed croppping
Bund plantation	hectares	100	
Biomass nursery	plants	25,000	250 plants produced per ha of bund plantation. Nursery to be operated by a landless woman.
Lined farm ponds	number	60	on land of those who now have no access to borewell (= poorer farmers)
irrigated	hectares	30	0.5 ha per pond (designed for one hectare)
	farmers	60	
Groundwater sharing	hectares	40	2/3 will be farmers who now have no access to borewell (=poorer farmers)
	farmers	100	0.4 ha per farmer - based on data from current scheme
Mobile protective irrigation	sets	3	per cluster, raingun, pump, pipes - GoAP subsidises operating costs
	hectares	60	2 ha per set per day x 10 days - save crop in monsoon gaps
	farmers	60	farmers with no access to irrigation.
Farmer micro-irrigation equip.	ha	20	per cluster, drip systems - complement government subsidy programmes
	farmers	50	0.4 ha per farmer. Priority to farmers unable to access subidy programme
Micro-irrigation pumps to rent	sets	10	to lift water from farm ponds, includes pipes and prinklers
	farmers	50	assume each set used by 5 farmers each season
Common rangeland developed	hectares	130	average area per cluster
	producers	130	100 with sheep/goat, plus 30 with bovines. Most of these are landless
FFS - livestock	producers	125	5 FFS x 25 producers - most landless
Night shelter: migratory flock	producers	6	for sheep rearing households
Night shelter: static flock	producers	6	for sheep rearing households
Pashu Sakhi service	producers	125	Avg 2.5 PS per cluster, each serve 50 producers
	Pash Sakhi	2.5	Pashu Sakhi are usually younger women for livestock rearing households
Fodder nursery	operators	0.33	one per three clusters. Operated by a poor/landless woman.
	customers	17	50 producers take cuttings, seedlings etc from each nursery
Fodder seed supply	tons	0.93	supplied at subsidised rate.
	producers	93	10 kg of seed per producer. Will be for households with some land
Fodder demonstrations	demonstration	0.5	Approximately one demonstration for every two clusters
Chaffer	number	2.2	per cluster. For hh practicing some supplementary feeding

Feed supply enterprises	number	0.06	Feed milling/mixing/reselling. Household/group/FPO enterprise
Backyard poultry units	producers	33	BYP supported households. Targeted at poor/landless women.
BYP breeder units	operators	0.33	one per 3 clusters. Operator could be a youth with some education
Farmer producer organisations			
FPO at super-custer levels	members	364	Total 40 FPO x 3000 members, may include farmers from non-project villages
FPO/FPO branch at GP level	members	348	Appox 60% of all farmers + sheep producers likley to want to join
Collective marketing	producers	70	Assume 20% of FPO members
Oganic input supply enterprise	operators	1	Operator could be a poor or landless household
	farmers	50	Assume 50 customers
Organic input equipment	farmers	10	set of bins, buckets etc.
Community managed seed			
seed growers	number	40	average per cluster. Existing groups can have 60 members
	hectares	10	produce around 10-20 tons of seed
seed users	number	200	plus additional farmers from other villages
	hectares	200	less if groundnuts, more if cereals or pulses
Machinery hire centres	centre	1	Owned by FPO or a sub-group. FPO may lease out operation to an individual.
	users	60	farmers renting equipment each year. Poorer farmers are less likely to have their own equipment and so will wish to rent this machinery
GP groundwater management committee		330	committees formed and supported
groundwater irrigation		150	ha - average area irrigated by goundwater
Soil and water conservation works		140	ha x 125 cu.m. per ha

Appendix 5: Institutional aspects and implementation arrangements introduction

1. This appendix describes the agencies that will be directly responsible for project implementation. Project management and coordination arrangements are then described, with organograms of the management structure. The final section outlines proposed capacity building.

A. Implementing Agencies

2. At the central level the Department of Economic Affairs will be the nodal agency for the project. At the state level, the Department of Agriculture and Cooperation (DAC) of the Government of Andhra Pradesh will be the nodal agency, with the implementing agency being the Department of Agriculture at the central level and the Agricultural Technology Management Agency (ATMA at the district level. ATMA is a government owned agency (falling under the remit of the Department of Agriculture) responsible for extension services (see Box 1), . At the district level, each ATMA society is headed by the District Collector and it has staff at the district and mandal (sub-district) level.

Box 1: Agricultural Technology Management Agency

Agricultural Technology Management Agency (ATMA) is a decentralised participatory and market driven extension approach. In each district an autonomous agency constituted for: a) Integrating extension programmes across all key line departments and other extension agencies b) Linking research and extension activities in a district c) Decentralising extension decision-making through a participatory programme planning process involving all categories of farmers The district collector/deputy commissioner heads the ATMA Governing Body, with members drawn from the line departments, research outreach centres farmers and NGOs. Under ATMA, grassroot-level extension is mainly implemented through the involvement of Block-level Technology Teams, farmer advisory committees, farmer/ farmer interest and self-help groups. This model was subsequently replicated in all districts with central government funds.

ATMA was pilot tested with support from the World Bank in 28 districts during 1999-2003, and was then scaled up by GoI across all rural districts in India. ATMA were set up in the APDMP districts in 2005-06. Positive outcomes from the pilot phase of ATMA included:

- It was the first attempt to converge extension services by different service providers through a legally-constituted body
- It provided a mechanism for participation of farmers in: (i) deciding priorities (strategic research and extension plan); and (ii) identifying and implementing programmes (Farmer Advisory Centres)
- It brought in additional funding for demonstrations, trainings, exposure visits, and farmer groups. Some of the groups were facilitated in developing better links with agro-processors.
- ATMA generated some publicity and goodwill, along with some success stories for extension at a time when public funding and support for extension has been dwindling.
- ATMA provided space for seeding some new ideas such as public-private partnerships and user contribution for extension, though several challenges still remained in mainstreaming these ideas.

During the pilot stage, ATMA was supported with additional resource, consultants, a full-time project director, and intensive training by national level organisations. However, this support was not available when it was up-scaled without donor funding. Being a centrally conceived and promoted model, it lacked local ownership and was treated as just one more central scheme that state level line agencies had to implement. The uniform approach struggled to cope with the diversity in Indian agriculture in terms of different crops, livestock, rural enterprises, infrastructure, governance, local institutions and ethnic groups, social and economic status of farmers. As a result the original expectations for a re-invigorated extension service have not been met, and there is little or no cross-sector convergence.

Source: The Fallacy of Universal Solutions to Extension: Is ATMA the new T&V?, Learning Innovation Knowledge, United Nations University, September 2008.

3. ATMA in AP suffers from the problems as described in Box 1. However it is an appropriate agency to manage implementation of APDMP as it has a mandate for multi-sector support including livestock and horticulture as well as crops, to facilitate convergence of different programmes, and to work with farmer groups. Unlike the mainstream Department of Agriculture[37] at the district level and

[37] Department of Agriculture forms part of the overall state Department of Agriculture and Cooperation (DAC). DAC also includes the Department of Horticulture and the Department of Agricultural Marketing and Cooperation.

below, ATMA is not fully occupied with the management of input subsidies, data collection and other administrative tasks. Current ATMA tasks largely relate to delivery of farmer training, and it has some spare capacity for additional work. To implement APDMP, the capacity of ATMA would be strengthened via district project management units (DPMU) with additional staff. Existing ATMA staff would be trained, as would those from DoA itself and from other line agencies responsible for livestock and groundwater. This capacity building, together with the experience gained in the implementation of APDMP, will aim to enable ATMA, after the project is completed, to provide technical support for integrated and multi-sector farming systems, and to implement programmes supporting such development.

B. Management and Co-ordination

4. A matrix summarising project management and coordination arrangements is in Attachment 1. Two broad principles will govern the management and co-ordination structure for APDMP:

a. Alignment to exiting government structure of DAC and ATMA.
b. Dynamic and flexible. The proposed arrangement is based on current assessment of project needs and may be modified based on the requirements that may arise during implementation.

5. Alignment to the existing structures: this will be manifested in the following ways:

a. The State Project Management Unit will be located in the Department of Agriculture.
b. The Director (or Commissioner) of Agriculture will be the ex-officio Project Director of APDMP
c. At the district level the District PMUs will be located in the district level ATMA societies
d. The District Collector (DC) is the chairman of the district-level ATMA society.
e. The ATMA Society Project Director (a DoA staff member) would manage APDMP at the district level.
f. The Joint Collector (Development) would become the Vice-Chair of ATMA and of the Primary Sector Mission Committee. This Committee, with representatives of departments of Agriculture, Animal Husbandry, Horticulture and Water Resources/Groundwater, along with SERP, would coordinate implementation of ATDMP and ensure convergence with other programmes.
g. Groundwater planning and demand management would be the responsibility of Groundwater Management Committees to be established as part of Gram Panchayats - the lowest tier of loan government. The committees will come together with district staff of the Ministry of Water Resources and the District Water Management Agency to draw up plans for water resource use at the sub-basin and basin levels.

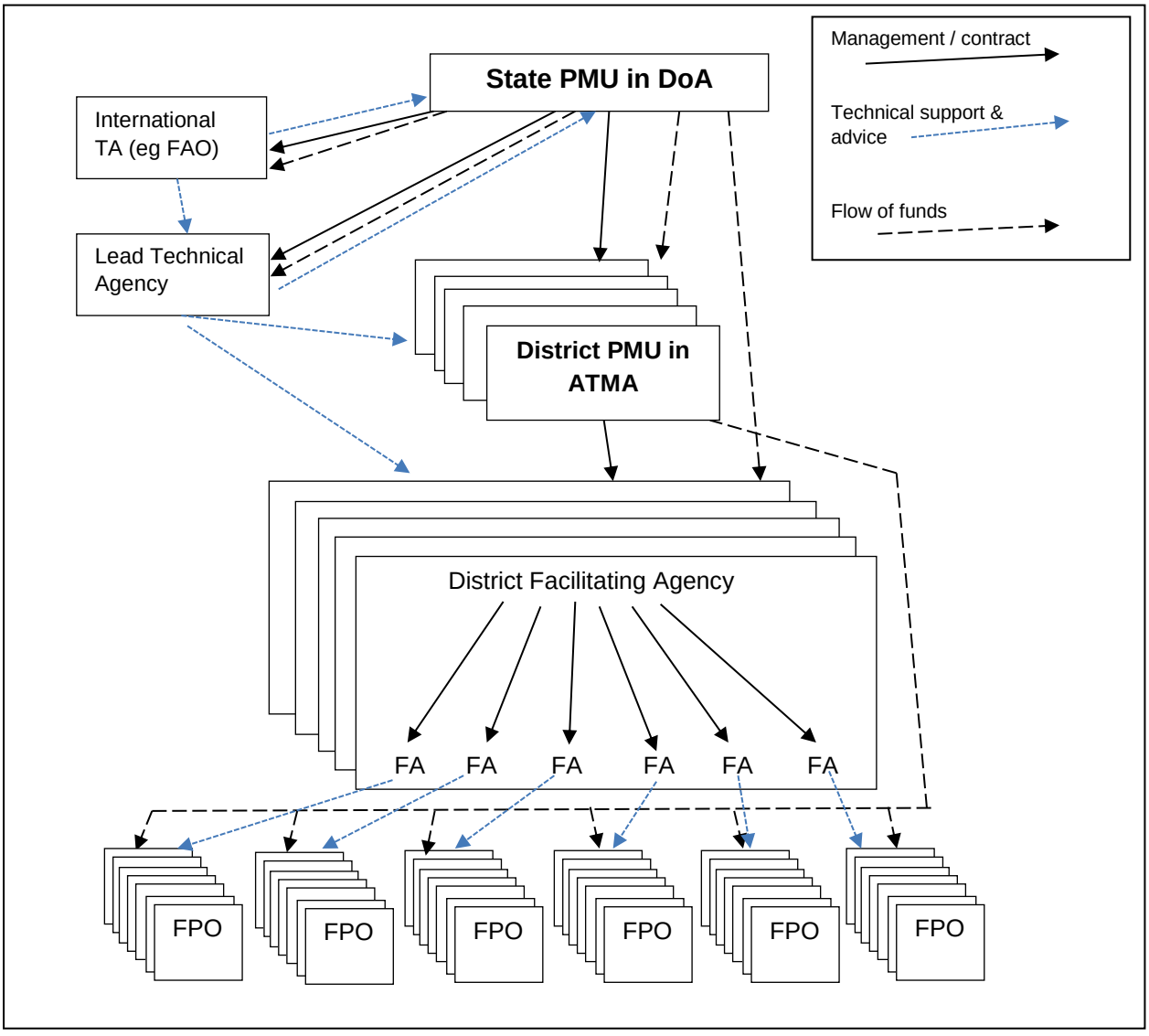
6. Staffing: Hiring of staff will be in a phased manner, starting with those who are essential for setting up the programme and subsequently bringing in technical staff as the implementation rolls out. In some instances, such as hiring of Accounts Assistant at the DPMU level, this would be done after assessing the volume of work which cannot be predicted at the start up stage. Staff positions in the PMU and DPMU will be filled from staff seconded from ATMA, DoA and other line departments, as well as contracted from the market.

7. Support agencies: implementation would be supported by two tiers of technical support agencies, a Lead Technical Agency (LTA) at the state level, and facilitating agencies at the district level. This support structure is the same as is now being used to support implementation of a number of government programmes, including watershed development, groundwater management, community seed villages, and millet promotion.

8. Given the successful FAO experience in promoting water demand management approaches and their vast experience in the key project technical domains, it is proposed that FAO supports the SPMU and LTA of the project with the following capacity building : (i) building the capacity of SPMU, LTA and FAs on water demand management, budgeting, and governance; (ii) lead the development of the

curriculum of FFS for water, crop and livestock production following an integrated drought resilient farming system approach, and train the master trainers; (iii) upgrade the training of livestock services providers in the provision of livestock services; (iv) in consultation with project stakeholders, develop the project M&E system incorporating the measurement of farmers' adaptive capacity to drought and the resilience of the farming systems promoted; (v) provide critical technical assistance for drought resilient farming systems and carrying out quality control of implementation of related activities; and (vi) technical support for priority studies needed for lesson learning and sustainability.

Figure 1: Project Organisation Structure



(b) Broad structures and roles of project management

9. **State Project Management Unit (SPMU):** At the state level, the SPMU will be housed within DoA. It will be headed by the Director (or Commissioner) of Agriculture who will be *ex officio* Project Director of APDMP, with day-to-day management of the PMU in the hands of an Additional Project Director or COO (staff for this post being seconded from the State Service or recruited from the market). It is envisaged that the state PMU would have the following technical and managerial staff:

- Additional Project Director / COO
- Four technical specialists such as:
    - Agricultural Specialist

  - Livestock Specialist
  - Horticultural Specialist
  - Natural Resource Management Specialist
  - Groundwater hydrologist/engineer
- Gender and Equity Specialist
- Planning and Monitoring Manager
- Monitoring Officer x 2
- IT specialists x 2

10. The four technical specialist positions would be filled by staff seconded from the relevant departments of the state government or, if these people are not available, recruited on the open market and employed on a contract basis. The other staff would probably need to be recruited in a contract basis, apart from one of the Monitoring Officer who should be seconded from the Planning Department. The SPMU would also have the following administrative, financial and support staff:

- Administrative Officer (seconded from DoA, of DD/JD rank, to service as the administrative anchor of the project)
- Accounts Officer (seconded from DoA)
- Accounts Assistant (seconded from DoA)
- Procurement and Contract Specialist (contracted)
- Finance Specialist (contracted)
- Finance Support Officer (contracted)
- General support staff (x4) (contracted)
- Office Assistant (x3) (contracted)

11. **District Project Management Unit (DPMU):** in each of the five districts, the PMU would be headed by the ATMA society Project Director. The district PMU would be managed on a full time basis by an ATMA Deputy Project Director, assisted by two Assistant Project Directors seconded from ATMA, an MIS Officer, along with administrative, accounts and support staff. Staffing of the DPMU would be as follows:

- Deputy Project Director (ATMA)
- Assistant Project Directors x2 (seconded from ATMA)
- MIS Officer (contracted)
- Accounts Officer (contracted)
- Accounts Assistant (contracted)
- Administrative Assistant (contracted)
- General support staff x2 (contracted)
- Office Assistant (contracted)

12. To ensure convergence with MGNREGS, which has an important role in the funding and construction of rainwater harvesting works, farm ponds and rangeland development, the DPMU will station one of its staff in the DWMA office responsible for the planning of MGNREGS. DWMA have a huge work load in planning MGNREGS (the 2016-17 budget for the five districts is USD 290 million for 62.7 million person-days of work) Having someone from the DPMU in the DWMA office will ensure that works for APDMP are incorporated into the MGNREGS worksheet for the district.

13. Existing ATMA staff at the block (a group of mandals in AP) and mandal levels would assist in monitoring the progress of implementation. The training provided to ATMA Block Technology Managers and Assistant Technology Managers for this work, along with exposure to project processes and outcomes would help in building the overall capacity of ATMA.

14. **Lead Technical Agency**: the SPMU would contract an experienced organisation to be the Lead Technical Agency (LTA) at the state level. The LTA would be staffed by thematic specialists and support the PMU in terms advice and support for:

- Development of project approaches & processes, including drawing up operational guidelines, and drafting of the Project Implementation Manual
- Support to PMU for planning, including draft AWPB
- Sourcing technical staff, services and expertise, including drawing up ToR
- Backstopping and capacity building of District FAs
- Planning of capacity building for the overall project - including needs assessment, development of training modules, resource person development/ TOT etc. The LTA will need to work closely with the international TA regarding planning of Farmer Field Schools.
- Drawing up a strategy for knowledge management and communications for review by project management, and then supporting the implementation of this strategy for both internal lesson learning and for internal and external communications.
- Documentation including editing annual reports and production of knowledge products
- Support to specify the MIS and procure a software suppliers, and then to monitor the performance of the system, and to help adapt and refine the system to meet the changing needs of the project.
- Process monitoring, including Annual Outcome Surveys, participatory M&E, thematic surveys and analysis and interpretation of data coming out of the MIS
- Anchor a learning & innovation platform

15. It is envisaged that the LTA would have the following staff:

- Lead Advisor / LTA Coordinator
- Process Management Advisor
- Capacity building planning & coordination
- Knowledge Management & Communications
- Process (outcome) M&E Team (x 2)
- IT Professional
- Need based provision for technical services (CPR, Gender, Agriculture Livestock, Business Development, Marketing, Farmer Organisations and other – to fill any gaps in expertise of District FAs)

16. The SPMU would contract experienced agencies to implement the project at the field level. These agencies will carry out the following tasks: (i) plan and implement project activities in the clusters selected in one district (about 50 to 100 GP clusters), including arranging for inputs, works and personnel; (ii) facilitate community water planning and monitoring; (iii) operate CLICs at the initial stage; (iv) form/ support FIG, FPO, GP GWMC & other organisations; (v) organize and provide training including to farmers, community organizations and government staff; (vi) provide oversight on financial expenditure at FPO level; (vii) monitor outcomes and support IT networks and (viii) support innovation (such as organising field trials).

17. Given the existence of a number of specialized agencies and multitude of grassroots type NGOs, it is expected that NGOs will apply to work as Facilitating Agencies on a consortium basis, with a specialised agency in the lead as the District Facilitating (or Resource) Agency (DFA) working in a partnership consortium with a number of smaller Facilitating Agencies (FA) that have good contacts and experience at the local level. Each of these FA, depending on their capacity, would support activities in around 10 GP clusters. Given that a significant proportion of priority clusters are likely to be in Anantapur district, this district may be divided between two DFA. If there were six DFA, each DFA would be in a consortium with around 5 to 6 FA (although some clusters could be directly implemented by the DFA). Such an arrangement will avoid the need to procure and manage contracts with a large number of organisations. A list of some potential DFA and FA are in Attachment 2.

18. To support a group of 10 GP village clusters (each of about 1000 hectares, 500 farmers), it is envisaged that an FA would require the following staff:

- Project Coordinator
- Natural Resource Management / Field Engineer x 2

- Institutions Facilitator x 2
- Agricultural Facilitator
- Livestock Facilitator
- Water Management Specialist x 2
- Training Facilitator
- Gender / Equity Enabler
- Accounts Assistant
- Database Assistant x 2
- Need-based provision for 10 community mobilisers

19. Each cluster would be supported by an FA for 4.5 years - six months of start-up followed by four years of intensive implementation. Thereafter continuing support would be provided on a less intensive basis by the DPMU and DFA. To coordinate and support activities at the district level, including ensuring the FA have the required capacity and understanding of project processes, the DFA would have a district office staffed as follows:

- Team Leader
- Water Management Specialist/Engineer
- Agronomist/Crop-Horticulture Specialist
- Rangeland Development Specialist
- Livestock Specialist
- Training Specialist
- Process Monitoring Officer
- Support staff (x2)

20. **Other implementation partners**. In addition APDMP will work closely with a number of GoAP departments and agencies. Apart from the technical line departments responsible for agriculture, horticulture, livestock and groundwater, the project will also work with the Rural Development Department and its agencies responsible for MGNREGS, SHGs (SERP) and watershed development. At a local level the Gram Panchayat will be the key partner for groundwater management. The project may sign MoUs for cooperation with research agencies such as Agricultural University, Central Research Institute for Dryland Agriculture (CRIDA), National Geophysical Research Institute, FAO, ICRISAT, AVRDC, IWMI, and ILRI. Project budgets include provision for APSAC to provide remote sensing based data, images and maps. NABARD, banks, insurance companies and other financial institutions may be involved in provision of credit and other financial services. APDMP may also contract public and private sector agencies to provide services such as impact evaluation studies and training. An assessment of potential APDMP stakeholders and implementation partners is in Table 1.

(c) Project coordination and convergence

21. Coordination at the highest level will be provided by a Project Steering Committee (PSC) chaired by the Chief Secretary or his nominee, with members being the Agricultural Production Commissioner, Principal Secretaries / Secretaries of Agriculture and Cooperation, Livestock and Fisheries, Water Resources and Rural Development. The PSC will meet twice-yearly to review the progress of APDMP and ensure that its activities are coordinated with other development efforts in the state. The PSC will also review and approve Annual Work plans and Budgets before incorporation into state plans and submission to IFAD for its approval.

22. To ensure that APDMP is coordinated at a high level with other major programme supported by external agencies, the same PSC may also oversee these other programmes, with PSC meetings involving all of these projects. These projects are: (i) a second phase or follow-up the the AP Community-Based Tank Management Project - World Bank; (ii) on-farm irrigation and agricultural development (JICA); Promotion of Farmer Producer Organisations (ICRISAT); and (iii) AP Rural Inclusive Growth Project - World Bank. In addition GIZ is supporting climate change adaptation.

23. At the district level coordination and convergence will be ensured by forming a having the Joint Collector (Development) chair a Primary Sector Mission Committee with representatives of departments of Agriculture, Animal Husbandry, Horticulture and Water Resources/Groundwater, along with SERP, to coordinate implementation of ATDMP and ensure convergence with other programmes. If there are any issues in the formation or operation of this committee, then the existing ATMA Governance Committee, chaired by the District Collector, could also undertake this role.

24. At the village level APWMP activities will be coordinated through close links with Gram Panchayats - which themselves has responsibilities for local organisation of MGNREGS, which provides a major source of funds for soil and water conservation and for regeneration of common property rangelands. In locations where basin level water management planning is feasible, GP water management committees from this basin will work with district staff of the Ministry of Water Resources (MoWR) and the District Water Management Agency (DWMA) with a Basin Water Resource Planning Group.

25. A summary of project management and coordination arrangements is in the matrix in Attachment A.

Table 1: Assessment of APGMP stakeholders and partners

Stakeholder / partner	Potential role / complementarity	Strengths	Weaknesses	Proposed action / support
Department of Agriculture and Cooperation: Department of Agriculture ATMA	Lead project agency – overall responsibility for implementation of APGMP Convergence with agricultural schemes	Ownership – sponsor of the proposal Primary state agency for agricultural development. Implementing "Insulating crops and farmers from climate variability" for groundwater management	Limited expertise in water management and livestock Little spare staff capacity – fully occupied with other programmes Extension staff have limited capacity to plan and advise on adaption to climate change	Contract a Lead Technical Agency and NGOs to provide expertise and outreach Capacity building for extension staff in provision of advice on climate change adaptation.
Gram Panchayats and Groundwater Management Committees	Planning and demand management of groundwater resources	Lowest tier of government, now with mandate for groundwater management	Very limited capacity. Elected body so can be subject to political pressures.	Build GW management capacity and supply monitoring equipment.
Department of Water Resources:	Water policy	Responsible for setting water policy in the state	Policies for rationale use of groundwater resources either do not exist or are not implemented.	Support development of community based groundwater demand management.
Department of Water Resources: Department of Groundwater Development	Technical support for groundwater management	Impressive real time monitoring of water table levels.	Lack of implementable policy for rationale groundwater management Limited information on aquifer characteristics Few local level staff	Capacity building for local level staff in community groundwater management Support Groundwater Management Committees of GP
Department of Water Resources: Departments of Irrigation and Minor Irrigation	Expansion of surface water irrigation (including tank irrigation) may reduce drought impact and help recharge groundwater.	Significant financial resources available for this priority programme.	Currently water is not available for around half of the command area, and the water supply may be inadequate for new expansion areas.	Potentially APGMP might take advantage of improved groundwater situation to expand irrigation of high value crops.
Department of Agriculture and Cooperation: Department of Horticulture	Technical support and convergence for development of horticulture and micro-irrigation	Expertise in horticulture – the region is a major horticultural producer.	Limited staff, limited knowledge of latest technologies and on how to link producers to markets	Tap into convergence programmes. Staff participate in project workshops and capacity building
Department of Animal Husbandry and Fisheries: Department of Animal Husbandry	Technical support and convergence for livestock support	Veterinary and para-veterinary staff at district and mandal levels	Limited outreach – most small ruminants not vaccinated or treated	Coordination and tap into convergence programmes. Supply of livestock vaccines.
Department of Rural Development: NRLM/SERP	Convergence with NRLM programmes for landless households.	SERP SHGs are active in all villages. Special programme in poorest mandals	SHG and MSS focus on financial services, little spare capacity, and funds unlikely to be of much use for farm lending	Coordinate closely to avoid overlapping and duplication – but SERP has few agricultural activities
Department of Rural Development: MGNREGS	Main source of funding for labour intensive infrastructure works such as farm ponds and water harvesting	Very large funds available from GoI combined with willingness of rural people to undertake this work.	Labour must be >60% of total cost, Works can be delayed, take time to complete Competition between government schemes to have works carried out by MGNREGS	Close coordination in preparation of AWBP to ensure required MGNEGS resources will be available.
Department of Rural Development:	Watershed development, including	Extensive programme in project districts.	Limited funds: rely much on NREGS and other	Coordinate closely to avoid

Stakeholder / partner	Potential role / complementarity	Strengths	Weaknesses	Proposed action / support
IWMP	farm production and livelihoods		convergence.	overlapping and duplication
Department of Rural Development: NTR Jalasiri	Sinking of new borewells for small farmers in areas of GW potental	125,000 new borewells planned for current year	May lack GW knowledge and add to overdevelopment of the resource	If recharge efforts expand GW resources, then may converge.
AP Space Applications Centre	Remote sensing, mapping, NR analysis	Impressive GIS capacity, experience of water resource and agriculture	May be too busy with on-going project. Could also be expensive	Contract for mapping / GIS
NABARD schemes	Convergence for support and subsidies	Schemes for organic inputs, godowns, marketing infrastructure and FPO credit	Schemes may have limited resources and not be tailored to needs of project farmers	Maintain close contact to take advantage of any useful support
NABARD: Green Climate Funds and RIDF	Provision of finance alongside IFAD to implement APDMP	Significant funds available. Project districts may be a priority area	Not much known (so far) about the processes involved	Make contact as part of the design process
NABARD watersheds	Watershed development, including farm production and livelihoods	Programme in project districts may have similar implementation approach.	Limited funds: rely much on NREGS and other convergence.	Programme is said to be coming to an end
Water & Land Management Training and Research Institute	Provision of groundwater and irrigation training.	Considerable capacity in irrigation and water management training. Partner in ClimaAdapt project (Norway) – village information centre	Most courses relate to surface water resources	Contract to provide specialised training and exposure visits to climate information centres/
ICAR: Central Research Institute for Dryland Agriculture (CRIDA)	Training in rainfed agriculture, technical studies, crop-weather status, laboratory, techn demo.	Highly relevant expertise Coordinates the National Initiative on Climate Resilient Agriculture	Limited outreach in project districts	Contract to provide specialised training and test/ demonstrate innovative technologies
Agricultural University: Research Stations	Develop new technologies and approaches for rainfed agriculture	Located in project districts – so experience the same conditions Good range of ideas	Limited outreach – such as seed multiplication to disseminate cv's.	Community seed groups. Contract to test / demonstrate technologies
National Geophysical Research Institute	Research on hydrogeology and mapping of aquifers. Decision support tool	Considerable expertise from long collaboration with France and implementing an EU project.	Not as well known as it should be.	Contract for hydrology studies and mapping, and to introduce decision support tool.
ICRISAT	Research and expertise on rainfed agriculture and related areas. Already working with MoAC	Major CGIAR centre not far from project area. Already has much data/ knowledge of the project area	May be more expensive than other service providers, but high quality work of international standard	Investigate if an IFAD grant project could be used to access ICRISAT support
AVRDC	Research and expertise on vegetable production	Tomatoes are a focal crop. Technology packages tested in project area	May be more expensive, but high quality work of international standard	Investigate if an IFAD grant project could be used fund AVRDC support
FAO	Technical backstopping and support, knowledge management and dissemination	Implemented APFAMGS, and has had a continuing involvement in groundwater management	Limited financial resources - although may well be willing to allocate some to this project	Contract as a support agency using project plus possible IFAD grant and FAO funds.
Banks and other lending institutions	Lending to farmers, FPO and other producer organisations	Mandate to lend to farmers Availability of funds	Rainfed agriculture seen as risky. Some farmers excluded as defaulters (expect loan write-off)	Develop an appropriate and practical package to unlock bank financing especially for tenant farmers
Consulting companies	Studies and project monitoring	Some have proven capacity in this area	Can be difficult to identify and exclude	Contract an agency or agencies for

Stakeholder / partner	Potential role / complementarity	Strengths	Weaknesses	Proposed action / support
	services		companies which lack the capacity to deliver the requires services	M&E surveys and/or to support monitoring with use of IT tools
National/regional NGOs	Lead Technical Agency, District Facilitating Agency, capacity building, studies	Significant amount of relevant expertise and experience in the roles envisaged for LTA and DFA	May not be welcomed by all government agencies at the district level.	Contract as LTA,DFA or to provide capacity building services and studies
Local NGOs	Implementing Agency at the cluster level.	A number have demonstrated their capacity for field implementation	It is not known if, collectively, they have capacity for 600+ clusters	Contract as FA as part of a consortium led by DFA. LTA and DFA to build capacity if needed.
Private sector	Market linkage, contract farming, PPP, supply of specialised inputs	A number of major corporations have expressed interest. ITC is already involved in chilli.	May not be so interested in rainfed agriculture. Tomato processing has been difficult to get off the ground	Support via training of FPO and supporting them to link with private sector.

Stakeholders in italics are unlikely to participate in implementation, but coordination with their activities will be needed

C. Capacity building

(a) Lessons from IFAD projects

26. Lessons regarding training and capacity building from the experience from IFAD projects in India and elsewhere in Asia[38] include:

- Results of mass training programmes, covering many thousands of rural people, has been generally disappointing. Reach ambitious numerical targets requires a huge effort and becomes the focus of project management, and quality is sacrificed.
- Post-training follow-up is a key factor in adoption of technologies and skills learned in training courses.
- Top quality training is well worth the extra cost - this may involve hands-on practical learning, good trainers (including farmers who have done what they are now teaching), and training from top institutions.
- Particularly good results in terms of transfer of technology and adoption of new practices have been obtained from Farmer Field Schools.
- Capacity building and skill development can take place through a number of routes, and does not always need to involve formal training courses. Farmers can adopt messages from group meetings, take advice from input suppliers, and learn through mass media, as well as day-to-day contact with project staff. Above all farmers learn from seeing what other farmers are doing.

(b) Approach to capacity building

27. An important conclusion to be drawn from these lessons is the need for flexibility in project design. Too often project management think that by following a detailed cost table line-by-line, they will achieve the objectives of the project. Training courses are provided because they are in the cost table, not because they are really needed. The approach for APDMP will be to provide lump sums for broad capacity building activities in each component, suggest possible training topics and methods, but let project management draw up detailed plans of what they actually want to do each year as part of the AWPB process. Training will be planned, coordinated and monitored by a Training Advisor in the LTA, with a Training Specialist in each DFA office and a Training Facilitator at the FA level looking after 10 GP clusters.

28. Project budgets include the following provision for training:

Component 1: Climate Resilient Production Systems

1.1 Crop production Systems

- Farmer Field Schools - season-long practical in-field learning regarding crop and horticultural production packages and technologies. A three tier capacity building programme will be implemented with key facilitators first trained by external facilitators with experience of the FAO FFS approach. These facilitators will be staff from FAs, along with people from ATMA, DoA, DoH, KVKs and other agencies involved in agricultural development. Once trained these people will facilitate six FFS in each cluster. The most capable and interested farmers from these FFS will then facilitate further FFS. Details of these FFS and a budget of the cost is in Working Paper 3.
- Exposure and training visits to see good practices and new ideas - including training during these visits.

1.2 Livestock production systems

- Farmer Field Schools for small ruminants and back-yard poultry. These will follow the same pattern as described above for crops, but it is hoped that they could be facilitated by Pashu Sakhi.

[38] in particular see Bangladesh: Evaluation of Training Provided by Projects, E Mallorie and N Sarder, IFAD Case Study, 2011

- Training and refresher training courses for pashu sakhis and paravets
- Veterinary Officer training
- Curriculum development - especially for paravets - with the objective of broadening the scope of the standard course for DoAH paravets to include more on animal production issues rather than only focusing on animal health, and also to introduce them issues regarding animal production as a business - the profitability of production systems, marketing and input supply.

1.4 Farmer Producer Organisations

- Super-cluster level FPOs: training and exposure visits for farmer members
- Training for directors and staff of super-cluster level FPOs
- Training for leaders and office-bearers in village/GP level FPOs

1.5 Field facilitation and support

District Facilitating Resource Organisations

- Training courses for FA staff
- Training courses for government staff
- Training courses for Community Resource Persons, including CLIC facilitators
- Training courses for community leaders and a limited number farmers (farmer training will be primarily via FFS)

Component 2: Drought Proofing through NRM and Governance

2.1 Groundwater governance

- GP office holders
- District Officers
- State Officers

2.2 Water monitoring and conservation

- Training of data collection assistants

3. Project management and lesson learning

3.1 Project Management Unit (State level)

- Training courses for project staff, including staff management, planning and evaluation

3.3 District Project Management Unit

- Training courses for project staff, such as monitoring, data collection, reporting. This will include ATMA mandal and block staff engaged in monitoring of the progress and quality of project outputs at the GP cluster level.

3.4 Lead Technical Agency

- Training courses for PMU and key FA staff including in project processes and systems

29. In addition, capacity will be built for farmers in the following ways:

- Information and knowledge from the CLIC information centre to be established in each cluster. This will provide on-line and off-line access to information on production technologies, markets and the environment.
- Day-to-day contact with project staff - especially FA staff
- Day-to-day contact and mentoring from community resource persons, pashu sakhi and farmer FFS facilitators
- Reading technical manuals, leaflets and other printed material
- Viewing of videos produced for farmer-to-farmer knowledge sharing
- Participation in knowledge sharing and review meetings at the village and district levels (participatory M&E)

- Utilisation of mobile-phone based information systems

30. Additional capacity building will be provided for project and government staff via:

- Contact with other staff, especially DFA specialists and LTA advisors.
- Contact with other agencies, especially GoAP line departments and research agencies
- Contact with agencies in other states and countries - this may be partly facilitated by IFAD, and include contact with IFAD supported grant projects.
- Monitoring of project implementation by ATMA block and mandal staff will expose them to now ideas and to systems for project implementation
- Technical manuals and other materials

D. Implementation arrangements

31. Preparation - as a first step PMU staff will need to be recruited and support agencies (LTA, DFA-FA) selected and contracted. The village clusters need to be selected at this stage - although some flexibility to change this selection will be needed. It is planned that an initial selection of clusters made prior to the start of the project, along with drawing up a process for selection of support agencies. Another preparatory activity will be to draw up a draft Project Implementation Manual - describing project processes and guidelines.

32. Stocktaking: once clusters are selected (or as part of the selection process), a stocktaking of key features of each cluster will be carried out, including location, area covered and existing land use (including area of common property rangeland), number of households and number of farm households, major crops and products, current and recent development initiatives, existing farmer and other community organisations.

33. Start up: close to the time that actual field implementation is to start, the PMU will organise a state-level start-up workshop to explain project objectives and approaches to stakeholders in government and civil society. IFAD representatives would attend this workshop to explain IFAD requirements for monitoring, reporting, procurement and financial management. This could be followed by start-up workshops in each of the project districts, and finally launching events in each of the village clusters. Linked to this, with by the training of project staff (SPMU, DPMU, LTA, DFA-FA) in project processes and systems - lack of staff understanding of how the project will operate can be a significant factor in delaying the start of implementation.

34. Participatory planning: the first step in implementation at the cluster level will be to carry out a detailed participatory planning exercise involving the community facilitated by the FA. This would check and expand the information from the initial stocktaking, and include:

(a) Mapping of the cluster in terms of key physical, economic and social resource, along with maps showing land use, irrigation sources and irrigated areas, tree crops, grazing areas, existing SWC works, and soil types. Although maps can be created though a participatory process, it may be useful to use base maps created by APSAC combining remote sensing and other data. This information could be validated by the community and additonal information added.

(b) Numbers of livestock would be recorded along with the distribution of land and livestock ownership, and the extent of land leasing.

(c) Main cropping systems (rainfed and irrigated), productivity of crops and key issues regarding irrigation water, drought and the productivity and profitability of different crops.

(d) Livestock production systems and problems facing livestock owners.

35. It is possible to collect a great deal of information during participatory planning, most of which is then never used during implementation. The LTA will have an important role in helping to define what information is actually needed and in designing simple formats to record and computerise this

information. A major element of participatory planning is involving the community in defining priorities and working out who will be involved in different activities, along with the contribution and roles of existing community organisations. Participatory planning may mean that the boundaries of cluster are re-defined. The final result would be a cluster plan setting out proposed interventions - but it is likely that all interventions will not take place in all clusters, with livestock and tree crop activities only in some clusters. Support to improve the productivity and profitability of irrigated horticulture is likely to be linked to the establishment of effective groundwater demand management to avoid providing incentives to increase unsustainable extraction of groundwater.

36. Mobilisation and start of implementation: one of the first things would be done would be the establishment of a CLIC (Climate Information Centre) providing farmers with a range of information on weather, production-related information and market data. The CLIC facilitator would initially be employed by the FA (later this person could be taken on by the FPO) and would be the focal point for initial project activities. At the same time a Groundwater Management Committee would be established by the GP. Farmers interested in participating in different activities would be registered via the CLIC, and may be formed into Farmer Interest Groups (FIG). DoA has already registered all farmers on a data base, with identification numbers relating to geocodes of the farm location. Information on their land holdings has also been collected.

37. Flow of funds for project implementation would follow the well-proven approach that has been used in the state for watershed development and for a number of agricultural development initiatives such a groundwater sharing.. Funds for field activities such as works, demonstrations, subsidies, and grants, and payments to community resource persons, would flow from the state to district PMU and from there directly to the farmers' association (FPO or other). Expenditure from the FPO account would be overseen by the FA.

38. DoA aims to have the first batch village clusters in GPs where some sort of FPO already exist - these may have been set up for watershed development, community seeds or some other programmes. It will also be possible to use the Village Organisations of SHGs that have been set up in virtually every village. If, by chance, an FPO has not have been already set up, the FA could facilitate the establishment of a village committee (members selected by the Gram Panchayat) who would open a joint account to receive project funds. This would only be a temporary arrangement until an FPO is established. However the preferred approach will be to work with existing FPOs or other type of CBO. Apart from their own operating costs and the capacity building that they undertake, funds for project implementation would generally not be routed through support agencies (the LTA and DFA).

39. Institutional development processes are described in Working Paper 7 (Community Institutions). The project will adopt a flexible approach, working with existing farmer organisations where suitable ones exist. Where needed a first tier of FIG will be formed, with a second tier Farmer Producer Organisations (FPO) at either the GP/village cluster level (covering about 500 farmers) or at a higher level covering 8 or 10 GP/village clusters (covering say 5,000 farmers).

Attachment 1: Summary of project management and coordination arrangements

	Function	State	District (x5)	Mandal/ Cluster	Village / GP (x 330)
1	**Coordination and Governance**	**Project Steering Committee** Chair: Chief Secretary or his representative. Members: Agricultural Production Commissioner, SCS/PS/ Secretaries of the departments of Agriculture, Animal Husbandry, Horticulture, Finance NABARD (CGM), Rural Development, Water Resources, Planning, Disaster Management Half-yearly	**ATMA Governance Committee:** Chair: District Collector OR **Primary Sector Mission Committee** Chair: Joint Collector Development Members (both committees): Heads of District Departments, NABARD DDM, NGOs and FPOs Quarterly	**Basin Water Resource Planning Group** Chair: District Staff of Ministry of Water Resources/DWMA Members: Representatives of GP GWMC and other water user groups (such as WUA)	**Gram Panchayat** a) APDMP sub-committee b) Groundwater Management Sub-Committee / Village Water & Sanitation Committee Chair: Village Pradan/Sarpanch FIG and FPO representatives Quarterly
	Committee functions	• Review progress and results of APDMP, • Ensure activities are coordinated with other development efforts, • Ensure adequate flow of funds & review audit report. • Make decisions on policy issues, • Review and approve AWPB for incorporation in state plans and submission to IFAD.	• Review the progress and financial disbursement, • Ensure coordination and convergence, • Evaluate results and lessons, • Approve draft district Annual Workplans and Budgets for submission to SPMU.	Calculate water supply and demand at the basin level and draw up water management plans.	a) Review FIG & FPO performance, social audit b) Review and agree water budgets and water management plans.
2	**Project Administration**				
	Anchoring Agency (Admin)	Directorate of Agriculture	ATMA	FPO (super-cluster level)	FPO branch or local FPO & GP GMC (for water management
	Head of the Project	Director of Agriculture (*Ex-officio* APDMP Project Director)	PD, ATMA		
	Dedicated Project Management Unit	SPMU in DoA	DPMU at ATMA	Selected Functional FPO	FPO branch or local FPO & GP (for water management)
	Head of the PMU	Additional Project Director /CEO (deputation of staff at Addl Director level)	Deputy Project Director (selection competitive process)		
	Team	• Admin Officer (DD/JD rank) of DoA (admin anchor) • Technical Persons (x4) (open market/ deputation) Agriculture / Livestock/ Water Resources/FO • Gender and Equity Specialist • Planning and Monitoring Manager • Monitoring Officer (x2) – second from Planning Dept • IT services (2 persons) • Accounts Officer (seconded from DoA) • Accounts Assistant (seconded from DoA) • Procurement and Contract Specialist (contracted)	• Assistant Project Director (x2) (seconded ATMA) • MIS officer (contracted) • Accounts Officer (contracted) • Accounts Assistant (contracted) • Administrative Assistant (contracted_ • General support staff (x2) (contracted) • Office Assistant (contracted)	ATMA BTM and ATM also monitor progress of project implementation and quality of works carried out at the field level.	• CLIC facilitator * • Community Resource Persons* • Pashu Sakhi (self-employed) and Paravets (DoAH) • Water/Weather Data Collection Assistants* * these posts will initially be paid via the FA but later shifted to the

	Function	State	District (x5)	Mandal/ Cluster	Village / GP (x 330)
		• Finance Specialist (contracted) • Finance Support Officer (contracted) • General support staff (x4) (contracted) • Office Assistant (x3) (contracted)			FPO.
	Key Roles:	• Overall project administration • Staff recruitment • Financial management and fund disbursement • Review functioning of district committees, DPMUs, and supporting agencies • Procurement of goods and services • Physical and financial progress monitoring • Website management, MIS and IT support • Linkage with line departments and other agencies • Liaison with IFAD and Government • Project reporting	• Administration of the project at district level • Consolidating district APWP • Admin and financial sanctions of the plans/ proposals • Disbursement of funds to FPO • District level procurement • Physical and financial performance monitoring • Operation of district level MIS including data quality assurance at the field level. • ATMA BTM/ATMs assigned to monitor performance of extension work at field level performed by Lead FA and FAs. • Linkage with district administration, line departments and other agencies for convergence purposes • District level project reporting		
3	**Project Support**	**Lead Technical Agency**	**District Facilitating Agency (DFA) with consortium of local Facilitating Agencies (FA)**		
	Key Roles:	• Development of project approaches & processes, • Support to PMU for planning, including draft AWPB • Sourcing technical staff, services and expertise, • Backstopping and capacity building of District FAs • Specification of MIS and support procurement and operational development • Capacity building – needs assessment, training modules, resource person development/ TOT etc., • Documentation including editing annual reports and production of knowledge products • Process monitoring, AOS & results evaluation • Anchor learning & innovation platform	• Plan and implement project activities in the clusters selected in one district (about 50 to 100 GP clusters), including arranging for inputs, works and personnel • Facilitate community planning • Operate CLICS at the initial stage • Form/ support FIG, FPO, GP GWMC & other organisations. • Organise / provide training including FFS, CRPs, and government agency staff • Provide oversight on financial expenditure at FPO level • Support innovation (field trials)		
	Team	• Lead Advisor / LTA Coordinator • Process Management Advisor • Capacity building planning & coordination • Knowledge Management & Communications • IT Professional	<u>DFA staffing in district office</u> • Team Leader • Water Management Specialist/Engineer • Agronomist/Crop-Horticulture Specialist • Rangeland Development Specialist	<u>FA staffing for group of about 10 GP cluster</u> • Project Coordinator • Water Management Specialist (x2) • Natural Resource / Water Management Field Engineer (x2)	

	Function	State	District (x5)	Mandal/ Cluster	Village / GP (x 330)
		• Process (outcome) M&E Team (x 2) • Need based provision for technical services (CPR, Gender, Agriculture Livestock, Business Development, Marketing, Farmer Organisations and other – to fill any gaps in expertise of Lead FAs)	• Livestock Production Specialist • Training Specialist • Process Monitoring Officer • Support staff (x2)	• Institutions Facilitator (x 2) • Agricultural Facilitator • Livestock Facilitator • Training Facilitator • Accounts • Gender / Equity Enabler • Database Assistant (x2) • Need based provision for 10 x community resource persons	
	Higher level support	**FAO**			
	Key Roles :	• Building the capacity of SPMU, LTA, LFA on water demand management, budgeting, and governance; • Lead development of the curriculum of FFS for water, crop and livestock production following an integrated drought resilient farming system approach, and train the master trainers among LTA and Lead FAs for FFS, and provide technical backstopping support to Lead FAs for FFS implementation • Upgrade the training of livestock services providers in the provision of livestock services. • In consultation with project stakeholders, develop the project M&E system; • Provide critical technical assistance for drought resilient farming systems and carrying out quality control of implementation of related activities. • Technical backstopping to SPMU and LTA for priority studies needed to shape policy and project sustainability			

Attachment 2

Potential Facilitating Agencies active in the project area

This list includes a number of NGO who are currently (or recently) involved in government-sponsored rural livelihood programmes in the project districts. These agencies may be amongst those considered for the role of DFA/FA and to provide ad hoc training support. However this is not an exhaustive list and many other NGOs and agencies (including KVKs - district level farm research and outreach institutions) may also be qualified to do this work.

Star Youth Association (SYA) is an NGO working for the development of poor and other marginalized people in general and particularly women, children and youth living in the rural parts of Kurnool & Anantapur districts of Andhra Pradesh. http://www.staryouth.org/

Society for Sustainable Agriculture and Forest Ecology – SAFE, is a Non-Governmental Organization, registered under Societies Registration Act of Government of Andhra Pradesh, Founding members of the organization hail from an array of professional fields, possessing long association with Non-governmental initiatives. Works in Prakasam district

Bharathi Integrated Rural Development Society (BIRDS) is a non-governmental organization that addresses issues of hunger, untouchability, migration, land rights, rights of women and children, sustainable agriculture and groundwater depletion. Major constituencies are dalits, tribals, and smallholder/landless farmers. Promotion of farmers' water and climate school, ground water management, organic agricultural practices, formal school and health services are the major programs of BIRDS. Works in Kurnool district. http://www.birdsorg.net/

People's Activity and Rural Technology Nurturing Ecological Rejuvenation (PARTNER), implemented various development programmes in its operational area like formation of SHGs, participation in Janmabhoomi programme, Health prrogrammes, capacity building programmes for Riyotmithra, Water user associations, and other farmer groups. With the support of FAO, Andhra Pradesh farmer Managed Ground Water System Project is being implemented in 70 Villages of Sagileru river basin, which is a Sub-Basin of river Pennar in Kadapa district.

MYRADA is a non-government organisation started in 1968 working in backward and drought-prone areas. It works with more than a million families in 18 districts of Karnataka, Andhra Pradesh and Tamil Nadu, forming and strengthening community based organisations (CBOs), promoting livelihood activities, management and development of natural resources, improving health and education status of the community and building capacities of the community to raise and manage resources independently. MYRADA also works with governments and other donors/partners to influence policies in favour of the poor. It is working in Ananatapur and Kurnool districts on watershed development and groundwater management. http://myrada.org/

Jana Jagruthi - works on watershed projects and the CMSS (community seeds) programme in Anantapur district

Accion Fraterna (AF), also called AF Ecology Centre was founded by Father Vincent Ferrer in 1982. It is actively involved in people's empowerment through natural resources management (NRM), watershed development, drought management, environmental development and policy advocacy. AF has made a substantial contribution to Anantapur district since 1986 with its Participatory Watershed Development Programme. It is perhaps the largest of such a programme implemented by an NGO in India. It reached out to over 300 villages, covering about 1.35 lakh ha of farm land and helped over 60,000 farmers. It has been actively involved at the policy level with various policy making bodies like Andhra Pradesh Water Conservation Mission, Andhra Pradesh State Commission on Farmers Welfare, and Advisory Committee on Watershed Development Programme of Andhra Pradesh. Further, AF has been actively involved in various consultations of the Ministry of Rural Development at national level. http://www.af-ecologycentre.org/

Timbaktu Collective is a registered Not-for-Profit Organisation initiated in 1990, working for sustainable development in the drought prone Anantapur district of Andhra Pradesh. The Collective works in over 150 villages of Chennekothapalli, Roddam and Ramagiri mandals of Anantapur district, reaching and serving about 20,000 marginalised families. The Collective works with some of most affected by chronic drought, unproductive land , unemployment and poor infrastructural facilities in the region, among them the landless, small and marginal farmers with special emphasis on women, children, youth and dalits. http://www.timbaktu.org/

RIDS - NGO working on watershed development, CMSS and RRA (rainfed farming) programmes in Anantapur district. Also contracted for DAC programmes on groundwater sharing.

Foundation for Ecological Security (FES) works towards conservation of nature and natural resources through collective action of local communities. The crux of FES' efforts lie in locating forests and other natural resources

within the prevailing economic, social and ecological dynamics in rural landscapes. Globally, FES hopes to see an increasing influence on two fundamental issues in governing shared natural resources – a 'socio-ecological systems' approach and a 'Commons paradigm', which together could have far-reaching impact on world views on 'development'. FES has played a pioneering role in furthering the concept of Commons as an effective instrument of local governance, as economic assets for the poor and for the viability of adjoining farmlands. It has also highlighted that by strengthening the institutional dimension, the collective action spins off from effectively managing natural resources to other spheres of village life such as education, health and access to economic opportunities. In the project area FES works on watershed development and the CMSS programme in Anantapur district and on CPR and livestock development in Chittoor. http://fes.org.in/

Gram Vikas Samstha is a Non-Governmental Development Organization, registered as a society in 1980. GVS is involved in the Chowdepalli ,Panjani, Punganur, Peddamandyam, Tamballapalle, Madanapalli and Ramasamudram mandals of Chittoor district, Andhra Pradesh. GVS deals with socio-–economic deprivation in society and addresses the issues of food security and livelihood rights of rural communities. GVS works on watershed development in Chittoor district

Sahajeevan works on watershed development in Chittoor district http://www.sahajeevanforrti.in/

Krushi Samstha works on watershed development in Chittoor district

Rashtirya Seva Samithi (RASS) was established in 1981 in Chittoor District. It presently operates in four States of India viz., Andhra Pradesh, Orissa, Tamil Nadu and Delhi, implementing 39 different welfare and development programmes with the funding support from Government of India, State Governments and International donor agencies and philanthropists. Today programme activities have increased significantly and cover 3.10 million people in 2560 villages, served by 3695 programme volunteers. RASS has established Acharya Ranga Krishi Vigyan Kendra (ARKVK) in 1992. This ARKVK has been established in memory of Veteran Farmers' Leader, Acharya N.G. Ranga. Designed and funded by the Indian Council of Agricultural Research (ICAR), ARKVK is intended to bridge the gap between the available agricultural technologies on the one hand and their application for better productivity on the other. It has been delivering location specific and need based training programmes for the farmers of Chittor district in the fields of Agriculture, Horticulture, Home Science, Sericulture and Animal Husbandry. http://rassngo.org/

GORD works on watershed development and the RRA (revitalising rainfed agriculture) programme in Chittoor district

Chaitanya Educational and Rural Development Society (CERDS) was established in 1996. CERDS works for uplifting the lives of disadvantaged children, women, disabled, small and marginal farmers, agricultural labourers and other underprivileged rural communities. At present, CERDS is working in 100 villages of drought prone and coastal parts of Prakasam, Guntur and Chittoor districts. http://www.cerds-india.org/

MASS – Maharshi Abhyudaya Seva Samstha, works on watershed development in Chittoor district

Jana Jagruthi works on watershed development in Chittoor district

Collective Development Society (CDS) works on watershed development in Kadapa district

RHGBMSS main objective is to develop and promote the upliftment of the rural poor. The operation area of the organization is entire Rayalaseema, for the last 28 years RHGBMSS has setup a special record in rural development activities. The organization has also been working in the field of Health, Education, Natural Resource Management, Watershed, Income Generation Programme, Awareness Generation Programme, Rehabilitation and Resettlement, Land and Water, Women and Child welfare. During this period the RHGBMSS has been working in 165 villages involving 19,500 families. The Government of Andhra Pradesh, Government of India and International Agencies have supported the Rural Development Programmes. http://rhgbmss.org/

REDS - Rural Environment and Development Society, registered as a non for profit organisation in 1996 to further the well-being of rural communities. REDS activities are mainly focused on rural development, sustainable agriculture, child rights and anti-trafficking, empowering CBO's to gain control over natural resources. The organization assists programs that promote sustainable development . REDS is also an active member of various networks at district and state level to build public opinion, advocacy and lobbying at appropriate levels. REDS works in Anantapur, Kurnool and Kadapa districts on watershed development, community seed production and groundwater management.

JCSS works on watershed development in Kadapa district

SPES works on watershed development in Kurnool district

AARDIP was started in the year 1988 and is working with multi-pronged developmental activities and starting to bring social, economic, cultural justice to the marginalized. AARDIP was instrumental in building a NGOs forum with about 120 NGOs and CBOs in the year 1993 with support and involvement of government. District level administration had financial and logistical support to AARDIP to coordinate the forum and played a major role to involve active NGOs in implementation of poverty alleviation programmes of UNDP in the year 1996. This involvement in bi-lateral programme led to promotion of Network of Voluntary Organisations in Kurnool (NOVOK) with likeminded and committed NGOs. http://www.aardip.org/about_us.html

Awakening Peoples Action for Rural Development (APARD) is a registered non-governmental organization. APARD has been primarily working in the drought prone western and southern parts of Kurnool District for enhancement of livelihoods of the poor using participatory processes.

WCUSS works on watershed development in Kurnool district

CRDO works on watershed development in Prakasam district

SNIRD was formed in 1987, has 54 field & administrative staff working on a full time basis besides part time staff. SNIRD is working in 73 fisher folk, 243 excluded communities and 98 other marginalized communities(inclusive of small and marginalised farmers), of 414 villages of Prakasam and Nellore Districts. www.snird.in

SARDS works on watershed development in Prakasam district

SREEKARAM works on watershed development in Prakasam district

RISDS works on watershed development in Prakasam district

SPACE works on watershed development in Prakasam district

HANDS works on groundwater sharing and community seed production in Anantapur district

WASSAN (Watershed Support Services and Activities Network) has been working and specializing in the area of "natural resources based livelihoods" in the drought prone areas over the last 17 years in Andhra Pradesh (and Telangana). It was promoted as a network of civil society organisations in AP in 1995 and established as a networking and support services organization with a mandate to build capacities in, and provide an interface between civil society and government programs in drought prone areas. WASSAN has been nominated by the government to be the LTA. www.wassan.org

Appendix 6: Planning, M&E, learning & knowledge management

A. Logical Framework and Annual Work Plan & Budget (AWPB)

1. The project logframe prepared as per IFAD's guidelines show the main activities that lead on to the outputs, outcomes and goals. The logframe will be the basis for preparing the AWPB each year. The logframe will demonstrate a clear discernible *theory of change* with outputs contributing to outcomes and subsequently impacts at goal level of the project. A preliminary logframe of the project has been prepared which is included with the main report or detailed design report. The project logframe will be refined periodically to reflect changes and modifications that may be necessary during the course of project implementation. Particular attention will be paid to revise the Logframe targets and indicators during the Mid-Term Review (MTR) of the project.

2. AWPB will be consolidated by the SPMU with inputs from District Project Management Unit (DPMU) and other entities such as Lead Technical Agency (LTA) and Resource Organisations (RO). DPMU will consolidate the planning and activities proposals that will come from project villages or FPOs. The AWPB would represent the key planning document of the APDMP project. It would serve as the instrument for identifying specific targets, activities and integrating management priorities for implementation, forecasting procurement requirements and facilitating the mobilization of staff and financial resources. All project villages would be *georeferenced.* The overall responsibility for the preparation of the AWPB would be assumed by the Project Director supported by M&E staff in the LTA who would also have the responsibility of planning. The AWPB would be presented as an integrated plan (but identified separately for each district).

3. The PMU would coordinate the preparation of a consolidated AWPB which would be finalized with the approval of the Project Steering Committee (PSC). The AWPB would be submitted to IFAD for its concurrence. If required, the PMU may propose adjustments or revision in the AWPB during the relevant project year. The AWPB would be disaggregated into quarterly segments for ease of implementation and follow-up. It would be also the foundation for monitoring the progress at the activity level and financial resource allocation and utilisation. IFAD guidelines would be used for the preparation of the AWPB. *The AWPB guidelines will be included in the Project Implementation Manual (PIM)*.

B. Monitoring & Evaluation (M&E) in APDMP

4. The main purpose of setting up an M&E system in any IFAD-funded project is to provide comprehensive, frequent, periodic and reliable data and information for sound result-based management and decision-making by the project management. The M&E system is designed to inform project management of whether implementation is going as planned and what corrective actions are needed in planning, target setting, budget allocation, etc. M&E system will general relevant knowledge based on analysis and disseminate lessons learned in a targeted and strategic manner to comprehend achievements in development objectives of the project. The M&E system is expected to perform and achieve four essential objectives: (a) to monitor and manage project progress; (b) asses project outcomes and impact; (c) capture and disseminate lessons learned and good practices; and (d) build local/community capacities for participatory M&E. However, the M&E system would operate in four interlinked domains:

a) *Setting up the M&E system* by identifying information needs to guide the project strategy, ensure effective operations and meet external reporting requirements (of IFAD and Government) – *prime responsibility of the Additional Project Director in the SPMU* supported Planning and Monitoring Manager in the SPMU, with inputs from the Process Management Advisor, the IT Professional and Process M&E team in the LTA. It will also be very useful to get inputs from the international TA (FAO) and from IFAD at this stage. If needed an M&E expert can be employed as a short term consultant. The system and processes involved will be documented in the form of project M&E guidelines, which will form part of the PIM;

b) *Implementing the M&E system* - gathering and managing information/data – information would be scattered around the five DPMU/district offices, the 330 project village clusters/GPs, numerous FPOs and the Facilitating Agencies in each district. The DPMU M&E focal persons (Deputy Project Directors) will be supported by DPMU MIS Officers in each district. Their prime responsibility will be the monitoring of the progress of physical implementation against project targets and the AWPB.

Information on project outcomes and the results of processes will be collected via Process Monitoring Officers in the district LFA offices and the process M&E team in the LFA. Impact evaluation surveys at project start-up, mid-term and completion will be contracted to an external agency;

c) *Involving project stakeholders in critical reflections* - once information has been collected it would be analyzed and discussed by project stakeholders (via monthly/quarterly/half-yearly/annual meetings)– prime responsibility of the LTA Process Management Advisor who will interact with project implementing partners including DFAs & DPMUs for a smooth information flow and results generation; this will include preparation of monthly/quarterly/half-yearly/annual physical and financial progress reports against AWPB targets;

d) *Communicating results of M&E* to all stakeholders including policy makers, project participants, Government and IFAD. The key combined M&E results will include Annual Progress Report, Mid-Term Review Report and Project Completion Report[39]. As part of good practice M&E such report will include details of project implementation and adequate information about what has been achieved and worked well. However, in the end, what makes the difference is how people interact, how ideas are shared and developed, and by doing so, how people are motivated and supported to learn and contribute to benefit all by meaningfully investing in rural people.

5. **M&E framework**. APDMP will set up its M&E system following IFAD's M&E guidelines[40]. The basic M&E framework to support in development of M&E system is the systematic collection, analysis and reporting of information/data at three different levels of project implementation results: **(i) outputs** (from inputs and activities)**; (ii) outcomes;** and **(iii) impact,** encompasses result-chain approach**.** A key element of the M&E framework is the M&E matrix - an expanded version of the logframe which identifies exactly when information will need to be collected and the methods of collection. The overall M&E framework will also include other M&E tasks annually or during the course of project implementation. These include conducting / reporting Annual RIMS (1st and 2nd level results), Annual Outcome Surveys, Baseline & Completion Impact Assessments. The project will also carry out a Mid-Term Review and draft a Project Completion Report following IFAD guidelines.

6. **Output monitoring** will measure the progress of activities and achievement of outputs against annual targets in the annual work plan & budget (AWPB) for each project component. AWPB outlines the inputs and activities to be undertaken and data on outputs would be collected or measured for each indicator at the end of each month/quarter/year. This can be linked to the financial expenditure on the concerned activities, and data will be stored and report via a computerised Management Information System (MIS). The type of output data to be collected and monitored will be carefully dovetailed with the **project logical framework indicators.** The computerised MIS will also record village profiles for each village where the project is working, which will be drawn up before work starts to collect basic human, economic and natural resource information against which progress can be measured. Physical and financial progress data and reports for each component/sub-component in each village will be recorded in the computerised MIS. Data would be collected by field implementation agencies such as FAs and by the community via CLICS, CRPs GP water management committees and, for livestock, Pashu Sakhis. Where required data will be disaggregated by gender and social groups (ST, SC, etc.), particularly related to training and access to services (refer to RIMS 1st level results reporting requirement).

7. Although output monitoring would appear to be a straightforward process, the experience of a number of IFAD projects in India and elsewhere have highlighted the need to pay adequate attention to the details of how data is collected (formats used, frequency of data collection, etc.) and reported. Overlapping components can mean households participate in more than one activity with the risk of double counting when calculating the number of households reached by project services. These problems can be overcome by training of staff responsible for progress reporting to use a common reporting format and carefully defining how participating households will be counted. The PMU M&E Unit will take the lead in harmonizing the different formats for data collection and reporting (*PIM will include some suggested formats based on experiences of data collection from IFAD projects in India)*.

8. **Outcome monitoring** measures the immediate changes coming about as a result of project interventions. A few outcome indicators are shown in the project logical framework, but others will

[39] For each of these reports, IFAD's appropriate guidelines would be provided and IFAD will support the project in understanding and applying these guidelines.

[40] See Managing for Impacts in Rural Development – A Guide for Project M&E, IFAD.

need to be added to create a results chain of evidence of change linking project outputs to the objective and goal. However, it is difficult to collect information from all households on indicators such as improved soil moisture, adoption of improved methods or increases in sales of commercial crops, the project will conduct Annual Outcome Surveys (AOS) as per IFAD's guidelines[41]. An AOS involves interviewing a sample of 400 to 800 farmers/households with a short questionnaire. Outcome surveys may also be carried out on a thematic basis in APDMP in order to focus on a specific area of project intervention, such as soil moisture and fertility enhancement, income from small ruminants, and fodder availability from regeneration of CPR, nutrition through dietary diversification. As part of the water management intervention in component 2.1, it is proposed to carry out annual Water Management Plan adoption surveys - which are a good example of such a thematic survey.

9. Related to outcome monitoring is **process monitoring**, which involves monitoring the processes leading to outputs and outcomes. Examples of specific areas where progress monitoring will be useful in APDMP may include adoption and effectiveness of groundwater management plans, the mechanism and effectiveness of groundwater sharing among farmers, mechanism of fodder resource sharing among the livestock JLGs, functioning of FPOs and other farmers' organisations. Information on these may be gathered via Participatory M&E or PME (*see section on PME below*), as well as from the records of FPOs/FOs. In APDMP, where high percentage of project participants would be illiterate particularly among rural women, audio-visuals would be used as effective process monitoring tools. Videos could be made describing in local language/dialects on project processes and results in a particular project village that can be disseminated. In addition, the Project will undertake specific studies related to social inclusion, water governance, CPR governance, etc. Surveys are already planned as part of component 2,1, into the adoption of groundwater management plans.

10. **Impact evaluation** is the process which will assess the contribution of project in achieving the overall goal of the project. It will refer to the baseline, mid-term[42] and end-of-project surveys results. This survey will be coordinated by the PMU M&E unit and contracted to an external agency, with specific expertise in such assessments. Information to be collected will include the impact level indicators of IFAD's Results and Impact Monitoring System (RIMS). These include mandatory 'anchor indicators' relating to household assets, and child malnutrition (anthropometric data of children under five years of age). Other indicators of poverty will also be used, such as quality of housing and sanitation, drinking water availability, cultivation, asset ownership, etc. Data will also be collected other goal and objective indicators from the logframe, and on other indicators that help relate changes in all these indicators following participation in project activities and delivery of project outputs, and also to other logframe*. Draft ToR for impact evaluation surveys would be included in PIM.*

11. **Participatory Monitoring and Evaluation (PME)**: This tool will be used particularly for outcome monitoring. At project level, one of the strategies could be to organise an annual workshop in which the participating smallholder farmers, women, progressive farmers, representatives from the FPOs/FOs, private sector representatives, partner agencies including banks, etc., would be given the opportunity for sharing their views about the project and identify mechanisms for improvement. In PME, the primary stakeholders - the project target communities – are active participants in all stages of project cycle, not just sources of information. PME will also focus on building the capacity of the local communities to analyse, reflect and take decisions and actions. PME attempts to provide opportunities for joint learning of various stakeholders at various levels of the project cycle. PME facilitates greater stakeholder commitment and ownership on the project activities, in turn empowering them to take corrective actions to help themselves. In the field implementation and community level, participatory M&E is a kind of social process; it generally involves intense negotiations between different target communities having different needs, expectations and worldviews. In a way PME is also a kind of grassroots political process which addresses issues of equity, power and social transformation. Above all, PME could be a highly flexible process, continuously evolving and adapting to the programme specific circumstances and needs. PME is but the building block for successful M&E system in all IFAD projects and the project staffs will be oriented and sensitized on the need for

[41] See Designing and Implementing ANNUAL OUTCOME SURVEYS -- a guide for practitioners –IFAD, 2016 (this is now in draft and hopefully will be finalized prior to will be dealt during start-up workshop and will also be included in the PIM).

[42] Mid-term survey is no longer an IFAD requirement, but it is usually useful - if nothing else, it provides an opportunity to test the design of a survey that will be needed at completion.

sharing of project information and knowledge on regular basis with all stakeholders including the project target communities with open mind and transparent attitudes.

12. **RIMS indicators**. The Results and Impact Management System (RIMS)[43] of IFAD generates annual report tables on a number of first and second level results indicators that correspond to the output and outcome indicators (of the project logframe). IFAD has produced a standard list of these indicators, but only some of these will apply to an individual project. Prior to mid-term review, the project will report on only the *first level results*, but after the mid-term report it will report on *second level indicators*. The list of first and second level indicators is currently being revised by IFAD. The *third level RIMS results* are the anchor indicators used for impact assessment. The anchor indicators relate to household assets, food security and child malnutrition (anthropometric data of children under five years of age). IFAD's RIMS Handbook provides clear guidelines on whole range of conducting, measuring and reporting RIMS results. The selection of first level indicators and second level indicators will be done on the basis of specific project characteristics or relevance to APDMP, which the project would develop and discussed during project start-up workshop. All indicators would be reported on sex-disaggregated basis and to the extent relevant differentiation of results for ST, SC and other vulnerable groups would be made. The project will prepare/develop the 1st level RIMS indicators and include in the PIM.

13. **First Main Review (FMR) of Project Implementation.** The scope of the FMR is to relevance and preliminary results of the project implementation processes. Such processes include: (i) the establishment of the climate information centers, rate of utilization by farmers and type of information farmers seek; (ii) the establishment of the farmer field schools for crops and livestock, regularity of farmers participation and types of practices being adopted by farmers and the degree of water use efficiency; (iii) the number of farmers participating in borewell sharing and adherence to by-laws of water sharing; (iv) performance of the Gram Panchayat water sub-committee; (v) effectiveness of water management plans and adherence to the implementation of the plan at GP and hydrological unit levels; (vi) regeneration of common property rangelands (survival rate of fodder species, management by farmers' organization and estimation of biomass produced); (vii) profile of the project beneficiaries in terms of size of holdings, poverty, gender, ST/SC. In addition to reviewing relevance and preliminary effectiveness of the project, the FMR will also allow to adjust the phasing of activities and their scale. The FMR will also review the rate of disbursement of the project and where applicable adjust the project costs and financing plan. The IFAD and RIDF financing and disbursement rate would be thoroughly reviewed. The FMR would be carried out jointly by the Directorate of Agriculture and IFAD.

14. **Mid-Term Review (MTR).** A mid-term review would be conducted 18 months from the completion of the First Main Review, to assess the progress, achievements, constraints and emerging impact and likely sustainability of project activities and make recommendation and necessary adjustments for the remaining project period. The MTR would be carried out jointly by the Directorate of Agriculture and IFAD, and will also assess the role of the implementing agencies including the SPMU, ATMA, LTA, FA, various community institutions and the role of the private sector and government, partnering banks, etc.

15. **Project Completion Review and Report**. At the end of the project, the PMU will draw up a Project Completion Report (PCR) based on IFAD's guidelines[44] for project completion. IFAD will provide support to the project in this work. IFAD will carry out a PCR Validation on the basis of the project PCR at least 3 months before the loan closing. IFAD's Independent Office of Evaluation (IOE) may also undertake a formal Evaluation of the project well after the closure of the project (which is usually known as Project Performance Assessment or PPA).

16. **Annual Outcome Survey (AOS).** The AOS is a household survey that is undertaken annually by project staff and will cover a small sample of 200 to 400 households selected randomly in project areas (project beneficiaries) and 200 to 400 households selected randomly in non-project areas (non-beneficiaries, to be used as a comparison group). IFAD's standard RIMS methodology is primarily intended to document end-of-project impact. As such, it does not provide regular or timely information about results that can be used to take corrective action during project implementation. The Annual

[43] RIMS First and Second Level Results Handbook, IFAD, April 2014. This is now under revision

[44] Guidelines for Project Completion Review, IFAD, October 2015. This includes stakeholder workshops to gather feedback on results and lessons learned

Outcome Survey (AOS) is a tool to monitor how well a project is doing through a systematic process of learning by doing. More specially, the AOS is intended to set out to identify positive and negative changes taking place at the household level, provide early evidence of project success or failure, provide timely performance information so that corrective actions may be taken as required, and also assess targeting efficiency. That is why samples are taken both from project villages and non-project villages for comparisons. For APDMP annual monitoring of outcomes is particularly important and variations in annual rainfall may mean that data used in baseline and impact surveys could well be collected in years of very different weather conditions, making it difficult to identify changes brought about by project interventions.

17. ***How and when to conduct the AOS***: Annual Outcome Survey is conducted annually starting from the 2nd year of project implementation. The Technical Guide for Conducting Annual Outcome Survey[45] has been developed by IFAD and revised (in draft) in 2016, which would be provided to APDMP at the time of start-up or as part of the PIM. Like all other projects in India, APDMP will conduct the AOS in January-February of each calendar year. This period in most part of India, as also in AP, coincides with the relatively off-season when farmers have more time to participate in the surveys. The HH survey will focus on quantitative data (e.g., the number of women participating in training, the % of HH that have adopted new farming technology, the % of female-headed HH that have increased profit, the number of HH taking loan to improve farming practices, changes in crop yields and numbers of livestock, and so on). These findings from HH survey are complemented by qualitative data that provide more in-depth explanations of why and how some outcomes were better achieved or not achieved. Such qualitative data are generated through focused group discussion, key informant interviews, etc. One of the key areas of attention in AOS is in developing questionnaires that are appropriate to the project (more of this would be deliberated at the time of technical start-up or by fielding implementation support mission).

18. Additionally, it is important that gender and vulnerability dimensions are appropriately reflected in the AOS. While trying to focus on activities and outputs, it is important that gender-specific information should be collected such as women participating in or indirectly benefiting from project activities. A practical approach is to review project logframe having gender-sensitive indicators, gender issues being adequately reflected in the M&E plan, updating the HH survey tool to align with the revised log-frame and providing skills to enumerators and project staff in quantitative and qualitative data collection methodologies especially to cover issues that matter differently to women and men, more so from vulnerable households.

19. **Special thematic/diagnostic studies.** The project may carry out, or commission, a number of relevant thematic special studies. The project will allocate budget in its AWPB and some of the thematic studies could include, for example, health and nutrition among the SC and STs including housing and settlement patterns; social inclusion and exclusion among rural population; common property resources for development as grazing land and carrying capacity with impacts on livestock; forest/ NTFP based livelihoods; migration dynamics; indebtedness among SC and ST population; etc. All the studies must be carried out through gender lens.

C. Gender and vulnerable groups in M&E

20. Integrating gender dimension in M&E and reporting on gender through sex-disaggregated data is imperative in all IFAD projects. Integrating gender into M&E system helps to measure the extent to which a project has addressed the different needs of women and men, and has made an impact on their lives and overall social and economic well-being. It also facilitates to improve project performance during implementation, allows for mid-term course correction, and makes it possible to derive lessons for future projects.

21. APDMP will clearly identify the extent to which the project has reached women and men the degree to which they have benefited from project activities and outputs. This involves gender disaggregation of data on project activities and outputs to see if women have fully participated in group membership, group leadership, training, livelihoods activities, credit activities and enterprise support. Further, gender disaggregation is needed to see if women have benefited in terms of outcomes - such as increasing production - or impacts - increased income and assets. As some indicators are better measured on a household basis, these need to be disaggregated by gender of

[45] See the DESIGNING AND IMPLEMENTING ANNUAL OUTCOME SURVEYS-- a guide for practitioners –IFAD, 2016.

the household head. Special studies may also be undertaken on measures to reduce women's drudgery and on other issues regarding women's welfare and empowerment (for example access to health services, and household decision making). This section may be read with Appendix 2 on Poverty, Gender and Targeting. Some ideas of gender-sensitive monitoring indicators[46] in APDMP including in AOS could be developed using the followings (Table 1):

Table 1. Examples of gender-sensitive indicators for M&E and AOS

Particulars	Questionnaire / issues to identify gender-sensitive indicators
Gender division of labour	- What is the gender division of labour or work burden at the household level? In other words, who is more responsible for working in the household, women or men? - When the project got started, has the mam/male started sharing household work with the woman/female, or woman has to work more?
Gender differences in access and control over resources (e.g. income, employment, land, social services)	- Who controls income in the household? Do the man and woman equally contribute in decision making on expenditure relating to household income? - Who participated in the project training more, female or male? What have been the outcomes of training in applying the knowledge to household economics? - In whose name is the land under the household control? Do both man and woman equally contribute in deciding the types of crops to be grown in the household land? - What different kinds of social services do the man and woman receive or enjoy? What influences do these services have into the woman's health and ability to access information?
Gender differences in information and knowledge	- Are there gender differences in accessing the same information (about amount of information and how to access)? - Are there any differences in economic opportunities between man and woman due to different amount of information accessed?
Decision making patterns in the household and community	- Who in the household has the decision power? (Compare with the contribution of man and woman in the total household income; whether person contributing the most in total income has the decision power). - The participation of female and male in activities of community (the voice and respectfulness opinions in community activities).
Women and men's attitude and self-confidence	- The difference between female and male about self-confidence in all different project and community activities (on participation and responsibility).
Gender differences in vulnerability and coping strategy	- Differences in dealing problems and in adjusting to external shock.

22. Vulnerable **groups in M&E**. The vulnerable categories of people are the SC, ST, women headed household (WHH), households having person with disability (PwD) and migrated households. In line with IFAD's targeting strategy and Policy on Engagement with Indigenous and Tribal People[47], APDMP will develop an M&E system that would capture indicators specific to these categories of target groups. With respect to the ST or tribal people[48], for example, the *Chenchu* tribe, a Particularly Vulnerable Tribal Group (PTG) that are living in Kurnool and Prakasam districts; *Yanadi* tribe, traditionally nomadic, live in Chittoor district. Wherever applicable the data would be sex-disaggregated. Some examples of vulnerable group-sensitive M&E could be the followings:

- No of SC/ST/WHH/PwD households participating in the project;
- Memberships in FPOs or FIGs from SC/ST/WHH/PwD;
- No of tribal HHs rearing local varieties of poultry birds as backyard poultry;
- No of tribal HHs dependent on forest NTFPs;
- No of SC/ST/WHH/PwD households participating in CPR;
- No of ST HHs in seeds systems;
- No of seed banks established for keeping/storing traditional crops seeds varieties;
- No of ST households or people practicing traditional arts and crafts as enterprise.

[46] Modified from M&E Manual Guide for IFAD funded Projects in Vietnam.
[47] See IFAD's Policy on Engagement with Indigenous People, 2009 (IP to be read with Tribal People)
[48] Undivided AP had 8 Integrated Tribal Development Project / Agency (ITDP/ITDA), 41 Modified Area Development Approach (MADA) pockets, 17 Clusters and 12 Particularly Vulnerable Tribal Groups (PTGs) in Tribal Sub-Plan Area of the state.

D. Implementation Responsibilities of M&E

23. **M&E Staff**: The project will recruit staff experienced in M&E at PMU and DPMU or district office. As already mentioned earlier, the M&E staff would be trained appropriately by the project and IFAD. In the first year of the project, the M&E staff will focus on establishing a functional M&E system for the project. This would include reviewing the results framework and indictors with management to ensure that they are relevant, refining the M&E plan, M&E matrix, assessing staff training needs on M&E, organising M&E training at all level (SPMU, DPMU and GP/village), coordinating and conducting the baseline survey, designing the various reporting formats, developing databases, setting up the MIS, preparing the AWPB, and training of the FPOs/FOs on some elements of data to be monitored, etc. From the second year, the M&E staff will amongst others focus on timely conduct of AOS, Annual RIMS Report, etc. (see also under step by step implementation arrangements).

24. The SPMU Planning and Monitoring Manager will be responsible for coordinating project planning - such as consolidation of the AWPB. This person will also oversee the preparation and submission of project reports (such as Annual/Half Yearly Progress Report, RIMS and AOS) - with support from the Knowledge Management and Communications Advisor in the LTA. This LTA advisor will have a key role in consolidating project knowledge management particularly learning and communication. M&E staff would also support the PD during IFAD supervision, implementation support, MTR and PCR mission and to organise all data and information relating to the project for reference by the IFAD mission.

25. **Technical agency for M&E.** The project may outsource the services of a technical agency through a standard procurement system for certain M&E tasks such as baseline survey, endline survey, annual outcome survey and other impact surveys. The technical assistance from an M&E support agency can also be engaged to build the capacity of the project M&E staff. Capacity building in M&E for project staff will be undertaken through structured orientation training programme, refresher training, and information sharing.

26. **Key M&E tasks and implementation arrangements during project implementation cycle.** The overall key M&E tasks and implementation steps during various cycles of project implementation are summarised in Table 2 below:

Table 2. Summary of key M&E tasks for APDMP

Key stages of project cycle	Key M&E tasks[49]
Project initiation (loan effectiveness) to project start-up workshop (usually the PY 1)	• Recruitment of all M&E staff • Review the project design/detail project report in relation to M&E with key stakeholders; • Review the PIM in relation to the section on M&E and KM in particular; • Develop a detailed M&E plan and system including appreciation of project M&E culture and practices that would be emerging taking into consideration the various project results chain; • Review / develop various M&E formats (data collection and reporting formats); • Undertake and complete the baseline surveys (outsource/procure an agency); • Develop project MIS (outsource the task / procure an agency); • Prepare the KM strategy and action plan; integrate M&E and KM. • Prepare the knowledge management strategy and link it up with • Put in place necessary conditions and capacities for M&E to be implemented.
Main implementation period	• Ensure all data and information needs for management and key stakeholders are regularly met; • Coordinate information gathering and analysis, as also data storage and data management; • Facilitate and support regular review meetings and processes with all implementers and stakeholders; • Prepare for and facilitate the project reviews/ review meetings (monthly/ quarterly/ half-yearly/yearly or annual); • Coordinate/prepare for supervision missions; implementation support missions, etc.; prepare the action taken report on recommendations of IFAD's missions. • Organise meeting of IFAD mission and government during supervision missions, etc.

[49] Should be read along with the overall KM tasks to have link between M&E and KM.

Key stages of project cycle	Key M&E tasks[49]
	• Conduct focused studies on emerging questions including documentation of good practices and missed opportunities (those not working well; suggest alternatives); • Disseminate / communicate project results with various stakeholders; • Prepare/undertake and ensure timely submissions of various reports as per IFAD's norms and requirements including documentation of success case studies, half-yearly/annual progress report, Annual Outcome Survey, Annual RIMS Report, etc. • Prepare the draft Exit Strategy cum Post Project Sustainability. • Consolidate the various types of supervision mission and implementation support mission feedback.
First Main Review	• Collate info about CLICs (rate of utilization by farmers and type of information farmers seek); • Farmer field schools for crops and livestock(regularity of farmers participation and types of practices being adopted by farmers and the degree of water use efficiency) • Number of farmers participating in borewell sharing and adherence to by-laws of water sharing; • Performance of the Gram Panchayat water sub-committee; • Effectiveness of water management plans (rate of implementation of planned activities) and adherence to the implementation of the plan at GP and hydrological unit levels; • regeneration of common property rangelands (survival rate of fodder species, management by farmers' organization and estimation of biomass produced); • Profile of the project beneficiaries in terms of size of holdings, poverty, gender, ST/SC • Disbursement rate of IFAD and RIDF • Effectiveness of Convergence
Mid-term	• Collate information for the mid-term review (MTR); • Coordinate for conduct of the MTR; • Facilitate internal review processes to prepare the external review processes. • Adjust the M&E system as required. • Revise the draft exit strategy and post-project sustainability. • Organise project workshop to review, share and disseminate changes proposed at MTR with all project staffs and partners.
Phasing-out and completion	• Assess what the implementers and communities can do to sustain project interventions, impacts and M&E/KM activities could be sustained after closing down; implement these specific ideas; revise and update the project exit strategy and post-project sustainability strategy or action plan. • Undertake end-line surveys / impact studies (outsource/procure an agency) • Organise workshops to review the key elements of project exit and post-project sustainability strategy. • Organise workshops and field studies with key stakeholders to assess project impacts; identify lessons learned for next phase of the project and/or other projects to be designed in future. • Prepare the Project Completion Report (PCR) as per IFAD's guidelines. • Facilitate and coordinate IFAD's PCR validation mission. • Organise closure workshop to share and disseminate lessons learned with all key stakeholders.

27. **Annual M&E Activities Calendar.** The key M&E activities and reporting requirements to be performed by the project by date/month are illustrated below. This does not include the higher level project coordination meeting such as Project Steering Committee (PSC) meeting.

Key activities	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*
Annual Progress Performance Review												
AWPB preparation and submission												
Annual Progress Report												
Half-yearly Progress Report												

Key activities	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*
Annual RIMS Report submission												
Annual Outcome Survey Report submission												
Annual Audit Report submission												
Quarterly Results Report Preparation (Outputs)												
Quarterly Review Meetings at PMU												
Focus Groups and Key Informant Interviews (Theme or Output based)												
Monthly physical & financial data collection/ MIS entry												
FPO/FG PME meetings												

28. **Management Information System (MIS)**. Project will establish an MIS system in the first year of project implementation. The MIS would generate, monthly, quarterly and annual progress reports on physical and financial progress and on project outputs and outcomes - and may have a GIS interface so that key data can be shown on maps. APDMP can draw lessons from the high level of IT application in the government agencies in AP, as well as lessons from other IFAD projects in India such as ILSP in Uttarakhand.

29. M&E staff would work closely with the IT professionals in the SPMU and LTA responsible for setting up the project MIS - the project has provision for actual software development/adaptation and support to to be contracted to a specialised company, along with software support. Project IT/MIS staff include a professional in the LTA, two IT service staff in the SPMU, an MIS Officer in the DPMUs, and two Database Assistants in each FA (covering 10 clusters). They will be responsible for operation of the MIS. Much data will be actually entered by other people (such as DPMU Monitoring Officers, CLIC facilitators, Pashu Sakhi, FFS facilitators, GP water management committees, weather and water data collection assistants) via office computers, tablet computers and other devices. A major part of the job for MIS/IT staff will be helping these people enter accurate and complete data, and checking on data quality. The LTA IT Professional will work closely with project management to draw up a specification for the system so that the software company can be procured and then knows what it needs the produce. One the system is operation the IT Professional will monitor the performance of the system (is it producing useful reports with accurate information?), and take a lead in adapting and refining the system so that it works better and meets the needs of project management. To do this will require close contact with the team in the software supplier.

E. Reporting and Communicating Project Results

30. As part of the MIS, the SPMU will develop common reporting formats to be used by all the project entities. All data would be gender disaggregated and the analytical reports are to be used for taking timely corrective actions and to learn from implementation experiences to further improve project management effectiveness and efficiency. As required, monthly, quarterly and annual reports may be produced at different levels within the Project. For IFAD corporate reporting the following are needed: Half-yearly progress Report (only against the AWPB), Annual Progress Report, RIMS Annual Reports and AOS.

31. Monthly Progress Reports (MPR) will be prepared from the project MIS developed to generate information at the Village/GP levels for reporting to the DPMU and onward to the SPMU. Information in the report will contain component/sub-component wise physical and financial progress against annual targets. This report will form the basis for monthly progress reviews at all levels and subsequently feed to the quarterly progress report.

32. Quarterly Progress Reports (QPR) will have physical and financial progress with information on challenges encountered in implementation and corrective actions and solutions to address constraints as well as communities response to project initiated activities. QPR would also be useful for consolidating RIMS Annual Report each year to be carried out for a calendar year (1st January to 31st December - although the RIMS reporting period is now flexible).

33. Half yearly and Annual Progress Reports (HR/AR) will be prepared from information compiled by the PMU on component/sub-component wise physical and financial progress, and loan category wise financial progress. The information will be generated via the project MIS and could contain summarised information and data from villages/GP and findings from PME and annual outcome surveys, showing progress towards development objectives, usefulness of training, benefits from component/sub-component interventions, gender issues and knowledge management. The reports could be dovetailed with case studies of successful interventions. The PMU will prepare the half-yearly progress report by the end of October (primarily progress against the AWPB) and a more detailed annual progress report by April end to mid-May every year and send to IFAD India Country Office and other stakeholders. *PIM will contain model format or guideline for preparing the Annual Progress Report*.

34. RIMS Annual Report. The key RIMS indicators corresponding to the project outputs and outcomes by components are included in the project's Logical Framework and will be reported annually by the end of January every year. In the first year the project information on RIMS first level indicators (list of indicators included in RIMS Handbook) associated with outputs would be reported. After mid-term review the report will include ratings of effectiveness and sustainability of 2nd level indicators, validated from the results of annual outcome surveys.

35. Annual Outcome Survey (AOS) Report: Each year the project will undertake AOS and report to IFAD. The first AOS will be done in the second year of project implementation after completing a full first year of project implementation. The AOS would be for a calendar year of January to December. Each year the project will submit the AOS report by February.

36. First Main Review (FMR). Given the complexity of the issue at stake and the risky nature of the project, a FMR will be carried out after 24 months from entry into force of the financing agreement. This process could also lead to the revision of the project activities, budget allocation and financing plan between IFAD and RIDF. A mutually agreed action plan and budget will be prepared based on the outcomes of the FMR.

37. Mid-Term Review Report (MTR): IFAD in cooperation with the GoAP and APDMP would undertake a mid-term review no later than 18 months after the completion of the FMR (or as would be specified in financing agreement) to review project achievements and implementation constraints including issues relating to loan administration and financial management. Any corrective measure would be addressed at MTR. A mutually agreed action plan will be prepared based on the MTR findings.

38. Project Completion Report (PCR): As the project reaches completion point, the PMU would prepare a draft Project Completion Report based on IFAD's Guidelines for Project Completion. IFAD and the Government will then carry out a Project Completion Review and validation based on the information in the Project Completion Report and other data. This review is usually done during the intervening period of project completion date and loan closing date.

39. Case studies on project innovations and success stories[50]: The project will undertake case studies of project innovations and success stories on regular basis and report them through Annual Progress Report and in the India Country Newsletters. The project will also report them and communicate through its IFADAsia webpage managed by IFAD and on the project's own webpage.

F. Learning and Knowledge Management (KM)

40. **KM Staffing**: In line with IFAD's policy, learning and knowledge management would be key element in APDMP with integrated approach in which M&E will feed to generating learning for the project and from the project. While the KM functions in the project would be cross-cutting and would

[50] IFAD's Communication Division has brought out a guideline for preparing case studies in the field. This will be provided at the time of start-up workshop.

be responsibility of every sector head or manager, the project will have KM officer or KM focal person in PMU. Knowledge services would be important element in APDMP management systems. The KM Officer / KM focal person and all relevant staff would be trained in KM. The M&E and KM units of the project at PMU will closely function as M&E will provide the building blocks for KM in the project.

41. **Knowledge Management in APDMP.** The project will prepare a Knowledge Management Strategy building on IFAD's Knowledge Management Strategy in the first year of project implementation. This will be the responsibility of the Knowledge Management and Communications Advisor in the LTA. Staff responsible for KM activities at the district level would undergo training on KM. *An outline of the ToR of the KM focal person and KM training module will be provided in the PIM.*

42. The project **learning system** would comprise of various activities relating to M&E and KM functions. Some of these would include monthly, quarterly and annual review meetings; capturing information on progress, lessons and finding solutions for implementation constraints. KM and lesson learning would be used as a tool for internal learning by project stakeholders such as staff of various implementing agencies, participating villagers and farmers, both women and men. This will involve a series of regular meetings at village/cluster, mandal (where useful), district and state levels. At these meetings, progress of project activities will be reviewed and learning from success and reasons for failure identified. Participatory tools such as "most significant change", "story telling" and "participatory monitoring and evaluation" (PME) may be used at these meetings.

43. The project will be encouraged to learn from KM culture and practices of experiences of other IFAD projects in India. A tested approach in sharing knowledge are "Learning Routes" - a continuous process of in-the-field training that seeks to broaden and diversify the markets of rural technical services, placing special value on the best experiences and knowledge of institutions, associations, communities and rural families. Each Route is organized thematically around experiences, case studies and best practices on innovative rural and local development. The project will have the opportunity of accessing the learning routes experiences from other IFAD projects in the country and outside.

44. **Enhancing Use of Knowledge from M&E.** In all IFAD-funded projects, each monitoring and evaluation activity has a purpose. The significance of M&E in projects are critical; when done and used correctly, M&E contributes to strengthening the basis for managing results, foster learning and generate knowledge for all the stakeholders including IFAD, Government and Communities. Thus, knowledge gained from M&E is at the core of IFAD-funded projects. IFAD and government will use and apply learning from M&E to improve the overall performance and quality of results of ongoing and future projects and strategies. M&E is now oriented to generating knowledge and learning. Projects are now designed with emphasis not only on the inputs, outputs and processes but on development results as outcome. APDMP would use its M&E data and information for improved learning, enhancing accountability of the project for learning, use the knowledge and learning from M&E for project planning, implementation and improved monitoring, and document innovations and success stories so as to contribute in the overall local, national and global knowledge pool in development particularly in the areas of rural development and poverty eradication in the era of climate change.

45. **Knowledge Products, Dissemination and Communication.** APDMP will generate various knowledge products such as publications, documented case stories, photo documentation, videos, charts, manuals, posters, etc. However, for meaningful learning and knowledge sharing, knowledge products should be of quality with clearly identified audience and purpose. The characteristics of good knowledge products[51] have the following elements:

- Based on an assessment of needs and demand for the product among targeted users to ensure relevance, effectiveness, usefulness and value of the knowledge product.
- Designed for a specific audience, taking into consideration functional needs and technical levels.
- Relevant for decision-making needs.
- Knowledge products brought out timely.
- Written in clear and easily understandable language.
- Data is presented in a clear and coherent manner; all data and information being from project M&E without any bias, both successful and failure cases.

[51] Adopted from the "Handbook on Planning, Monitoring and Evaluating for Development Results", UNDP, 2009

- Knowledge products developed through participatory process and validated through quality assurance processes with relevant stakeholders or peer reviewed appropriately.
- The knowledge products should be easily accessible to the target audience through most effective and efficient means, and timely.
- Consistency in presentation of products to enhance visibility and learning.

Practical tips for developing knowledge products from project M&E and dissemination of the products could include the following steps:

- Identify the target audiences and their information needs.
- Collect and keep at hand the contact information of all key stakeholders.
- Identify and determine the types of knowledge products to be developed (keep in mind the availability of project resources for this purpose as also the capacity of the project to develop the knowledge products, directly or through outsourced).
- Select and determine types of knowledge products that meet the target audience's information needs.
- Identify language requirements per product and audience.
- Determine most likely efficient forms and dissemination methods for each knowledge product.
- Monitor feedback and measure results of dissemination efforts as also quality of knowledge products.

46. **Knowledge Sharing and Learning Culture.** The project will endeavour to capture and disseminate lessons learned, successful case studies and document good practices. The project will adopt various knowledge sharing methods and tools including designing and facilitating knowledge events such as meetings and workshops. APDMP will adopt some of the best practices in knowledge sharing and learning culture of IFAD funded projects in India around the followings:

- Building strong network by conducting periodic workshops/seminars/conferences on key thematic issues relevant to the project.
- Conduct monthly/quarterly/half-yearly/yearly review meetings of key stakeholders.
- Developing skills and competencies of project staffs to improve human resources in the areas of knowledge management.
- Tailoring knowledge management activities closely to the needs of project staff and stakeholders.
- Developing and actively using project website, newsletter, etc. and contributing in the IFADAsia website.
- Adoption of specific knowledge sharing methodologies and tools[52] with capacity building components, such as: Tools treasure hunt, Video storytelling, Speed sharing, Chat show, Jumpstart storytelling, World Café, Peer Assist, etc.

47. **Linking with Research Institutions for knowledge and learning**. The project would do well to have linkage with existing agricultural research institutions of programme areas such as Regional Agricultural Research Stations at Nandiyal and Ananthapuramu of Acharya N.G. Ranga Agricultural University. These institutions have history of field-based research on rain-scarce dryland crops which would be useful to APDMP. Linking with these institutions could enhance the knowledge pool of the project on specific thematic areas of crops and farming practices.

[52] Details are available at "*Introducing Knowledge Sharing Methods and Tools: A Facilitator's Guide*" by Allison Hewlitt and Lucie Lamoureux. IDRC-IFAD, 2010

Appendix 7: Financial management and disbursement arrangements

A. Summary of Risk Assessment

1. During the first detailed design mission, a Financial Management (FM) risk assessment has been completed in accordance with CFS guidelines. The assessment has been developed after visiting Department of Agriculture and Cooperation (DAC), the Agricultural Technology Management Agency (ATMA), the Department of Finance (DF), Auditor General Office Andhra Pradesh (AG-AP), WASSAN, WB Office Delhi, NABARD. No PEFA has been conducted at AP State level, so the risk assessment builds on the latest national PEFA conducted in 2010, the "Comptroller and Auditor General of India on States Finances of Andhra Pradesh State" report related to the year ended 31 March 2014, DAC specific information abstracted from the "Accounts at Glance 2013-14 for Andhra Pradesh" issued by the Accountant General and a series of publications related to the 2014 division of the AP State in two (Telangana and Andhra Pradesh).

2. The 2010 PEFA discloses the "status of arts" in the organization of the Public Financial Management (PFM) function in the country at central federal level highlighting results, issues and planned reforms to improve support to national development. While the overall budget management function is sufficiently efficient, internal and external audit functions are in need if substantial improvements. No information has been provided on donor practices in the country.

3. At AP State level, there have been remarkable efforts to modernize the PFM with the introduction of a series of instruments and systems, of which the most important is the State Treasury System (STS) used for the management and disbursement of the State approved budget. The introduction of the STS has increased the level of accountability and control over the use of public financial resources and eliminated almost in full all cash transactions in the public sector by massive use of bank transfers. STS system is not yet completely secure due to limited capacity and control on its use and for the possibility of bypassing it through "self-cheques". All these aspects are detailed in the following paragraphs.

4. Within the AP State, a specific analysis has been conducted on DoA and ATMA; the results outline that DoA is not one of the most efficient departments of AP from a financial management point of view. Under-utilization of the approved budget for a long number of consecutive years is a consequence of organizational bottlenecks as well as limited capacity in the implementation of schemes and grants.

5. The design of the financial management aspects of APDMP has been largely influenced by the decision to rely largely on the use of Government Systems. This is the first time IFAD is following such approach in India. A further challenge is represented by the fact that IFAD is re-engaging in AP after a number of years and there is very little direct knowledge of the fiduciary environment.

6. Based on the combination of inherent risks with control risks, explained in detail in the following paragraphs, the overall risk rating assigned at this stage is **high** before any mitigation measures are put in place. Despite the application of FM good practices, the risk remains **high** due to a series of fiduciary considerations. Further analysis, especially in the control area, will need to be performed during the initial implementation period, however, the practical implementation will still contain some risk elements. Risk mitigation measures are specifically described in the subsequent pages; the implementation of some of these may be considered as condition precedent to withdrawal.

B. Financial Management risk assessment

Inherent risks at country level

7. The latest available PEFA is dated 2010 and is related to the central government only. No specific information on AP, but the document gives useful information to understand PFM in the country context.

8. *Credibility of budget*: while the budget classification system is uniform throughout the country, the revenue estimates to finance it are precise, the extra budgetary expenditures are reported and external funded financing is duly considered, substantial overdraft of expenditures over approved budget are recorded. Other areas for improvement include the presence of variation in the composition of expenditures in relation to the approved budget, and limited ability of the central government to monitor the financial positions of the single states.

9. *Policy based budgeting*: A clear calendar for budget preparation exists and relevant circulars are issued by Ministry of Finance in due time; however the weak link between investment and recurrent costs persists undermining the policy aspects of the budget.

10. *Predictability of the budget (tax management) and budget execution*: despite the articulated and documented tax policies and exemptions, their applicability is largely subject to the discretion of administrative authorities. The system for debt management and its monitoring is adequate as well as the management of public sector employees' salaries. The monitoring of non-salary expenditures is in need of improvements.

11. Internal *audit*: The internal audit function is not independent, it is conducted in a routine manner and does not focus on systemic issues to help management in improving efficiency and effectiveness of operations. Internal audit recommendations are not necessarily binding for implementation.

12. *Accounting, Recording and Reporting*: At federal level the accounting function is well established and efficient both in terms of information provided and timely submission of it. Year-end financial statements, in the form of Finance Accounts, are presented to legislators with a time lag of 8-10 months. Accounting standards used are the national ones which are not fully aligned to IPSAS.

13. *External scrutiny and audit*: There is a detailed scrutiny process run by the legislator before discussion and approval of the annual budget law. CAG audits all government departments and public entities every year as prescribed by the law, but the submission of audit reports to legislator is delayed up to 12 months after the end of the fiscal year. There is a limited scrutiny of audit reports followed by a limited implementation of audit recommendations.

14. The following table summarizes the features of the public finance management system, based on the PEFA methodology:

Criteria	Assessment
Credibility of the budget **PEFA score: B-**	• Increased alignment between actual expenditures and approved budget; • Still substantial misalignment between actual composition of expenditures and approved budget; • Forecast of revenue to finance budget very realistic as well budget classification; • Monitoring and clearance of arrears remains an issue
Comprehensiveness and transparency **PEFA score: B+**	• Comprehensiveness of Information Included in Budget Documentation; • Government operations completely reported; • Limited fiscal analysis; • Adequate public access to key fiscal information.
Policy-based Budgeting **PEFA score: C-**	• While budget preparation is a participative exercise, there is still a lack of multi-year perspective in fiscal planning, expenditure policy and budgeting.
Predictability and control in budget execution **PEFA score: C-**	• Taxation codification leaves room for interpretation; • Problematic the collection of arrear tax payments; • Adequate cash and debt management; • Payroll controls to be enhanced; • Internal audit function is not independent.
Accounting, recording and reporting **PEFA score: B+**	• Reconciliations and production of reports are regular exercises, the quality needs to be improved as the information provided is not complete;. • Financial statements are prepared timely and the information provided is complete. Standards used for accounting are not completely in line with IPSAS.
External Scrutiny and audit	• Annual audit reports are submitted to the legislator with delay; limited follow up for the implementation of recommendations; • The annual budget law is properly scrutinized, while the examination of audit

Criteria	Assessment
PEFA score: C	reports is limited.
Donor Practices **PEFA score : N/A**	• 2010 PEFA did not scrutinize donor practices

Inherent risks at Andhra Pradesh State level

15. Part of the observations mentioned in the 2010 PEFA, are outlined also in the latest available report of the "Comptroller and Auditor General of India on States Finances of Andhra Pradesh State", related to the year ended 31 March 2014. The report was issued just two months after the division of the State in two separate entities, Telangana and Andhra Pradesh. The information provided does not exactly relate to the Andhra Pradesh State in its actual configuration but gives adequate insight of trends in the PFM area at State level.

16. *Audit of accounts of Andhra Pradesh Government for the year ended 31 March 2014*. With the aim of securing economic growth and stability in the medium term, the AP Government enacted the "Fiscal Responsibility and Budget Management Act" (FRBM) in 2005. With the implementation of FRBM, the State registered a surplus of revenues over expenditures for eight consecutive years. Total liabilities were brought down to 26.67% of the Gross State Domestic Product (GSDP), even better than the annual target fixed at 28.20%. During the period under observation, revenues growth by 6.63%. Auditors expressed some doubts on some substantial liabilities related to non-contribution to pension schemes excluded from the overall calculation. It was recorded a minor increase in capital expenditures. Capital works and projects in irrigation and road sectors continued in a very slow manner causing block of investments in uncompleted works. Although the State prioritised development expenditures, the allocated funds were not fully released for the intended purposes. The percentage of investment expenditures over the total stands at 11.81% with the residual part being recurrent.

17. *Financial Management and Budgetary Control*. Budget assumptions at the beginning of the period were not completely correct and the budget control mechanism was not effective; in fact 20% of the approved budget was not utilized; also DCA had recorded substantial savings on the approved budget. This event happened for the fourth consecutive year. Savings occurred are mainly due to bureaucratic bottlenecks affecting the implementation of policy decisions; this situation represents an actual risk also for the IFAD funded project. The budget contained several misclassifications despite previous years audit recommendations; this implies that Government should be more proactive in setting up necessary controls in budget formulation. Budget management is in need of substantial improvements; expenditures incurred without provision, budgetary allocations which resulted in substantial savings, together with excessive transfer to Pre-Debited Accounts (PD accounts) indicate that the internal control mechanisms need to be enhanced especially in the area of programme implementation and expenditures monitoring.

18. *Financial Reporting*. There were delays in submission of annual accounts by several autonomous bodies/authorities with the result of diluting accountability and defeats the purpose of preparation of accounts. The Government, at the instance of previous audits has reduced the number of PD accounts operated; however a balance of more than USD 2.2 Billion equivalent remained unspent under more than 72 000 PD accounts. Discrepancies between previous year's closing balances and current year opening balances have not been reconciled. Self-cheques issued from PD accounts by several PD account holders continued to be an issue in violation of Government orders. Use of generic Head accounts for recording expenditures distorted a meaningful analysis on the quality of expenditures. The non-reconciliation of 36.76% of total expenditures and 52,29% of total receipts increased the possibility of non-detection of potential irregularities. Similarly, non-receipt of approx. 30 000 vouchers and more than 6 000 cheques exposed the system to the risk of non-detection of cases of misappropriation and fraud.

Financial Management Capacity of the Directorate of Agriculture (DoA)

19. Few details related to DoA extrapolated from the "Accounts at Glance 2013-14" for Andhra Pradesh issued by the Accountant General. The following list includes main FM issues identified in DAC.

(a) Incorrect-Generic accounting: contingent bills for an amount equivalent to approx. USD 63 million were not correctly reported impacting the reliability and completeness of the accounting and reporting function of DoA.

(b) Substantial savings under grants and schemes assigned to DoA indicate either non-implementation or slow implementation of certain schemes/ programmes.

(c) DoA has shown persistent problems in being able to provide reconciled accounts to Department of Finance in the period 2004 – 2014 (ten years).

(d) Additional information have been gathered during a series of meetings with DoA Senior management and administration and accounting officers.

(e) In addition to the Head office based in Hyderabad, but which will be soon be moved to the new AP State Capital, DoA comprises District Offices in all the districts of the state.

(f) The introduction of STS by FD few years ago has brought major enhancements in the management and control of DoA financial transactions. However, as outlined in the previous sections, important improvements in the system are still necessary.

(g) The preparation of DoA budget, its submission to FD for consolidation with the budget of other departments and its approval at legislative level, are the first steps required for the release of "book" resources for DoA's use.

20. In fact DoA does not have any access to cash and does not manage any accounts in commercial banks, but uses this STS platform, which is web based, for all its financial transactions at central and district level.

21. Internal control systems are very effective, with stringent segregation of duties; all disbursements must be authorized by the Director of Agriculture, the highest operative authority of DoA. For disbursements greater than INR 10 million (approx. USD 160 000 equivalent) it is necessary the second signature of FD; however such a rule is not applicable to external funded projects. At district level, all disbursements need the authorization of the District Collector, the highest local administrative authority which is not part of DoA, before release via STS.

22. All authorized payments are input in the STS website and transmitted to the AP Treasury for bank transfer execution. The STS performs a series of system checks, including those related to budget, before releasing the payment via bank transfers.

23. All funds not used at year end are withdrawn from the STS and is not possible their further use. As outlined in the above analysis, DoA has had substantial savings in the last number of years; this due both to schemes (India/AP self-funded projects) implementation problems, but also to the fact that being so much emphasis placed on the effectiveness of funds management, efficiency in their use has suffered.

24. In order to enhance flexibility, the STS can be used for direct disbursements (to suppliers, beneficiaries, etc.) but also to transfer funds to the PD Accounts. These accounts are still held at Treasury level and not in commercial banks. With an order to STS, funds are transferred to PD Accounts. Funds are withdrawn from PD Accounts via special cheques transmitted to Treasury for disbursement via bank transfer.

25. The main advantage of using such an instrument is the fact that funds remain available after year end; in fact funds can be held in PD Accounts for a period of two years. This facility allows the continuation of DoA activities when STS balances are cancelled at year end and pending the allocation of new resources.

26. The Auditor General of India has recommended multiple time the limitation in uses of PD Accounts, due to huge balances in the accounts over long periods and the possibility of issuing "self-cheques" and manage financial resources outside Government System.

27. DoA currently is not directly implementing any externally funded project and the reporting over schemes implemented is transactional, based on the download of transactions from the STS and PD Accounts websites. IFAD reporting requirements need a more sophisticated set of reports.

28. DoA has its internal audit function and is subject to a financial transactional audit performed by the AG-AP on a yearly basis. In AP, AG is entrusted for the audit of DoA and all its implemented schemes. A performance audit executed by AG in 2010 outlines the inability of DoA to spend a big portion of the budget allocated for implementation of schemes due to limited organizational capacity and various inefficiencies identified in the Department.

29. As a result of the above mentioned shortcomings, the inherent fiduciary risk associated with the public financial management system at State and DoA level is considered ***high.***

Control risks

30. Overall, APDMP will be operating in a rather high inherent risk environment due to limited efficiency of DoA and the absence of an administrative function in ATMA at the present. The proposed financial management arrangements for the project incorporate a number of measures intended to reduce such risks to acceptable levels and ensure that (i) the project funds are used for intended purposes in an efficient and effective way, (ii) reliable and timely financial reports are prepared, and (iii) project assets and resources are safeguarded from unauthorized or wasteful use.

Summary of FM risks and mitigating actions

Summary of Project Fiduciary Risk Assessment at Design			
	Initial Risk Assessment	**Proposed Mitigation**	**Final Risk Assessment**
Inherent Risk			
1. TI Index	**M** Index: **38** in 2015 (**ranking 76** out of 175 surveyed countries)	**-**	**M**
2. RSP Score	**M** Score: **4.00** (2015)[53]	**-**	**M**
Control Risks			
1. Organization and Staffing	**H**	• The PMU currently does not exist, to ensure deputation of adequate Gov Staff supplemented by contracted staff • Ensure the recruitment process of contracted staff provides the project with qualified and experienced human resources • Comprehensive, user-friendly PIM	**M**
2. Budgeting	**H**	• Ensure inclusion of an adequate ATMA-PMU budget in DAC budget submission • Ensure adequate coding of project's activities at DF to ensure correct accounting and reporting	**H**
3. Funds flow and Disbursement Arrangements	**H**	• If budgeting issues are resolved, funds flow should be sufficiently efficient	**H**
4. Internal Controls	**M**	• Application of Gov. rules ensures	**M**

[53] http://www.ifad.org/operations/pbas/

		adequate internal control mechanism, sometimes to detriment of efficiency	
5. Accounting Systems, Policies & Procedures	**H**	• use of Gov. procedures does not ensure conformity to IFAD standards • The hiring of a Finance Officer in the market to serve the project should mitigate reporting risks	**M**
6. Reporting and monitoring	**H**	• PIM to detail reporting and monitoring requirements and rules • To ensure finance staff contracted in the market has the means to fulfil IFAD reporting requirements	**H**
7. Internal Audit	**H**	• FO vested with an internal audit role • Project management to act on internal audit findings and recommendations	**M**
8. External Audit	**M**	• Continuous dialogue with AG to ensure submission of acceptable reports, timely submission of annual audits and informative management letters	**M**
Project Fiduciary Risk @ Design	**H**		**H**

31. Despite mitigation, the overall project fiduciary risk remains **High** at the stage**.**

C. Financial Management and disbursement arrangements

32. **Finance unit organization of PMU at central and district level.** The Project Management Unit will be set up within Directorate of Agriculture which will be the Lead Project Agency for APDMP. At each of the District, the ATMA will be the District Project Management Unit. The current structure of ATMA is purely technical both at central and district level. In order to ensure an effective and efficient FM function for APDMP it shall be necessary to reinforce ATMA structure with a number of fiduciary staff.

33. An Accounting Officer and Accounting Assistant shall be deputed by GoAP administration and shall be in charge for the management of all disbursements via STS and PD Account. Both staff shall report to the Project's Director.

34. A Finance Officer (FO) and a Finance Support Officer (FSO) shall be contracted on the market and play a pivotal role for the project's administration. Their TORs shall make clear reference to the fact that the FO, supported by the FSO, shall be responsible for the preparation of consolidated IFRs, preparation of project's financial statements, review of financial reports and audits of NGOs, and shall be in charge for a number of internal control and administrative organizational activities. They shall report to the Project's Director.

35. At district level, a district Finance Officer shall be hired on the market and will be supported by an Accounting Assistant shall be deputed by GoAP administration. The District Finance Officer shall be in charge for the management of all disbursements through the District Programme Account to be opened at any of the nationalised banks at district level. Both staff shall report to the Project Director, ATMA of the district.

36. **Budgeting.** The APDMP-PMU, after consultation with its district offices, shall prepare its annual budget linking all the planned activities at HQ and district level to the cost categories outlined in the schedule II of the Financing Agreement. The overall DAC budget document transmitted to FD shall request the determination/creation of separate budget codes under the capital expenditure head for APDMP to receive fund allocation.

37. **Disbursement arrangements and Flow of Funds.** Routing of IFAD finances will be through a designated account denominated in USD that will be opened at the Reserve Bank of India and administered by the Office of Controller of Aid, Accounts & Audit (CAA&A). IFAD will establish an Authorised Allocation for initial advance. It is recommended that the Authorised Allocation may be established at USD 5 Million. However, the quantum is subject to the agreement of both GoI and

GoAP at Loan Negotiations, as this will count for the payment of interest and service charge. The flow of funds at the State level will have two different modalities. The Directorate of Agriculture will transfer the funds to the District ATMA Societies are outside the Treasury System, they will receive the APDMP funds in a District Accounts.

38. The District Account will be opened in a bank acceptable to the State Government and IFAD. Disbursements to the LTA NGO and to all other facilitating agencies shall be managed at HQ level, while disbursements to be performed by the district offices shall be outlined in detail in the PIM. The District ATMA Societies will submit financial report every month based on the actual expenditures incurred to the SPMU of APDMP. The SPMU will consolidate the district expenditures and its own and report quarterly consolidated IFRs, subject to audit certification at the end of each financial year.

39. **Disbursement of RIDF Funds:** Finance Department of GoAP will release funds for RIDF in a timely manner as per the approved AWPB for the activities under RIDF Financing. The fund flow will be similar to IFAD financing, but the accounting and reporting to Government of AP and NABARD will be on separate account heads and formats.

40. **AWPB and release of advance funds from Government of AP:** The SPMU will consolidate the planned activities and the budget required for a particular programme year and Directorate of Agriculture will include the budget required in the Directorate Budget for legislative approval. As APDMP is a limited duration project and both IFAD and RIDF financing have to be utilised within a timeframe, GOAP will provide a commitment during loan negotiations that no budgetary cuts will be effected by the Finance Department. This is crucial for maintaining the disbursement profile of the project.

41. It is proposed to adopt Interim Financial Reporting (IFR) modality for submission of withdrawal applications to IFAD through CAA&A, Ministry of Finance. The formats and the contents of IFR will be discussed with CAA&A by IFAD and communicated to the GOAP.

42. APDMP shall submit withdrawal applications every quarter based on the actual expenditures incurred at central PMU and district level. These expenditures shall be reported in quarterly consolidated IFRs, subject to audit certification at the end of each financial year. Expenditure categories eligible for financing under the Financing Agreement and as per the disbursement percentage will be financed out of the proceeds of the IFAD loan.

43. IFRs shall be prepared by grouping expenditures in accordance with the loan categories as outlined in Schedule II of the APDMP Financing Agreement. IFRs shall contain in annex the list of contracts above USD 50 000 equivalent for which disbursements have been executed during the period as well as all the required supporting documentation. Full supporting documentation shall be annexed to the IFRs for single payments above USD 50 000 equivalent executed in the period. The above mentioned prescriptions are applicable to all cost categories outlined in Schedule II of the Financing Agreement.

44. IFRs shall be submitted to IFAD on a timely basis within 30 days after the end of each quarter; in case of APDMP liquidity needs above USD 5 million equivalent, ad-hoc IFRs can be prepared and submitted to IFAD anytime.

45. IFRs, together with all required annexes, shall be prepared by the project's FO, which shall number them on a progressive basis. The FO shall organize and coordinate the receipt of relevant information from the central PMU and all the district PMUs. IFRs shall be signed by the FO and the Project's Director before submission to CAAA in New Delhi for the signature of the authorized representative and subsequent claim to IFAD. In its claim, CAAA shall indicate the bank account placed at RBI were IFAD funds for reimbursement shall be transferred. Detailed disbursement modalities shall be indicated in the Letter to the Borrower.

46. **Internal controls.** Procedures and record maintenance at all levels will be based on GoAP procedures as well as other specific project's procedures properly documented in the PIM. The PIM shall include specific provisions outlining: internal controls settings, IFRs preparation procedure,

financial reporting arrangements between the districts and the central PMU, NGOs contract's management, financial reporting and audit requirements for NGOs. The FO shall play a pivotal for the effective implementation of the overall internal control system.

47. Detailed procedures for adequate recording, management and safeguard of project fixed assets shall be disclosed in the PIM and implemented at project's level.

48. **Accounting systems, policies, procedures and financial reporting.** At central PMU level there shall be full use of Government system . GoAP Treasury system (and the associated PD account system), foresees single accounting entries in a secure website at project level in accordance with dedicated budget lines which are matched with bank transactions. All disbursements are executed via bank transfers. This ensures accurate recording of all project's transactions with no circulation of cash. The reporting available from the GoAP Treasury system shall be of a transactional nature only.

49. At district level, funds shall be managed outside the Government systems so there will be the need to set-up an accounting software to track transactions and produce the necessary financial reports.

50. The FO shall be responsible for the preparation of consolidated IFRs summarizing the expenditures incurred in the period at central PMU and district level. Such IFRs shall be valid also for submission to IFAD to obtain the reimbursement of expenditures incurred. District FOs shall produce on a regular basis relevant financial reports for the use of the FO of the SPMU.

51. The FO of SPMU shall use a dedicated accounting software to consolidate project's expenditures coming from STS and the districts and prepare IFRs. It shall be necessary to synchronize central and district accounting software to facilitate timely preparation of IFRs and financial reports.

52. The FO shall be also responsible for the preparation of the annual financial statements of the project. Annual financial statements shall be built on the basis of the IFRs prepared during the year and derived from the accounting software. Both the annual financial statements and the quarterly consolidated IFRs shall be subject to audit.

53. **Internal Audit.** The internal audit office of DoA shall be in charge for the internal audit of APDMP. The FO shall complement the DoA internal audit office activities by performing internal control reviews at central and district level on a six monthly basis, he/she shall propose improvements in the processes and shall issue recommendations. Implementation of such recommendations shall be monitored during the following exercise. FO internal audit main duties shall include monitoring and review of the financial systems and procedures, their application and adherence to the PIM, support the introduction of administrative efficiencies. The six monthly reports prepared by the FO shall be submitted to the attention of the Project Director, APDMP and forwarded to IFAD.

54. **Financial Powers at District ATMA Societies.** GOAP will issue a Government Order delegating appropriate and adequate financial powers to Joint Collector (Development) or PD, ATMA for APDMP expenditure. This is required to facilitate reduction of approvals and resultant delays at the level of Chairperson, ATMA.

55. **External Financial Audit.** The Auditor General Office of Andhra Pradesh (AG-AP) shall perform the yearly financial audit of APDMP in SPMU located at DoA and the District ATMA Societies in accordance with its statutory TORs and in accordance with National Audit Standards. For ADPMP, the AG-AP shall perform a "certification audit" for external funded projects; this includes some specific activities as the audit of the project's financial statements, the audit of the IFRs submitted to IFAD during the year, the audit of the APDMP Treasury transactions, and the District ATMA Societies. AG-AP shall issue separate opinions covering the financial statements, IFRs, and the use of the Treasury system/commercial banking system. The audited financial statements and audit report containing the three different opinions shall be submitted to IFAD within six months after the end of each financial year up to Project Closing Date. Department of Economic Affairs, Ministry of Finance will seek the

concurrence of the Office of C&AG for the statutory audit to be performed by AG-AP for the project. LTA, Resource Organizations and other agencies including community organizations receiving APDMP funds will submit the audit report and financial statements limited to their engagement with APDMP to PMU, APDMP within three months of the end of each fiscal year. For APDMP, the AG-AP shall also issue a management letter outlining any internal control weaknesses and recommending remedies; more particularly, the auditor shall ascertain that the information included in the annual financial statements are correct, reliable, and present a true and fair description of the project financial position. The management letter will provide an update on the status of implementation of audit recommendations issued in previous years.

56. Contracts with all Facilitating Agencies shall need to include provisions for the submission of the project audits to the ATMA-PMU within four months after the end of each financial year and by the project's completion date. DPMU shall transmit copies of such reports to IFAD together with its own audit.

57. **Taxes.** The proceeds of the IFAD financing may not be used to pay taxes which will be part of the contribution of GoI and GoAP to the project. Social security benefits (employee's portion) and income tax (employee deductions) are eligible for IFAD financing.

58. **Financing Terms**: IFAD financing to APDMP will be USD 75.5 million on Blend terms and subject to interest on the principal amount outstanding at a fixed rate of 1.25% per annum, a service charge of 0.75% and shall have a maturity period of 25 years, including a grace period of five years. Government of India has agreed for the Single Currency Lending for APDMP and the loan assistance will be denominated in United States Dollars. The amortization schedule for repayment will be provided during the Loan Negotiations. IFAD assistance to the Programme will be on back-to-back terms decided by the Government of India. While the responsibility of repayment of principal, interest and service charge rests with the Government of Andhra Pradesh, Government of India only effects the payment in foreign exchange and adjusts with the State as per national procedure.

Appendix 8: Procurement

A. Country Level Procurement Framework

1. In India, there is no law exclusively governing public procurement of goods by the departments and ministries at the Central level or at the State level. Rules and directives in this regard provided in the General Financial Rules (GFR). An important number of instructions, issued by the Central Vigilance Commission (CVC), supplement these regulations. No central authority exists that is exclusively responsible for defining procurement policies, overseeing compliance and grievance redressal systems. A limited control and oversight functions are exercised by the Comptroller and Auditor General and the Central Vigilance Commission. As per the rules and procedures on procurement stipulated in the GFR the Departments have been delegated full powers to make their own arrangements for procurement of goods and each of the Department has issued office orders to define the process. In the Government departments, no dedicated staff available with procurement skills. In the absence of required procurement expertise, a Department can procure goods through the Central Purchase Organization, Directorate General of Supplies and Disposals (DGS&D). Tenders for contracts above a threshold size are issued and are reported by the respective departments. While the advertisements for procurement for goods, works and services are published, the data on actual procurement and the award of the contracts by the Departments are not publicly available.

2. A complaint mechanism to address protests/grievances redressal does not exist. The contract provisions provide for dispute resolution through mutual consultation for the contracts awarded. In case the mutual consultation is not successful, the affected party (usually the contract winner) can initiate arbitration under Indian Arbitration and Conciliation Act, 1996 to settle the disputes and/or differences. The option for complaint/protest available to the unsuccessful bidders is usually to approach the judiciary. However, considering the backlog of cases at the lower level civil courts and higher judiciary, the costs/time delays are not proportional to the value of the contract. Hence, protests/complaints are taken to the judiciary only in cases of large contracts.

3. While the procurement of goods and works have been generally done by the Government departments over the years, the procurement of consultancy services are new to government departments. As the consultancy services are knowledge-based, the Government departments find it extremely difficult to precisely prepare the terms of reference, deliverables, monitoring formats and contract management.

4. Government of India had constituted a Task Force to examine in details revision of procurement norms and to make suitable recommendations. The recommendations of the Task Force were accepted ‘in principle’ by the GoI. As part of the acceptance, Ministry of Finance, Department of Economic Affairs had prepared and circulated Manual on Procurement of Goods, Works and Consultancy Services in August 2006. Essentially these are for the use of Central Ministries/Departments.

5. In addition, the Ministry of Finance has also proposed a Public Procurement Bill in 2013, which aims to provide the legal framework for the processes of public procurement, but it is yet to be approved by the Parliament of India.

B. State Level Procurement Framework

6. Government of Andhra Pradesh has implemented many World Bank assisted projects. These projects followed the World Bank Guidelines on Procurement. The departments which implemented the external aided projects have the Project Procurement Manuals and experience of complying to the World Bank guidelines on procurement.

7. Some of the earlier World Bank projects appraised at the design stage, indicated significant weaknesses in the procurement and risk mitigation measures were deployed to address these risks.

8. **E-Procurement** Government of Andhra Pradesh has formulated a procurement policy for e-governance solutions in 2015. The major objective is to enhance efficiency, effectiveness and transparency in procurement decisions relating to e-Governance. AP Technology Services Ltd. (APTS) was nominated as the nodal agency for the procurement of IT goods and services. However, this E-Procurement modality is not available for consultancy services other than e-governance

solutions. There are document templates for the procurement of goods and consultancy services in the APTS website with other detailed information on filling up online forms. As the current project procurement is not limited to e-governance solutions, this e-procurement modality including the rate contracts may be used only for IT products within the local shopping threshold.

C. Procurement assessment of Directorate of Agriculture

9. Directorate of Agriculture do not have the recent experience of implementing any external aided programmes. The staff capacities are technical or administrative in nature. The Directorate's main procurement is related to procurement of seeds and agricultural inputs and release of subsidies for farm mechanisation and inputs. There is no dedicated staff to handle procurement related functions and these are handled as per the Scheme division of responsibilities. The APDMP is proposed to be implemented by setting up a dedicated Project Management Unit in the Directorate of Agriculture at the State level and at the district level. The SPMU is yet to be created. The project strategy is to involve engagement of multiple NGOs, creating community level organizations which will implement some of the activities at the ground level and some lead technical agencies to support the SPMU. Considering the complexity of multiple service providers and resource organizations, the procurement risk assessment of the existing Directorate of Agriculture is **High**.

D. Risk Mitigation measures proposed for APDMP

1. It is proposed to establish the following risk mitigation measures to address the High Risk assessment:

(f) Engaging one full time Procurement Officer with the experience and skill sets of procurement and compliance to established procurement norms. As and when required, an individual Procurement Specialist should be engaged to support the Procurement Officer. As the Procurement Officer will be engaged from the market, it should be ensured that some of the Government staff should also be involved as second line arrangement to address the issues of attrition and continuity of capacity;

(g) Appropriate and regular procurement training of selected procurement staff in "IFAD Procurement Guidelines" to enable efficient and effective project procurement actions;

(h) A Project Procurement Manual with adequate controls and safeguards, consistent with IFAD Procurement Guidelines and Procurement Handbook would be prepared by the Project. The manual shall include the adequate provision risk mitigation measures/safeguards; procurement planning; the processes and procedures; contract management and its controls and records retention. Guidelines for procurement involving community participation will also be included in this document. The manuals shall be subject to IFAD review and approval. The manual could be a stand-alone document or as a subset of the Project Implementation Manual.;

(i) Procurement plan for the initial 18 months of project implementation listing out all procurement activities to be taken up by the project consolidated at the State level to be prepared and submitted along with the first AWPB. For the subsequent years of implementation, procurement plans covering a 12-month period will be sufficient. The procurement plan will be updated at least semi-annually or as required to reflect the actual project implementation needs. All procurement plans and its revisions will have to be approved by IFAD. Any procurement undertaken which is not as per the approved plan will not be eligible for IFAD financing.

2. With the above measures put in place fully and effectively, the risk is mitigated to **Medium**. In addition, IFAD will field additional Implementation Support Missions during the initial year of the project to support and guide the project. It is also proposed that all critical procurement irrespective of value or selection method will be reviewed by IFAD in the first year of implementation.

E. Procurement arrangements under APDMP

10. Procurement. Procurement of goods, works and services under APDMP financed from resources provided or administered by IFAD will be undertaken in accordance with IFAD's

Procurement Guidelines and Handbook (dated September 2010) and as amended from time to time as an exception to the provisions of the General Conditions.

11. National Competitive Bidding, Shopping and Direct Contracting. Goods and Civil works a procured using NCB, Shopping and Direct Contracting will follow the procedures and processes defined in the Procurement Manual/Project Implementation Manual approved by Project Steering Committee and the IFAD. The PIM shall also include details of selection method to be applied in case of consultancies and services such as Quality and Cost Based Selection, Fixed Budget Selection, Least Cost Selection, Consultants Qualification Selection and Single Source Selection.

12. The procedures would be adapted and adopted in accordance with the provisions of IFAD Procurement Guidelines and the Procurement Handbook. Consistent with these Guidelines, the Programme Implementation Manual to be developed will have detailed processes, steps and documentation requirements to comply with the principles of public procurement.

13. **Standard Bidding Documents & Standard Contract:** Standard Bidding Documents are of paramount importance for transparency, speed of the process, increase competition and creation of capacity (standardization of procedures). The SBD to be used in all local open bidding processes would be described in the PIM and it should include: (i).Time to submit bid: minimum 30 days; (ii). Bids may be submitted by post or by hand; (iii) Budget: could be disclosed (if local legislation so requires); (iv). Clear instructions on how to buy bidding documents indicating address and price to buy the bidding documents. However, bidders who decide to submit a bid without having bought the bidding documents should not be disqualified, submitting their bids under their own risk; (v) Clarifications to bidding documents should be in writing only; (vi) Amendments to bidding documents should be advertised with the same procedure used for advertisement of bidding documents; (vii) Single envelope procedure for goods and works notwithstanding any other Government instructions/guidelines; (viii) Evaluation Criteria: the bid evaluation criteria should be non-discriminatory. It should be disclosed and rigorously quantified in monetary terms to define the “lowest evaluated bidder”. This allows to indisputably identify the lowest evaluated responsive bid. Quantifying bid evaluation criteria in monetary terms is the only method that leads to transparent evaluation and that allows bidders to submit an effective protest to the awarding authority.

14. The SPMU Cell in the Directorate of Agriculture, while developing the Procurement Manual (separately) or part of the PIM will refer to the Government of India Task Force concurred Manuals and the Bidding documents and contract templates of other multilateral donors. IFAD do not prescribe any SBD and would concur with the use of available templates adapted to project requirements, so long as they are consistent with IFAD Procurement Guidelines.

15. Procurement of goods under the rate contract of DGS&D will be considered as Local Shopping and these are to be undertaken within the Local Shopping thresholds prescribed by IFAD in its Letter to the Borrower. It is to be understood that procurement under DGS&D process will not be considered as National Competitive Bidding.

Procurement Plan

16. As provided in appendix I, paragraph 1 of IFAD’s Procurement Guidelines, IFAD review of and no objection to the consolidated procurement plan is compulsory and the 18 month procurement plan and subsequent annual procurement plans submitted by the PMU, APDMP must include as a minimum:

- A brief description of each procurement activity to be undertaken during the period and name of the implementing agency responsible for the procurement.;
- The estimate value of each procurement activity;
- The method of procurement to be adopted for each procurement activity and;
- The method of review IFAD will undertake for each procurement activity indicating either post review or prior review.

17. Any changes and amendments to the procurement plan shall be subject to IFAD’s No Objection.

Good governance framework

18. All procurement for goods, works and services financed from resources funded or administered by IFAD require bidding documents and the contracts to include a provision requiring suppliers, contractors and consultants ensure compliance with IFAD zero tolerance to anticorruption policy and to permit IFAD to inspect their accounts, records and other documents relating to the bid submission and contract performance, and to have them audited by IFAD-appointed auditors.

19. As part of the robust e-governance policy and framework of Government of Andhra Pradesh, PMU of APMDP will disclose the following minimum documents either in its Project Website or Directorate of Agriculture Website. i) Procurement plan and its revisions, ii) Procurement manual iii) invitation for bids for goods and works for all NCB contracts, iv) request for expression of interest for selection/hiring of consulting services, iv) contract awards of goods, works and all consultancy services, v) list of contracts following Direct Contracting or Single Source Selection (SSS), vi) short list of consultants, (vii) contract award of all consultancy services, and (viii) action taken report on the complaints received. In addition, the PMU Cell will also publish any information required under the provisions of suo-motu disclosure as specified by the Right to Information Act and the decisions of the State Information Commissioners applicable to project implementation.

Procurement involving community participation

20. Due to the nature of IFAD financed projects, there is a high degree of involvement of communities in the procurement activities. Communities would be empowered to undertake procurement as a service provider or an implementing unit through GP water sub-committees, Producer Organizations under a legal framework (Grant Agreement) for procurement below a threshold of USD 10,000 equivalent. The operational and implementation arrangement would be defined in the Project Implementation Manual which shall include implementation, administration, financial management and procurement related activities supported by clearly defined roles and responsibilities of the intermediaries who will assist these community organizations in performing the activities. Currently it is envisaged that the procurement through community organizations will be only for goods, small equipment, inputs and some water conservation/distribution structures.

F. Procurement Methods and Thresholds

21. Procurement of Goods and Works**.** Methods for procurement of goods/works as per thresholds is established as follows:

(b) Goods

i) National Competitive Bidding (NCB), for contract values greater than USD 25,000 equivalent.
ii) National shopping for contracts less than USD 25,000 up to USD 2,000 equivalent,
iii) Direct contracting for contracts below USD 2,000 equivalent
iv) Procurement involving community participation below a threshold of USD 10,000 equivalent through direct contracts or local shopping

(c) Works

i) National Competitive Bidding (NCB), for contract values greater than USD 50,000 equivalent.
ii) National shopping for contracts less than USD 50,000 and up to USD 2,000 equivalent
iii) Direct contracting for contracts below USD2,000 equivalent
iv) Procurement involving community participation below a threshold of USD 10,000 equivalent through direct contracts or local shopping

24. Consultancy and Services. Consulting service will include project management technical assistance, implementation support technical assistance for different components, conducting studies, mobilisation/establishment of community groups, technical training and strengthening of community groups, and monitoring and evaluation. Services would be provided by consulting firms and individual consultants.

i) Each contract for the selection of consultancy services estimated to cost USD 50,000 equivalent or above, shall be selected in accordance with the IFAD Procurement Guidelines following any one of the selection methods listed below:

- Quality and Cost Based Selection
- Fixed Budget Selection
- Least Cost Selection

ii) Each contract for the selection of consultancy services estimated to cost below USD50,000 equivalent, shall be selected in accordance with the IFAD Procurement Guidelines following any one of the selection methods listed below:

- Quality and Cost Based Selection
- Fixed Budget Selection
- Least Cost Selection
- Selection Based on Consultants Qualification
- Single Source Selection

25. **Selection of individual consultants**. Individual consultants are selected on the basis of their qualifications for the assignment of at least three candidates among those who have expressed interest in the assignment or have been approached directly by SPMU or DPMU. Individuals employed by the SPMU and the DPMU shall meet all relevant qualifications and shall be fully capable of carrying out the assignment. Capability is judged on the basis of academic background, experience and, as appropriate, knowledge of the local conditions, such as local language, culture, administrative system, and government organization.

26. Consultancy Services and Individuals consultants may be selected on a **sole-source basis** with due justification in exceptional cases such as: (a) tasks that are a continuation of previous work that the consultant has carried out and for which the consultant was selected competitively; (b) assignments lasting less than six months; (c) emergency situations resulting from natural disasters; and (d) when the individual consultant or consulting firm is the only consultant qualified for the assignment. All proposals for contracts on Sole Source basis will require IFAD's prior review. For facilitating IFAD's prior review, justification for resorting to SSS, the detailed proposal including budget from the sole source agency/institution or individual, recommendation and approval following the Department's internal approval procedures to be submitted to IFAD.

G. Review of Procurement Decisions by IFAD

27. IFAD will undertake to review the provisions for the procurement of good, works and services to ensure that the procurement process is carried out in conformity with its Procurement Guidelines. For the purposes of IFAD's Procurement Guidelines, the following procurement decisions shall be subject to prior review by the Fund for the award of any contract for goods, equipment, materials, works, consultancy and services under FARM.

i) Procurement of goods, materials and works

- Prequalification documents and shortlist when prequalification is undertaken;
- Bid Documents for goods, materials and works;
- Evaluation Report and Recommendation for Award; and
- Contract and amendments.

ii) Procurement of consultancy services and services

- Prequalification documents and shortlist when prequalification is undertaken;
- Request for Proposal;
- Technical evaluation report;
- Combined (technical and financial) evaluation report and the recommendation for award; and
- Contract and amendments.

28. Prior or Post Review. Except as IFAD may otherwise agree, the prior or post which applies to various procurement of good, works and consultant recruitments shall be defined as follows:

Procurement Method	Type of Review Prior or Post	Comments
Procurement of Goods and Works		
ICB Works and Goods	Prior	All Contracts
NCB Works and Goods	Prior	Except procurement valued below USD 100,000
Shopping for works (quotations)	Post	
Shopping for goods (quotations)	Post	
Direct Works	Prior	Except procurement valued below USD 2,000
Direct Goods	Prior	Except procurement valued below USD 2,000
Recruitment of Consulting Firms		
Quality and Cost-Based Selection (QCBS)	Prior	Except procurement valued below USD 50,000
Fixed Budged Selection (FBS)	Prior	Except procurement valued below USD 50,000
Least Cost Selection (LCS)	Prior	Except procurement valued below USD 50,000
Selection Based of Consultants Qualification	Prior	Except procurement valued below USD 50,000
Sole Source Selection (SSS)	Prior	All contracts
Recruitment of Individual Consultants		
Individual Consultants	Prior	Except procurement valued below USD 20,000

Attachment: Procurement Plan for First 18 months

Draft Procurement Plan for Goods

	SL No.	Package No.	Review by Bank Prior/Post	Description of Works/Goods	Estimated Cost (Local Currency) In INR	Method of Procurement	Design/ Investigation/Specs. Completed (Date)	Final Estimate Prepared & Sanctioned (Date and Value) INR	Finalization of Bidding Document (Date)	IFAD's No Objection to Bidding Document (Date)**	Bids		Contract Award decided (Date/Value/ Currency)	IFAD's No Objection to Contract Award (Date)**
											Invitation (Date)	Opened on (Date)		
	1	2		3	4	5	6	7	8	9	10	11	12	13
Component 1 - Climate Resielient Production Systems														
*PP	1	G1	Post	Computers and printers (90 sets) for Climate Information Centre	45,00,000.00	LCB	1-9-17	5-9-17	10-9-17	NA	14-9-17	14-10-17	17-10-17	NA
R														
A														
*PP	2	G2	Post	Furniture sets (90) for Climate Information Centre	18,00,000.00	LS	1-9-17	5-9-17	10-9-17	NA	10-9-17	25-9-17	28-9-17	NA
R														
A														
*PP	3	G3	Post	235 Tablet computers for data monitoring	32,90,000.00	LCB	1-9-17	5-9-17	10-9-17	NA	14-9-17	14-10-17	17-10-17	na
R														
A														
*PP	4	G4	Post	60 low cost soil testing kits to be given to mobile testing labs	6,00,000.00	LS	1-10-17	10-10-17	15-10-17	NA	17-10-17	1-11-17	5-11-17	NA
R														
A														
*PP	5	G5	Post	Lining of farm ponds (990 nos) to be executed by CBOs (RIDF financing)	53,46,000.00	CPS		1-12-17	NA	NA	NA			NA
R														
A														
*PP	6	G6	post	60 Micro irrigation pumps (RIDF Financing) (by District ATMA)	30,00,000.00	LS	1-11-17	5-11-17	10-11-17	NA	12-11-17	27-11-17	29-11-17	NA
R														
A														
*PP	7	G7	post	105 Equipment kits		LS	1-7-17	5-7-17	10-7-17	NA	12-7-17	27-7-17	31-7-17	NA

	SL No.	Package No.	Review by Bank Prior/Post	Description of Works/Goods	Estimated Cost (Local Currency) In INR	Method of Procurement	Design/ Investigation/Specs. Completed (Date)	Final Estimate Prepared & Sanctioned (Date and Value) INR	Finalization of Bidding Document (Date)	IFAD's No Objection to Bidding Document (Date)**	Bids		Contract Award decided (Date/Value/ Currency)	IFAD's No Objection to Contract Award (Date)**
											Invitation (Date)	Opened on (Date)		
	1	2		3	4	5	6	7	8	9	10	11	12	13
R				for Pashu Sakhis (Spring scales, castration devices, other misc items)	21,00,000.00									
A														
*PP	8	G8	post	60 Chaffers for support to feed and fodder	24,00,000.00	LS	1-7-17	5-7-17	10-7-17	NA	12-7-17	27-7-17	31-7-17	NA
R														
A														
*PP	9	G9	Post	1500 farm equipment sets for preparation of bio-inputs (to be executed by CBOs)	30,00,000.00	LS	1-11-17	5-11-17	10-11-17	NA			17-11-17	
R														
A														
*PP	10	G10	post	16 nos. water quality testing equipments (8 under RIDF and 8 under IFAD)	24,00,000.00	LCB	1-12-17	5-12-17	8-12-17	NA	10-12-17	10-1-18	17-1-18	NA
R														
A														
*PP	11	G11	post	14 computers and printers for State PMU	7,00,000.00	LCB	1-5-17	5-5-17	10-5-17	NA	14-5-17	14-6-17	17-6-17	NA
R														
A														
*PP	12	G12	post	40 computers and printers for 5 district ATMA	20,00,000.00	LCB	1-5-17	5-5-17	10-5-17	NA	14-5-17	14-6-17	17-6-17	NA
R														
A														
*PP	13	G13	post	6 licenses of Accounting Software (Tally or equivalent)	1,20,000.00	Direct		15-3-17	15-3-17				17-3-17	
R														
A														

	SL No.	Package No.	Review by Bank Prior/Post	Description of Works/Goods	Estimated Cost (Local Currency) In INR	Method of Procurement	Design/ Investigation/Specs. Completed (Date)	Final Estimate Prepared & Sanctioned (Date and Value) INR	Finalization of Bidding Document (Date)	IFAD's No Objection to Bidding Document (Date)**	Bids		Contract Award decided (Date/Value/ Currency)	IFAD's No Objection to Contract Award (Date)**
											Invitation (Date)	Opened on (Date)		
	1	2		3	4	5	6	7	8	9	10	11	12	13
*PP	14	G14	post	16 sets of office furniture for State PMU	1,92,000.00	LS	1-3-17	5-3-17	8-3-17	NA	10-3-17	20-3-17	22-3-17	
R														
A														
*PP	15	G15	post	40 sets of office furniture for each of District ATMA offices	4,00,000.00	LS	1-3-17	5-3-17	8-3-17	NA	10-3-17	20-3-17	22-3-17	
R														
A														
*PP	16	G16	post	Multifunction B&W Photocopier (A4 and A3 size) 1 unit for State PMU	2,00,000.00	LCB		15-4-17	20-4-17	NA	22-4-17	24-5-17	30-5-17	NA
R														
A														
*PP	17	G17	post	5 Multifunction B&W Photocopier (A4 and A3) 1 unit each for 5 District ATMA	10,00,000.00	LCB		15-4-17	20-4-17	NA	22-4-17	24-5-17	30-5-17	NA
R														
A														
*PP	18	G18	Post	6 LCD Projectors, 7 High Resolution Digital Cameras, 7 Video Cameras	14,00,000.00	LCB		15-4-17	20-4-17	NA	22-4-17	24-5-17	30-5-17	NA
R														
A														
Total for Goods					**248,58,000.00**									

Procurement of Services

	SL No.	Package No.	Review by Bank Prior/Post	Description of Works/Goods	Estimated Cost (Local Currency) In INR	Method of Procurement	Design/ Investigation/Specs. Completed (Date)	Final Estimate Prepared & Sanctioned (Date and Value) INR	Finalization of Bidding Document (Date)	IFAD's No Objection to Bidding Document (Date)**	Bids		Contract Award decided (Date/Value/Currency) INR	IFAD's No Objection to Contract Award (Date)**
											Invitation (Date)	Opened on (Date)		
	1	2		3	4	5	6	7	8	9	10	11	12	13
Component 3 - Lesson Learning and Management														
*PP	1	S1	Post	Renting of PMU office space (if not available in existing Government premises) 1 year rental	720000.00	LCS		1-12-16	1-12-16	NA	5-12-16	27-12-16	15-1-17	NA
R														
A														
*PP	2	S2	Post	Renting of District ATMA office space in 5 districts (if not available in existing Government premises). Each District will separately hire.	2400000.00	LCS		1-12-16	1-12-16	NA	5-12-16	27-12-16	15-1-17	NA
R														
A														
*PP	3	S3	Post	Hiring of Vehicle for PMU from April 2017 to March 2018	720000.00	LCS		15-2-17	20-2-17	NA	22-2-17	15-3-17	25-3-17	
R														
A														
*PP	4	S4	Post	Hiring of Vehicle for District ATMA from April 2017 to March 2018 (Each District will undertake procurement separately)	72,00,000.00	LCS		15-2-17	20-2-17	NA	22-2-17	15-3-17	25-3-17	
R														
A														
*PP	5	S5	Post	Hiring enumerators for in house studies	2,50,000.00	LCS		15-12-17	20-12-17	NA	22-2-18	15-3-18	25-3-18	
R														
A														
				Total	**112,90,000.00**									

Procurement of Consultancy Services

	SL No.	Package No.	Review by IFAD Prior/Post	Description of Services	Estimated Cost (INR)	Method of Selection	Advertising for EOI (Date)	TOR/ Shortlist Finalized (Date)	RFP Final Draft forwarded to IFAD (Date)**	IFAD's No Objection for TOR Shortlist/ Final REP (Date)**	RFP Issued (Date)	Proposals Received by the Project Authorities (Date)	Evaluation Finalized (Technical /# Combined/ Draft Contract/Final Contract) (Date)	Contract Award decided (Date)	IFAD's No Objection (Technical /# Combined/Draft Contract/Final Contract) (Date)**
	1	2		3	4	5	6	7	8	9	10	11	12	13	14
Component 1 - Climate Resilient Cropping Systems															
*PP	1	C1	Prior	Hiring an agency or institution for curriculum development for Livestock capacity building	15,00,000.00	CQS	1-10-17	25-10-17	27-10-17	5-11-17	6-11-17	30-11-17	15-12-17	17-12-17	22-12-17
R															
A															
*PP	2	C2	Prior	Hiring an Individual Consultant for Market Studies	3,00,000.00	IC		25-10-17	27-10-17	5-11-17	6-11-17	30-11-17	15-12-17	17-12-17	22-12-17
R															
A															
*PP	1	C3	Prior	Engaging 5 District Facilitation Agencies for implementation and support (1 year cost)	1407,20,000.00	FBS	1-10-16		25-10-16	5-11-16	6-11-16	10-12-17	15-1-17	15-2-17	10-3-17
R															
A															
Component 2 - Drought Proofing through NRM and Governance															
*PP	3	C4	Prior	Engaging NGPRI for Pilot Hydrogeological Mapping (NGPRI is a GoI Agency and no other service providers are available for this type of assignment)	6,00,00,000	SSS			1-6-17	6-6-17	NA			15-6-17	
R															
A															

	SL No.	Package No.	Review by IFAD Prior/Post	Description of Services	Estimated Cost (INR)	Method of Selection	Advertising for EOI (Date)	TOR/ Shortlist Finalized (Date)	RFP Final Draft forwarded to IFAD (Date)**	IFAD's No Objection for TOR Shortlist/ Final REP (Date)**	RFP Issued (Date)	Proposals Received by the Project Authorities (Date)	Evaluation Finalized (Technical /# Combined/ Draft Contract/Final Contract) (Date)	Contract Award decided (Date)	IFAD's No Objection (Technical /# Combined/Draft Contract/Final Contract) (Date)**
	1	2		3	4	5	6	7	8	9	10	11	12	13	14
Component 3 - Learning and Management															
*PP	4	C5	Prior	Engaging Lead Technical Agency (1 year cost)	128,77,000.00	SSS			30-9-16	7-10-16				15-10-16	20-10-16
R															
A															
*PP	5	C6	Prior	Engaging institution for conducting Baseline Survey of APDMP	20,00,000.00	QCBS	1-10-16	25-10-16	26-10-16	5-11-16	8-11-16	15-12-16	20-1-17	22-1-17	5-2-17
R															
A															
*PP	6	C7	Post	Engaging Knowledge Partner for customising Accounting Software for financial reports	10,00,000.00	SSS			15-4-17	20-4-17				22-4-17	30-4-17
R															
A															
*PP	7	C8	Post	Engaging Individual Consultant for short term technical assistance	80,000.00	IC	15-6-17	30-6-17	NA	NA	NA	NA		2-7-17	NA
R															
A															
*PP	8	C9	Prior	Engaging an agency for MIS Development	10,00,000.00	QCBS	1-10-16	25-10-16	26-10-16	5-11-16	8-11-16	15-12-16	20-1-17	22-1-17	5-2-17
R															
A															
*PP	9	C10	Prior	International Technical Assistance	84,00,000.00	SSS		15-4-17	N/A	25-4-17	N/A	15-5-17	31-5-17	5-6-17	10-6-17
R															
A															
				Total	**1678,77,000.00**										

Appendix 9: Project Costs and Financing[54]

A. Main assumptions

1. This Appendix describes the key assumptions underlying the estimation of Project costs and its financing plan. The Project is designed for implementation over a seven year period starting from the fiscal year 2017/18. Accordingly the costab tables, which are generated using Costab version 3.2, are presented in fiscal years, rather than in calendar years.

2. **Unit Costs**: Unit costs together with physical units have been identified for most items. In certain instances a lump sum allocations have been computed so as to give flexibility in procurement or for the implementation of such activity/task. It is noted that "all unit costs are indicative and are used for the purposes of estimating the overall project costs. These are, therefore, subject to changes and revision during project implementation and also at the time of preparing Annual Work Plans and Budgets". All unit costs are in domestic currency unit, ie, INR, Indian Rupees.

3. **Physical and Price Contingencies**: As the current domestic inflation rate is 5%, price contingencies assumed at a constant rate of 5%, with foreign inflation rate assumed to be 2%. Price contingencies have been applied to all items.

4. **Exchange Rates**: The exchange rate for the analysis has been set at Indian Rupees (INR) 70[55] to one USD. This is the forecast rate for the duration of the implementation period.

5. **Taxes and Duties**: Taxes and duties have been estimated using the prevailing rates in May 2016 and applied to the expenditure categories "Works"(12.5%) and "Goods, Inputs and Services" (5%). It is assumed that such items will be procured or purchased nationally. Consulting services, surveys and studies are contracted or sourced out and contracted entities are responsible of their national tax liabilities. Taxes and duties will be foregone by GoI/GoAP and therefore accounted for as GoI/GoAP contribution to the project.

6. **Project costab account categories**: Procurement, disbursement and expenditure accounts have identical nomenclature in the project COSTAB accounts. Expenditure accounts conform to the standard categories of expenditures established by IFAD in August 2013. Following are the costab accounts for the project:

Table 1: Project costab accounts

Procurement Accounts	Disbursement Accounts	Expenditure Accounts
Works_PA	Works_DA	Works_EA
Training and capacity building_PA	Training and capacity building_DA	Training and capacity building_EA
Consultancies, studies & TA_PA	Consultancies, studies & TA_DA	Consultancies, studies & TA_EA
Goods, services & inputs_PA	Goods, services & inputs_DA	Goods, services & inputs_EA
Grants and subsidies_PA	Grants and subsidies_DA	Grants and subsidies_EA
Salaries and allowances_PA	Salaries and allowances_DA	Salaries and allowances_EA
Office operating costs_PA	Office operating costs_DA	Office operating costs_EA

7. **Project Costtab Tables:** The Project has three components namely: (a) climate resilient production systems; (b) drought proofing through NRM and governance; and (c) lesson learning and project management. There are one or more sub-components under each component and therefore separate cost tables were prepared for each sub-component as listed in Table-2 below.

[54] File: "APDMP6.tab" Prepared by A M Alam, IFAD Consultant

[55] Based on forecasts by Economist Intelligence Unit for India for the period 2017 to 2022; The actual exchange rate at the time of the design mission was INR 67 = USD 1.

Table-2: Components and sub-components		
Project Components	Project sub-components	Table Ref #
1. Climate resilient production systems	1.1 Crop production systems	1.1
	1.2 Livestock production systems	1.2
	1.3 Farmer organisations	1.3
	1.4 Field facilitation	1.4
2. Drought proofing through NRM and governance	2.1 Improving dairy productivity	2.1
3. Lesson learning and project management	3.1 Lesson learning and project management	3.1

8. Project coordination and management: Overall implementation responsibility rests with the Programme Management Unit to be set up in Vijayawada supported by 5 District Project management units.

B. Project costs

9. **Project Costs by Project Components**: Total Project Costs are estimated at USD 151.89 million. Project costs by components are: (i) Climate Resilient Production Systems (73% of total baseline costs); (ii) Drought proofing through NRM and governance (22% of total base costs); and (iii) Lesson learning and project management (5% of estimated baseline costs). Overall physical and price contingencies are estimated at 4% and 7%, respectively. Project baseline costs together with contingencies are summarised in Table-3 below.

Table 3: Project costs by Component (INR and USD, 000)

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMP

Components Project Cost Summary	**(INR '000) Total**	**(US$ '000) Total**	**% Total Base Costs**
A. Climate Resilient Production Systems			
Crop production systems	3,916,400	55,949	40
Livestock Production Systems	500,388	7,148	5
Farmer Organisations	1,432,850	20,469	15
Field Facilitation	1,219,569	17,422	13
Subtotal Climate Resilient Production Systems	7,069,208	100,989	73
B. Drought Proofing through NRM and Governance	2,145,549	30,651	22
C. Lesson learning and Project management	527,736	7,539	5
Total BASELINE COSTS	9,742,493	139,178	100
Physical Contingencies	362,082	5,173	4
Price Contingencies	1,381,180	7,546	5
Total PROJECT COSTS	11,485,756	151,897	109

Detailed cost estimates are provided in Annex-1 and the summary cost tables in Annex-2

10. Project Costs by investment and recurrent costs: Total investment costs are estimated at USD 145.99 million and these accounts for about 96% of the total project costs and the balance, USD 5.9 million are recurrent costs. Goods, services and inputs accounts for 52%, civil works account for 24%, followed by consultancies, studies and TA (16%), training and capacity building (3%) and grants and subsidies 1% of the total project costs. The recurrent costs include salaries and allowances and office operating costs account for 4% of the total estimated cost. Refer to Table 4 below for details.

Table 4: Investment and Recurrent costs by expenditure category (USD 000)

ANDHARA PRADESH DOUGHT MITIGATION PRO **Expenditure Accounts by Components - Totals Ir** (US$ '000)	**Climate Resilient Production Systems**				**Drought Proofing through NRM and Governance**	**Lesson learning and Project management**	**Total**
	Crop production systems	**Livestock Production Systems**	**Farmer Organisations**	**Field Facilitation**			
I. Investment Costs							
A. Works	18,564	-	-	-	17,137	-	35,701
B. Training and capacity building	1,523	2,635	-	-	20	154	4,332
C. Consultancies, studies & TA	-	525	24	19,621	1,620	3,029	24,819
D. Goods Services and Inputs	40,316	4,776	22,492	-	11,687	147	79,418
E. Grants and Subsidies	1,726	-	-	-	-	-	1,726
Total Investment Costs	62,128	7,937	22,516	19,621	30,465	3,330	145,996
II. Recurrent Costs							
A. Salaries and allowances	-	-	-	-	-	4,087	4,087
B. Office operating costs	-	-	-	-	847	967	1,814
Total Recurrent Costs	-	-	-	-	847	5,054	5,901
Total PROJECT COSTS	62,128	7,937	22,516	19,621	31,312	8,384	151,897

C. Project financing

11. The proposed financiers for the Project are IFAD, RIDF (NABARD), the Government of Andhra Pradesh, NREGA, RKVY and beneficiaries. IFAD will finance about USD 75.5 million about 49.7% of total project costs, RIDF funding will be 6.2 million, the government counterpart funding will be about USD 15.0 million equivalents including taxes and duties and staff salaries for the staff seconded from the government, the beneficiaries USD 10.27 million equivalents. Taxes and duties account for USD 5.5 million equivalents.

12. Recurrent Costs to be borne by GoAP include staff seconded from GoAP. IFAD will finance all expenditure types within Investment Costs. NREGS will support the cost of labour for works only, whereas RKVY will cover costs for micro-irrigation and Goods, Input and Services for farms demonstrations. Beneficiaries will receive grants and inputs on a co-sharing basis and provide labour for works when required. They will also contribute equity capital for FPOs. Project Components by Financier are shown in Table-5 below.

Table 5: Project financing plan by financier and component (USD 000)

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT
Components by Financiers
(US$ '000)

	IFAD		**RIDF**		**GOAP**		**NREGS**		**RKVY**		**Beneficiary**		**Total**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
A. Climate Resilient Production Systems														
Crop production systems	30,375	48.9	3,505	5.6	6,369	10.3	19,190	30.9	-	-	2,689	4.3	62,128	40.9
Livestock Production Systems	6,728	84.8	556	7.0	497	6.3	-	-	-	-	156	2.0	7,937	5.2
Farmer Organisations	10,208	45.3	1,398	6.2	1,246	5.5	-	-	2,886	12.8	6,778	30.1	22,516	14.8
Field Facilitation	16,678	85.0	-	-	2,943	15.0	-	-	-	-	-	-	19,621	12.9
Subtotal Climate Resilient Production Systems	63,989	57.0	5,459	4.9	11,055	9.9	19,190	17.1	2,886	2.6	9,623	8.6	112,202	73.9
B. Drought Proofing through NRM and Governance	6,149	19.6	721	2.3	884	2.8	23,102	73.8	-	-	455	1.5	31,312	20.6
C. Lesson learning and Project management	5,293	63.1	-	-	3,090	36.9	-	-	-	-	-	-	8,384	5.5
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0

13. **Disbursement Accounts and financing rules**: The disbursement accounts and the financing rules (total allocation net of taxes) set for each of the disbursement accounts for IFAD are summarised in Table-6 below.

Table 6: Project financing plan by financier and component (USD 000)

Disbursement Accounts by Financiers
(US$ '000)

	IFAD		**RIDF**		**GOAP**		**NREGS**		**RKVY**		**Beneficiary**		**Total**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
1. Works	2,420	6.8	613	1.7	2,457	6.9	29,105	81.5	-	-	1,106	3.1	35,701	23.5
2. Training and capacity buidling	4,326	99.9	-	-	6	0.1	-	-	-	-	-	-	4,332	2.9
3. Consultancies, studies and TA	21,268	85.7	-	-	3,551	14.3	-	-	-	-	-	-	24,819	16.3
4. Goods Services and Inputs	43,312	54.5	4,936	6.2	6,126	7.7	13,187	16.6	2,886	3.6	8,972	11.3	79,418	52.3
5. Grants and Subsidies	1,023	59.3	631	36.6	72	4.2	-	-	-	-	-	-	1,726	1.1
6. Salaries and Allowances	1,450	35.5	-	-	2,637	64.5	-	-	-	-	-	-	4,087	2.7
7. Office operating costs	1,632	90.0	-	-	181	10.0	-	-	-	-	-	-	1,814	1.2
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0

ANNEX-1: SUMMARY COST TABLES

PROCUREMENT ARRANGEMENTS BY YEAR

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PI
Procurement Arrangements
(US$ '000)

	Procurement Method											
	Local Competitive Bidding	**Consulting Services**	**Consulting Services: QCBS**	**Consulting Services: FB**	**Consulting Services: LCS**	**Consulting Services: CQ**	**Shopping**	**Local Shopping**	**Direct Contracting**	**Community Participation in Procurement**	**N.B.F.**	**Total**
A. Civil works	5	-	-	-	-	-	7,505	-	-	35,696	-	43,206
B. Training & capacity building	-	-	209	10	-	16	321	-	-	-	-	556
C. Consultancies, studiees and TA	-	12	19,652	24	782	118	525	-	3,313	-	-	24,425
D. Goods, services and inputs	21,099	-	1,141	1,630	-	291	22,334	-	4,806	26,508	-	77,809
E. Goods and subsidies	-	-	-	-	-	-	-	-	-	-	-	
F. Salaries and allowances	-	1,611	-	-	-	-	-	-	-	-	2,476	4,087
G. Office operating costs	-	-	-	-	-	-	-	1,814	-	-	-	1,814
Total	21,104	1,623	21,002	1,663	782	425	30,685	1,814	8,119	62,204	2,476	151,897
	-	-	-	-	-	-	-	-	-	-	-	-

DISBURSEMENT ACCOUNTS BY FINANCIERS

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PRO
Disbursement Accounts by Financiers

(US$ '000)	IFAD		RIDF		GOAP		NREGS		RKVY		Beneficiary		Total		Local (Excl. Taxes)	Duties & Taxes
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%		
1. Works	2,420	6.8	613	1.7	2,457	6.9	29,105	81.5	-	-	1,106	3.1	35,701	23.5	33,297	2,404
2. Training and capacity buidling	4,326	99.9	-	-	6	0.1	-	-	-	-	-	-	4,332	2.9	4,332	-
3. Consultancies, studies and TA	21,268	85.7	-	-	3,551	14.3	-	-	-	-	-	-	24,819	16.3	19,215	-
4. Goods Services and Inputs	43,312	54.5	4,936	6.2	6,126	7.7	13,187	16.6	2,886	3.6	8,972	11.3	79,418	52.3	68,707	3,112
5. Grants and Subsidies	1,023	59.3	631	36.6	72	4.2	-	-	-	-	-	-	1,726	1.1	1,726	-
6. Salaries and Allowances	1,450	35.5	-	-	2,637	64.5	-	-	-	-	-	-	4,087	2.7	4,087	-
7. Office operating costs	1,632	90.0	-	-	181	10.0	-	-	-	-	-	-	1,814	1.2	1,814	-
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0	133,178	5,516

COMPONENTS BY FINANCIERS

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMF
Components by Financiers

(US$ '000)	IFAD		RIDF		GOAP		NREGS		RKVY		Beneficiary		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. Climate Resilient Production Systems														
Crop production systems	30,375	48.9	3,505	5.6	6,369	10.3	19,190	30.9	-	-	2,689	4.3	62,128	40.9
Livestock Production Systems	6,728	84.8	556	7.0	497	6.3	-	-	-	-	156	2.0	7,937	5.2
Farmer Organisations	10,208	45.3	1,398	6.2	1,246	5.5	-	-	2,886	12.8	6,778	30.1	22,516	14.8
Field Facilitation	16,678	85.0	-	-	2,943	15.0	-	-	-	-	-	-	19,621	12.9
Subtotal Climate Resilient Production Systems	63,989	57.0	5,459	4.9	11,055	9.9	19,190	17.1	2,886	2.6	9,623	8.6	112,202	73.9
B. Drought Proofing through NRM and Governance	6,149	19.6	721	2.3	884	2.8	23,102	73.8	-	-	455	1.5	31,312	20.6
C. Lesson learning and Project management	5,293	63.1	-	-	3,090	36.9	-	-	-	-	-	-	8,384	5.5
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0

EXPENDITURE ACCOUNTS BY FINANCIERS

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PRC
Expenditure Accounts by Financiers

(US$ '000)	IFAD		RIDF		GOAP		NREGS		RKVY		Beneficiary		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
I. Investment Costs														
A. Works	2,420	6.8	613	1.7	2,457	6.9	29,105	81.5	-	-	1,106	3.1	35,701	23.5
B. Training and capacity building	4,326	99.9	-	-	6	0.1	-	-	-	-	-	-	4,332	2.9
C. Consultancies, studies & TA	21,268	85.7	-	-	3,551	14.3	-	-	-	-	-	-	24,819	16.3
D. Goods Services and Inputs	43,312	54.5	4,936	6.2	6,126	7.7	13,187	16.6	2,886	3.6	8,972	11.3	79,418	52.3
E. Grants and Subsidies	1,023	59.3	631	36.6	72	4.2	-	-	-	-	-	-	1,726	1.1
Total Investment Costs	72,349	49.6	6,180	4.2	12,211	8.4	42,292	29.0	2,886	2.0	10,078	6.9	145,996	96.1
II. Recurrent Costs														
A. Salaries and allowances	1,450	35.5	-	-	2,637	64.5	-	-	-	-	-	-	4,087	2.7
B. Office operating costs	1,632	90.0	-	-	181	10.0	-	-	-	-	-	-	1,814	1.2
Total Recurrent Costs	3,082	52.2	-	-	2,819	47.8	-	-	-	-	-	-	5,901	3.9
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0

PROCUREMENT ACCOUNTS BY FINANCIERS

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PRC
Procurement Accounts by Financiers

(US$ '000)	IFAD		RIDF		GOAP		NREGS		RKVY		Beneficiary		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Civil works	7,838	18.1	1,574	3.6	3,583	8.3	29,105	67.4	-	-	1,106	2.6	43,206	28.4
2. Training & capacity building	499	89.7	-	-	57	10.3	-	-	-	-	-	-	556	0.4
3. Consultancies, studiees and TA	20,933	85.7	-	-	3,492	14.3	-	-	-	-	-	-	24,425	16.1
4. Goods, services and inputs	43,079	55.4	4,606	5.9	5,079	6.5	13,187	16.9	2,886	3.7	8,972	11.5	77,809	51.2
5. Goods and subsidies	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Salaries and allowances	1,450	35.5	-	-	2,637	64.5	-	-	-	-	-	-	4,087	2.7
7. Office operating costs	1,632	90.0	-	-	181	10.0	-	-	-	-	-	-	1,814	1.2
Total PROJECT COSTS	75,432	49.7	6,180	4.1	15,030	9.9	42,292	27.8	2,886	1.9	10,078	6.6	151,897	100.0

COMPONENTS PROJECT COST SUMMARY

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMF

Components Project Cost Summary	**(INR '000) Total**	**(US$ '000) Total**	**% Total Base Costs**
A. Climate Resilient Production Systems			
Crop production systems	3,916,400	55,949	40
Livestock Production Systems	500,388	7,148	5
Farmer Organisations	1,432,850	20,469	15
Field Facilitation	1,219,569	17,422	13
Subtotal Climate Resilient Production Systems	7,069,208	100,989	73
B. Drought Proofing through NRM and Governance	2,145,549	30,651	22
C. Lesson learning and Project management	527,736	7,539	5
Total BASELINE COSTS	9,742,493	139,178	100
Physical Contingencies	362,082	5,173	4
Price Contingencies	1,381,180	7,546	5
Total PROJECT COSTS	11,485,756	151,897	109

EXPENDITURE ACCOUNTS PROJECT COST SUMMARY

INDIA ANDHARA PRADESH DOUGHT MITIGATION PRC **Expenditure Accounts Project Cost Summary**	**(INR '000)** **Total**	**(US$ '000)** **Total**	**% Total Base Costs**
I. Investment Costs			
A. Works	2,357,481	33,678	24
B. Training and capacity building	273,049	3,901	3
C. Consultancies, studies & TA	1,554,711	22,210	16
D. Goods Services and Inputs	5,070,159	72,431	52
E. Grants and Subsidies	120,800	1,726	1
Total Investment Costs	9,376,201	133,946	96
II. Recurrent Costs			
A. Salaries and allowances	253,422	3,620	3
B. Office operating costs	112,871	1,612	1
Total Recurrent Costs	366,293	5,233	4
Total BASELINE COSTS	9,742,493	139,178	100
Physical Contingencies	362,082	5,173	4
Price Contingencies	1,381,180	7,546	5
Total PROJECT COSTS	11,485,756	151,897	109

PROJECT COMPONENTS BY YEAR

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMF
Project Components by Year -- Totals Including Contingencies
(US$ '000)

	Totals Including Contingencies							
	17/18	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**Total**
A. Climate Resilient Production Systems								
Crop production systems	2,430	9,480	15,171	15,383	13,978	5,576	111	62,128
Livestock Production Systems	703	1,776	2,188	1,437	1,133	641	58	7,937
Farmer Organisations	968	3,632	6,965	6,543	2,891	1,517	-	22,516
Field Facilitation	2,132	2,899	2,957	3,017	3,077	3,138	2,401	19,621
Subtotal Climate Resilient Production Systems	6,232	17,788	27,281	26,380	21,079	10,873	2,569	112,202
B. Drought Proofing through NRM and Governance	1,449	3,715	8,171	8,838	6,560	2,524	55	31,312
C. Lesson learning and Project management	993	1,376	1,253	1,225	1,251	1,142	1,143	8,384
Total PROJECT COSTS	8,675	22,879	36,705	36,443	28,890	14,538	3,767	151,897

EXPENDITURE ACCOUNTS BY YEAR, INCLUDING CONTINGENCIES

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PRO
Expenditure Accounts by Years -- Totals Includin
(US$ '000)

	Totals Including Contingencies							
	17/18	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**Total**
I. Investment Costs								
A. Works	921	4,105	8,517	9,693	9,311	3,154	-	35,701
B. Training and capacity building	501	969	925	850	668	363	55	4,332
C. Consultancies, studies & TA	3,699	3,762	3,653	3,675	3,706	3,612	2,713	24,819
D. Goods Services and Inputs	2,803	12,756	22,306	20,958	14,026	6,366	203	79,418
E. Grants and Subsidies	183	454	381	325	220	163	-	1,726
Total Investment Costs	8,107	22,047	35,782	35,501	27,930	13,658	2,972	145,996
II. Recurrent Costs								
A. Salaries and allowances	412	583	594	606	618	631	643	4,087
B. Office operating costs	156	250	329	335	342	249	152	1,814
Total Recurrent Costs	568	833	923	941	960	880	795	5,901
Total PROJECT COSTS	8,675	22,879	36,705	36,443	28,890	14,538	3,767	151,897

ANNEX-2: DETAILED COST TABLES

Abbreviations used in detailed cost tables (disbursement categories)

CON	Consultancies, studies and technical assistance
GS	Grants and subsidies
GSI	Goods, services and inputs
O&M	Operations and maintenance
TCB	Training and capacity building
SAA	Salaries and allowances
Works	Civil works

Sub-component 1.1: Crop production system

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APL
Table 1.1. Crop production systems

Detailed Costs	Unit	Quantities							Total	Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24				17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
A. Climate information centre																					
Participatory Planning and preparing plan documents	Cluster	75	165	90	-	-	-	-	330	100,000	1,429	114	255	142	-	-	-	-	510	TCB_DA	IFAD (100%)
Climate Info Centre equipment, RIDF	Unit	15	30	15	-	-	-	-	60	100,000	1,429	23	46	24	-	-	-	-	93	GSI_DA	RIDF (95%)
Climate Info Centre equipment, IFAD	Unit	75	120	75	-	-	-	-	270	100,000	1,429	114	185	118	-	-	-	-	417	GSI_DA	IFAD (85%)
Tablet computers, RIDF	each	90	90	-	-	-	-	-	180	14,000	200	19	19	-	-	-	-	-	39	GSI_DA	RIDF (85%)
Tablet computers, IFAD	each	100	450	260	-	-	-	-	810	14,000	200	21	97	57	-	-	-	-	176	GSI_DA	IFAD (85%)
Climate Info Centre - operation (rent, office, maint)	Year	75	240	330	330	330	180	-	1,485	120,000	1,714	136	445	624	637	649	361	-	2,853	GSI_DA	IFAD (85%)
CLIC facilitator	Year	75	240	330	330	255	90	-	1,320	120,000	1,714	136	445	624	637	502	181	-	2,525	GSI_DA	IFAD (85%)
Subtotal Climate information centre												563	1,494	1,589	1,273	1,151	542	-	6,613		
B. Extension service provision																					
1. Farmer Field school																					
Training of staff facilitator /a	batch	5	6	-	-	-	-	-	11	2,402,600	34,323	182	223	-	-	-	-	-	405	GSI_DA	IFAD (85%)
FFS facilitated by Staff /b	FFS	-	396	660	660	660	264	-	2,640	43,580	623	-	267	453	462	472	192	-	1,847	GSI_DA	IFAD (85%)
FFS facilitated by farmers /c	FFS	-	-	297	495	495	495	198	1,980	24,460	349	-	-	115	195	199	203	83	793	GSI_DA	IFAD (85%)
Support to farmers to continue FFS activities	FFS	-	398	957	1,155	1,155	759	198	4,622	3,000	43	-	18	45	56	57	38	10	224	GSI_DA	IFAD (85%)
Subtotal Farmer Field school												182	508	613	713	727	433	93	3,269		
2. Extension service provision																					
Allowance for Community Resource Persons	pers_day	-	15,000	33,000	33,000	33,000	18,000	-	132,000	400	6	-	93	208	212	216	120	-	850	GSI_DA	IFAD (85%)
Exposure and training visits	Person	500	3,000	6,600	6,600	3,100	-	-	19,800	3,200	46	24	148	333	340	163	-	-	1,008	TCB_DA	IFAD (100%)
Subtotal Extension service provision												24	241	541	552	379	120	-	1,858		
Subtotal Extension service provision												206	749	1,154	1,265	1,106	553	93	5,126		
C. Support to Adaptive research and demonstrations																					
On-farm trials and demonstrations	each	-	396	957	1,155	1,155	799	198	4,660	5,000	71	-	31	75	93	95	67	17	377	GSI_DA	IFAD (85%)
Fund for innovation and pilot testing	Lumpsum	-	0.2	0.3	0.3	0.2	-	-	1	20,000,000	285,714	-	57	86	86	57	-	-	286	GS_DA	IFAD (100%)
Internships	Number	-	1	1	1	1	1	1	6	50,000	714	-	1	1	1	1	1	1	5	TCB_DA	IFAD (100%)
Subtotal Support to Adaptive research and demonstrations												-	89	162	179	153	68	18	668		
D. Integrated soil fertility management																					
Compost pits, compost making, bund plantation; RIDF	each	750	1,500	750	-	-	-	-	3,000	7,700	110	87	178	91	-	-	-	-	357	GSI_DA	RIDF (85%), BEN (15%)
Compost pits, compost making, bund plantation; IFAD	each	1,350	2,700	2,700	2,700	2,700	1,350	-	13,500	7,700	110	157	321	328	334	341	174	-	1,655	GSI_DA	IFAD (85%), BEN (15%)
Demonstrations of improved composting methods, RIDF	Cluster	30	30	60	30	-	-	-	150			-	-	-	-	-	-	-	-	GS_DA	RIDF (85%), BEN (15%)
Demonstrations of improved composting methods, IFAD	Cluster	-	120	270	270	180	-	-	840			-	-	-	-	-	-	-	-	GS_DA	IFAD (85%), BEN (15%)
Low-cost soil testing (mobile kits linked to soil testing labs), RIDF	Cluster_yr	60	60	60	60	-	-	-	240	10,000	143	9	9	9	10	-	-	-	37	GSI_DA	RIDF (95%)
Low-cost soil testing (mobile kits linked to soil testing labs), IFAD	Cluster_yr	-	120	270	330	330	330	-	1,380	10,000	143	-	17	39	47	47	47	-	197	GS_DA	IFAD (95%)
Tank silt application, RIDF	cluster	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	GSI_DA	RIDF (95%)
Tank silt application, NREGA	ha	-	2,696	8,228	11,864	10,965	5,393	-	39,146	10,300	147	-	409	1,272	1,871	1,764	885	-	6,201	GSI_DA	NREGS (100%)
Residue management, RIDF	cluster	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	GSI_DA	RIDF (95%)

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INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APD
Table 1.1. Crop production systems

Detailed Costs		Quantities								Unit Cost	Unit Cost	Totals Including Contingencies (US$ '000)								Other Accounts	
	Unit	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	(INR)	(US$)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
Promote crop rotation & green manure incorporation RIDF	ha	90	600	600	510	-	-	-	1,800	2,500	36	3	21	21	18	-	-	-	64	GS_DA	RIDF (95%)
Promote crop rotation & green manure incorporation, IFAD	ha	-	1,620	1,620	1,620	1,620	1,620	-	8,100	2,500	36	-	63	64	65	66	68	-	326	GSI_DA	IFAD (85%)
Promotion of bund plantation for soil biomass RIDF	ha	1,800	3,000	1,200	-	-	-	-	6,000	5,500	79	141	236	94	-	-	-	-	471	GS_DA	RIDF (95%)
Promotion of bund plantation for soil biomass, IFAD	ha	-	2,700	5,400	8,100	5,400	5,400	-	27,000	5,500	79	-	229	468	716	487	497	-	2,398	GSI_DA	IFAD (85%)
Biomass nursery, RIDF	1000 plants	450	750	300	-	-	-	-	1,500	6,000	86	39	64	26	-	-	-	-	129	GS_DA	RIDF (95%)
Biomass nursery, IFAD /d	1000 plants	-	675	1,350	2,025	1,350	1,350	-	6,750	6,000	86	-	58	116	174	116	116	-	579	GS_DA	IFAD (95%)
Subtotal Integrated soil fertility management												437	1,606	2,528	3,235	2,821	1,786	-	12,414		
E. Protective irrigation																					
1. Farm ponds																					
Excavation by manual labour, NREGS	pond	990	2,970	4,970	4,970	4,970	990	-	19,860	46,800	669	702	2,148	3,666	3,740	3,814	775	-	14,845	WORKS_DA	NREGS (100%)
Excavation by machine, RIDF	pond	990	1,080	1,080	450	-	-	-	3,600	7,800	111	117	130	133	56	-	-	-	436	WORKS_DA	RIDF (95%)
Excavation by machine, IFAD	pond	-	1,890	3,870	4,500	4,950	900	-	16,110	7,800	111	-	228	476	564	633	117	-	2,018	WORKS_DA	IFAD (95%)
Lining of farm ponds, materials, RIDF	pond	990	1,080	1,080	450	-	-	-	3,600	5,400	77	81	90	92	39	-	-	-	302	GSI_DA	RIDF (85%), BEN (15%)
Lining of farm ponds, materials, IFAD	pond	-	1,890	3,870	4,500	900	-	-	11,160	5,400	77	-	158	329	391	80	-	-	957	GSI_DA	IFAD (85%), BEN (15%)
Lining of farm ponds, labour	pond	1,980	5,950	9,920	9,920	9,920	1,890	-	39,580	2,000	29	60	184	313	319	325	63	-	1,264	WORKS_DA	BEN (100%)
Subtotal Farm ponds												960	2,938	5,009	5,109	4,853	956	-	19,823		
2. Sharing/collectivisation of borewells, RIDF	ha	480	720	980	240	-	-	-	2,420	30,000	429	218	334	463	116	-	-	-	1,131	GSI_DA	RIDF (85%)
3. Sharing/collectivisation of borewells, IFAD	ha	-	1,500	3,300	3,300	3,300	1,800	-	13,200	30,000	429	-	695	1,560	1,592	1,623	903	-	6,374	GSI_DA	IFAD (85%)
4. Mobile protective irrigation, RIDF	set	-	60	60	60	-	-	-	180	125,000	1,786	-	116	118	121	-	-	-	355	GSI_DA	RIDF (85%)
5. Mobile protective irrigation, IFAD	set	-	90	270	270	180	-	-	810	125,000	1,786	-	174	532	543	369	-	-	1,617	GSI_DA	IFAD (85%)
6. Farmer micro-irrigation equipment, RIDF	set	-	40	60	60	20	-	-	180	60,000	857	-	37	57	58	20	-	-	171	GSI_DA	RIDF(95%)
7. Farmer micro-irrigation equipment, IFAD	set	-	810	1,350	1,350	1,350	540	-	5,400	60,000	857	-	751	1,277	1,302	1,328	542	-	5,200	GSI_DA	IFAD (85%), BEN (15%)
8. Micro-irrigation pumps for rentals RIDF	set	60	240	240	60	-	-	-	600	50,000	714	45	185	189	48	-	-	-	468	GSI_DA	RIDF (85%), BEN (15%)
9. Micro-irrigation pumps for rentals IFAD	set	-	405	675	675	675	270	-	2,700	50,000	714	-	313	532	543	553	226	-	2,167	GSI_DA	IFAD (85%), BEN (15%)
Subtotal Protective irrigation												1,224	5,543	9,737	9,431	8,746	2,627	-	37,308		
Total												2,430	9,480	15,171	15,383	13,978	5,576	111	62,128		

Sub-component 1.2: Livestock production system

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMP)
Table 1.2. Livestock Production Systems

Detailed Costs	Unit	Quantities								Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total			17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
A. Livestock production systems																					
1. Support to sheep production																					
Plans for nucleus development consulting services	Weeks	-	2	2	2	2	2	-	10	40,000	571	-	1	1	1	1	1	-	6	CON_DA	IFAD (85%)
Night shelters for migratory flocks RIDF	cluster	120	120	120	-	-	-	-	360	10,000	143	18	19	19	-	-	-	-	56	GSI_DA	RIDF (85%), BEN (15%)
Night shelters for migratory flocks, IFAD	each	270	540	540	270	-	-	-	1,620	10,000	143	41	83	85	43	-	-	-	253	GSI_DA	IFAD (85%), BEN (15%)
Shelter for static flocks, RIDF	each	120	120	120	-	-	-	-	360	15,000	214	27	28	28	-	-	-	-	83	GSI_DA	RIDF (95%)
Shelter for static flocks, IFAD	each	540	540	540	-	-	-	-	1,620	15,000	214	123	125	128	-	-	-	-	376	GSI_DA	IFAD (95%)
Spring scales, Castration device, FAMACHA cards, RIDF	Set	35	65	45	-	-	-	-	145	10,000	143	5	10	7	-	-	-	-	22	GSI_DA	RIDF (75%) , BEN (25%)
Spring scales, Castration device, FAMACHA cards, IFAD	Set	-	160	300	195	-	-	-	655	10,000	143	-	25	47	31	-	-	-	103	GSI_DA	IFAD (75%) , BEN (25%)
Equipment for cold chain and disease survillence, RIDF	Set	-	9	9	-	-	-	-	18	210,000	3,000	-	29	30	-	-	-	-	59	GSI_DA	RIDF(85%)
Equipment for cold chain and disease survillence, IFAD	Set	-	40	42	-	-	-	-	82	210,000	3,000	-	130	139	-	-	-	-	269	GSI_DA	IFAD (85%)
Breed improvement - high quality rams consulting services	cluster_yr	-	150	330	330	330	150	-	1,290	25,000	357	-	58	130	133	135	63	-	519	CON_DA	IFAD (95%)
Breed exchange event	events	-	100	200	200	200	200	-	900	25,000	357	-	39	79	80	82	84	-	363	TCB_DA	IFAD (100%)
Pashu Sakhi training /a	Person	105	215	190	190	100	-	-	800	50,000	714	80	166	150	153	82	-	-	630	TCB_DA	IFAD (100%)
Equipment & tool kits for pashu sakhi	set	105	215	190	190	100	-	-	800	20,000	286	32	66	60	61	33	-	-	252	GSI_DA	IFAD (85%)
Honorarium to pashu sakhi /b	pers_year	105	320	510	595	480	290	100	2,400	18,000	257	29	89	145	172	142	87	31	694	GSI_DA	IFAD (85%)
Travel allowance to paravet	pers_month	17	36	36	20	-	-	-	109	2,000	29	1	1	1	1	-	-	-	3	TCB_DA	IFAD (100%)
Refresher training of paravet	Person	-	-	17	36	36	20	-	109	5,000	71	-	-	1	3	3	2	-	9	TCB_DA	IFAD (100%)
Tablet computers for Pashu Sakhi and paravets, RIDF	each	45	60	60	-	-	-	-	165	14,000	200	10	13	13	-	-	-	-	36	GSI_DA	RIDF (85%)
Tablet computers for Pashu Sakhi and paravets, IFAD	each	-	170	370	205	-	-	-	745	14,000	200	-	37	82	46	-	-	-	165	GSI_DA	IFAD (85%)
Subtotal Support to sheep production												364	919	1,145	725	478	237	31	3,899		

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ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APDMP)
Table 1.2. Livestock Production Systems

Detailed Costs	Unit	Quantities								Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total			17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
2. Support to feed and fodder																					
Chaffer RIDF	set	30	60	60	30	-	-	-	180	40,000	571	18	37	38	19	-	-	-	112	GSI_DA	RIDF (85%), BEN (15%)
Chaffer, IFAD	set	-	135	270	135	-	-	-	540	40,000	571	-	83	170	87	-	-	-	340	GSI_DA	IFAD (85%), BEN (15%)
Fodder nursery, RIDF	each	9	9	-	-	-	-	-	18	200,000	2,857	27	28	-	-	-	-	-	55	GSI_DA	RIDF (95%)
Fodder nursery, IFAD	each	-	40	82	-	-	-	-	122	200,000	2,857	-	124	258	-	-	-	-	382	GSI_DA	IFAD (95%)
Fodder seed supply, RIDF	ton	-	15	56	83	75	36	-	265	50,000	714	-	12	44	67	61	30	-	214	GSI_DA	IFAD (95%)
Fodder seed supply, RIDF	ton	15	15	15	-	-	-	-	45	50,000	714	11	12	12	-	-	-	-	35	GSI_DA	RIDF (95%)
Fodder seed supply, IFAD	ton	-	30	51	51	51	20	-	203	50,000	714	-	23	40	41	42	17	-	163	GSI_DA	IFAD (95%)
Demonstration - azolla	each	20	100	100	100	80	-	-	400	3,500	50	1	5	6	6	5	-	-	22	GSI_DA	IFAD (75%) , BEN (25%)
Demonstration - new fodder (e.g. spineless cactus)	each	2	10	10	10	10	8	-	50	3,500	50	0	1	1	1	1	0	-	3	GSI_DA	IFAD (75%) , BEN (25%)
Feed mix enterprises	each	-	1	4	4	4	4	3	20	150,000	2,143	-	2	9	10	10	10	8	49	GSI_DA	IFAD (75%) , BEN (25%)
Subtotal Support to feed and fodder												58	327	578	230	118	57	8	1,376		
3. Support to backyard poultry																					
Backyard poultry units, RIDF	each	198	792	792	198	-	-	-	1,980	4,500	64	13	55	56	14	-	-	-	139	GSI_DA	RIDF (85%)
Backyard poultry units, IFAD	each	-	1,337	2,228	2,228	2,228	891	-	8,912	4,500	64	-	93	158	161	164	67	-	644	GSI_DA	IFAD (85%)
Entrepreneur poultry breeder unit, RIDF	each	5	10	5	-	-	-	-	20	140,000	2,000	11	22	11	-	-	-	-	43	GSI_DA	RIDF (95%)
Entrepreneur poultry breeder unit, IFAD	each	-	14	23	23	23	9	-	92	140,000	2,000	-	30	51	52	53	21	-	207	GSI_DA	IFAD (95%)
Subtotal Support to backyard poultry												24	200	276	227	217	88	-	1,033		
4. Capacity building																					
Curriculum development	Lumpsum											23	-	-	-	-	-	-	23	TCB_DA	IFAD (85%)
Curriculum retraining	Lumpsum											15	-	-	-	-	-	-	15	TCB_DA	IFAD (85%)
Training pashu sakhi for FFS /c	batch	6	8	-	-	-	-	-	14	2,402,600	34,323	218	297	-	-	-	-	-	515	TCB_DA	IFAD (100%)
FFS facilitated by Pashu sakhi	each	-	50	300	400	500	400	-	1,650	32,200	460	-	25	152	207	264	215	-	864	TCB_DA	IFAD (100%)
Continued support for FFS	FFS	-	50	300	400	500	400	-	1,650	3,000	43	-	2	14	19	25	20	-	80	TCB_DA	IFAD (100%)
Veterinary officer training	Person	-	-	20	20	20	20	20	100	25,000	357	-	-	8	8	8	8	9	41	TCB_DA	IFAD (100%)
Paravet training	Person	-	17	36	36	20	-	-	109	25,000	357	-	7	14	14	8	-	-	43	TCB_DA	IFAD (100%)
Refresher training for paravet	persons	-	-	-	17	36	36	26	115	25,000	357	-	-	-	7	15	15	11	48	TCB_DA	IFAD (100%)
Subtotal Capacity building												256	331	189	256	320	259	20	1,630		
Total												703	1,776	2,188	1,437	1,133	641	58	7,937		

Sub-component 1.3: Farmer Organisations

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (APD
Table 1.3. Farmer Organisations

Detailed Costs	Unit	Quantities								Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total			17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
A. Support for FPOs																					
1. Super cluster FPOs																					
Support for 1st year	FPO	-	10	20	10	-	-	-	40	1,105,000	15,786	-	171	348	178	-	-	-	697	GSI_DA	IFAD (85%)
Support for 2nd year	FPO	-	-	10	20	10	-	-	40	840,000	12,000	-	-	132	270	138	-	-	540	GSI_DA	IFAD (85%)
Support for 3rd year	FPO	-	-	-	10	20	10	-	40	790,000	11,286	-	-	-	127	259	132	-	518	GSI_DA	IFAD (85%)
Working capital support	FPO	10	20	10	-	-	-	-	40	6,000,000	85,714	857	1,714	857	-	-	-	-	3,429	GSI_DA	IFAD (50%), BEN (50%)
Subtotal Super cluster FPOs												857	1,885	1,338	575	397	132	-	5,184		
2. Village level FPOs																					
Capacity building for village level FPOs	FPO	100	250	330	310	-	-	-	990	40,000	571	61	155	208	199	-	-	-	623	GSI_DA	IFAD (85%)
Subtotal Support for FPOs												918	2,040	1,546	774	397	132	-	5,806		
B. Services to producers																					
Market and value chain studies	study	1	1	1	1	1	-	-	5	300,000	4,286	5	5	5	5	5	-	-	24	CON_DA	IFAD (85%)
Collective marketing and related infrastructructure, RIDF /a	Cluster	-	30	30	-	-	-	-	60	100,000	1,429	-	46	47	-	-	-	-	94	GSI_DA	RIDF (85%)
Collective marketing and related infrastructructure, IFAD /b	Cluster	-	120	150	-	-	-	-	270	100,000	1,429	-	185	236	-	-	-	-	422	GSI_DA	IFAD (85%)
Organic input supply enterprises, RIDF	each	-	30	30	-	-	-	-	60	75,000	1,071	-	35	35	-	-	-	-	70	GSI_DA	RKVY (30%), RIDF (50%), BEN (20%)
Organic input supply enterprises, IFAD	each	-	-	150	180	-	-	-	330	75,000	1,071	-	-	177	217	-	-	-	394	GSI_DA	RKVY (30%), IFAD(50%),BEN (20%)
Farm equipment for preparation of bioinputs, RIDF	set	1,500	3,000	1,500	-	-	-	-	6,000	2,000	29	45	93	47	-	-	-	-	185	GSI_DA	RIDF (40%), RKVY (40%), BEN (20%)
Farm equipment for preparation of bioinputs, IFAD	set	-	-	3,300	8,400	9,900	5,400	-	27,000	2,000	29	-	-	104	270	325	181	-	879	GSI_DA	IFAD (40%), RKVY (40%), BEN (20%)
Subtotal Services to producers												50	364	653	492	330	181	-	2,069		
C. Community Managed Seed System																					
Infrastructure (bins, weighing scales, graders, drying platform, cleaner, packing), RIDF	cluster	-	30	30	-	-	-	-	60	150,000	2,143	-	70	71	-	-	-	-	140	GSI_DA	RIDF (60%), RKVY (40%)
Infrastructure (bins, weighing scales, graders, drying platform, cleaner, packing), IFAD	cluster	-	120	150	-	-	-	-	270	150,000	2,143	-	278	355	-	-	-	-	633	GSI_DA	IFAD (60%), RKVY (40%)
Bags and other consumables	set	-	1,200	5,040	10,320	13,200	7,200	-	36,960	1,000	14	-	19	79	166	216	120	-	601	GSI_DA	BEN (60%), RKVY (40%)
Labour for processing and packaging	pers_day	-	1,200	5,040	10,320	13,200	7,200	-	36,960	1,000	14	-	19	79	166	216	120	-	601	GSI_DA	BEN (100%)
Foundation seed	ton	-	150	630	1,290	1,650	900	-	4,620	64,000	914	-	148	636	1,327	1,732	963	-	4,806	GSI_DA	RKVY (40%) , BEN (60%)
Subtotal Community Managed Seed System												-	533	1,220	1,659	2,165	1,204	-	6,781		
D. Machinery hiring centres																					
RIDF supported	each	-	30	30	-	-	-	-	60	1,500,000	21,429	-	695	709	-	-	-	-	1,405	GSI_DA	RIDF (85%), BEN (15%)
IFAD supported	each	-	-	120	150	-	-	-	270	1,500,000	21,429	-	-	2,837	3,617	-	-	-	6,455	GSI_DA	IFAD (85%), BEN (15%)
Subtotal Machinery hiring centres												-	695	3,546	3,617	-	-	-	7,859		
Total												968	3,632	6,965	6,543	2,891	1,517	-	22,516		

Sub-component 1.4: Field facilitation

INDIA
ANDHARA PRADESH DOUGHT MITIG.
Table 1.4. Field facilitation

Detailed Costs	Unit	Quantities								Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total			17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
Facilitating Agencies /a	agency_year	4.5	6	6	6	6	6	4.5	39	31,271,000	446,729	2,132	2,899	2,957	3,017	3,077	3,138	2,401	19,621	CON_DA	IFAD (85%)
Total												2,132	2,899	2,957	3,017	3,077	3,138	2,401	19,621		

\a Includes office set up and operation costs, salaries and allowances and institutional overhead costs @10%

Component-2.1: Drought proofing through NRM and Governance

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (A
Table 2.1. Drought Proofing through NRM and Governance

Detailed Costs		Quantities								Unit Cost	Unit Cost	Totals Including Contingencies (US$ '000)								Other Accounts	
	Unit	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	(INR)	(US$)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
A. Water governance																					
1. Capacity building trainings																					
GP office bearers capacity building	person	192	400	200	-	-	-	-	792	5,500	79	16	34	17	-	-	-	-	67	GSI_DA	IFAD (85%)
GP water subcommittee meeting	GP year	165	330	330	330	165	-	-	1,320	15,000	214	37	76	78	80	41	-	-	312	GSI_DA	IFAD (85%)
HU sub-committee meeting	HU_year	132	264	264	264	132	-	-	1,056	3,000	43	6	12	12	13	6	-	-	50	GSI_DA	IFAD (85%)
Drainage basin sub-committee meetings	year	-	64	100	100	-	-	-	264			-	-	-	-	-	-	-	-	GSI_DA	IFAD (85%)
District officers capacity bilding training	LS	10	20	10	-	-	-	-	40	17,500	250	3	5	3	-	-	-	-	11	GSI_DA	IFAD (85%)
State officers' capacity building training	training	2	-	-	-	-	-	-	2	25,000	357	1	-	-	-	-	-	-	1	GSI_DA	IFAD (85%)
Subtotal Capacity building trainings												63	128	111	92	47	-	-	441		
2. water budgeting workshop																					
GP level water budgeting workshops	year	165	495	660	660	660	660	165	3,465	7,500	107	19	57	78	80	81	83	21	419	GSI_DA	IFAD (85%)
HU level water budgeting workshop	each	33	99	132	132	132	66	-	594	15,000	214	7	23	31	32	32	17	-	143	GSI_DA	IFAD (85%)
Water budgeting workshops	each	1	2	2	2	2	2	1	12	50,000	714	1	2	2	2	2	2	1	10	TCB_DA	IFAD (100%)
Subtotal water budgeting workshop												27	82	111	113	115	101	22	571		
3. HU management plan																					
Dissemination of management plans	HU plan	165	495	660	660	660	660	165	3,465	2,000	29	5	15	21	21	22	22	6	112	GSI_DA	IFAD (85%)
Water management plan adoption survey	HU plan	165	495	660	660	660	660	165	3,465	1,000	14	2	8	10	11	11	11	3	56	GSI_DA	IFAD (85%)
Subtotal HU management plan												7	23	31	32	32	33	8	168		
4. Studies and consultancies																					
Remote sensing applications	LS	0.5	0.1	0.1	0.1	0.1	0.1	-	1	30,000,000	428,571	227	46	47	48	49	50	-	469	CON_DA	IFAD (85%)
Subtotal Water governance												325	279	300	285	244	184	30	1,648		
B. Water monitoring and conservation																					
1. Soil and water conservation																					
Soil and Water Conservation Works, NREGS /a	1000 cubic meter	-	590	1,887	2,595	2,399	1,180	-	8,651	130,400	1,863	-	1,099	3,515	4,834	4,469	2,198	-	16,116	WORKS_DA	NREGS (100%)
Pilot Groundwater Recharge Structures, RIDF	cluster	90	180	180	90	-	-	-	540	31,100	444	42	87	88	45	-	-	-	262	WORKS_DA	RIDF (95%)
Pilot Groundwater Recharge Structures, IFAD	cluster	-	135	270	270	135	-	-	810	31,100	444	-	65	132	135	69	-	-	401	WORKS_DA	IFAD (95%)
Subtotal Soil and water conservation												42	1,250	3,736	5,014	4,538	2,198	-	16,779		
2. Monitoring water resources																					
Observaton borewells and other equipment RIDF	cluster	-	30	30	-	-	-	-	60	262,500	3,750	-	122	124	-	-	-	-	246	GSI_DA	RIDF (95%)
Observaton borewells and other equipment, IFAD	cluster	-	80	150	40	-	-	-	270	262,500	3,750	-	325	621	169	-	-	-	1,114	GSI_DA	IFAD (95%)
Community weather stations, RIDF	each	-	30	30	-	-	-	-	60	78,000	1,114	-	36	37	-	-	-	-	73	GSI_DA	RIDF (85%)
Community weather stations, IFAD	each	-	80	150	40	-	-	-	270	78,000	1,114	-	96	184	50	-	-	-	331	GSI_DA	IFAD (85%)
Data display board, RIDF	each	-	150	150	-	-	-	-	300	7,000	100	-	16	17	-	-	-	-	33	GSI_DA	RIDF (85%)
Data display board, IFAD	each	400	750	200	-	-	-	-	1,350	7,000	100	42	81	22	-	-	-	-	146	GSI_DA	IFAD (85%)
Data collection assistants	pers_month	-	3,600	7,920	7,920	7,920	4,320	-	31,680			-	-	-	-	-	-	-	-	GSI_DA	IFAD (85%)
Training of data collection assistants	person	200	200	260	-	-	-	-	660	1,000	14	3	3	4	-	-	-	-	10	TCB_DA	IFAD (100%)
Water quality testing equipment, RIDF	set	8	-	-	-	-	-	-	8	150,000	2,143	18	-	-	-	-	-	-	18	GSI_DA	RIDF (85%)
Water quality testing equipment, IFAD	set	8	33	-	-	-	-	-	41	150,000	2,143	18	76	-	-	-	-	-	95	GSI_DA	IFAD (85%)
Water quality testing, procedures	LS	-	40	40	40	40	40	40	240	35,000	500	-	22	22	23	23	23	24	136	GSI_DA	IFAD (85%)
Surface water flow measurement, RIDF	station	-	24	-	-	-	-	-	24	16,000	229	-	6	-	-	-	-	-	6	GSI_DA	RIDF (85%)
Surface water flow measurement, IFAD	station	-	30	78	-	-	-	-	108	16,000	229	-	7	20	-	-	-	-	27	GSI_DA	IFAD (85%)
Subtotal Monitoring water resources												82	791	1,051	241	23	23	24	2,235		

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INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (A
Table 2.1. Drought Proofing through NRM and Governance

Detailed Costs		Quantities								Unit Cost	Unit Cost	Totals Including Contingencies (US$ '000)								Other Accounts	
	Unit	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	(INR)	(US$)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
3. civil works																					
Works for river flow measurement, iFAD	site	-	30	8	-	-	-	-	38	5,000	71	-	2	1	-	-	-	-	3	WORKS_DA	IFAD (100%)
Works for river flow measurement, RIDF	sites	-	24	-	-	-	-	-	24	5,000	71	-	2	-	-	-	-	-	2	WORKS_DA	RIDF (100%)
Subtotal civil works												-	4	1	-	-	-	-	5		
4. Surveys and studies																					
Surface water quantification in minor irrigation tanks	tank	160	500	-	-	-	-	-	660	15,000	214	36	116	-	-	-	-	-	152	CON_DA	IFAD (85%)
River section survey	site	-	54	78	-	-	-	-	132	5,000	71	-	4	6	-	-	-	-	10	CON_DA	IFAD (85%)
Pilot hydrogeological mapping by NGRI	Basin	1	-	-	-	-	-	-	1	60,000,000	857,143	909	-	-	-	-	-	-	909	CON_DA	IFAD (85%)
Study on one cascade of three tanks	LS	-	0.2	0.2	0.2	0.2	0.2	-	1	5,000,000	71,429	-	15	16	16	16	17	-	80	CON_DA	IFAD (85%)
Subtotal Surveys and studies												945	136	22	16	16	17	-	1,152		
Subtotal Water monitoring and conservation												1,070	2,181	4,809	5,272	4,577	2,238	24	20,170		
C. Regenerating common property rangeland																					
Enhancement of biomass productivity RIDF	ha	-	820	1,800	980	-	-	-	3,600	2,400	34	-	30	68	38	-	-	-	136	GSI_DA	RIDF (95%)
Enhancement of biomass productivity, IFAD	ha	-	3,680	8,100	4,420	-	-	-	16,200	2,400	34	-	136	306	171	-	-	-	613	GSI_DA	IFAD (85%), BEN (15%)
Common property area development (NREGS)	ha	-	4,500	12,900	16,500	9,000	-	-	42,900	12,000	171	-	771	2,211	2,829	1,543	-	-	7,354	GSI_DA	NREGS (95%), BEN (5%)
Renovation of waterbodies	each	-	225	270	-	-	-	-	495	50,000	714	-	161	193	-	-	-	-	354	WORKS_DA	IFAD(85%)
Water sources for small ruminants, RIDF	Number	-	30	30	-	-	-	-	60	20,000	286	-	9	9	-	-	-	-	17	GSI_DA	RIDF (95%)
Water sources for small ruminants, IFAD	Number	-	120	300	180	-	-	-	600	20,000	286	-	34	86	51	-	-	-	171	GSI_DA	IFAD (95%)
Subtotal Regenerating common property rangeland												-	1,142	2,873	3,088	1,543	-	-	8,646		
Total Investment Costs												1,394	3,602	7,982	8,645	6,364	2,423	54	30,465		
II. Recurrent Costs																					
A. Water conservation																					
Data collection Assistants	pers_year	200	400	660	660	660	330	-	2,910	18,000	257	55	111	187	191	195	99	-	838	O&M_DA	IFAD (90%)
Water quality testing costs	set_year	16	49	49	49	49	49	-	261	500	7	0	0	0	0	0	0	-	2	O&M_DA	IFAD (90%)
Equipment operation and maintenance	year	0.5	1	1	1	1	1	0.5	6	70,000	1,000	1	1	1	1	1	1	1	7	O&M_DA	IFAD (90%)
Total Recurrent Costs												55	113	189	193	196	101	1	847		
Total												1,449	3,715	8,171	8,838	6,560	2,524	55	31,312		

Component-3.1 Lesson learning and project management

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT (AF
Table 3.1. Lesson learning and management

Detailed Costs	Unit	Quantities								Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total			17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
I. Investment Costs																					
A. Lesson learning																					
1. Surveys and studies																					
Hiring enumerators and consultants for inhouse studies	year	1	1	1	1	1	1	-	6	250,000	3,571	4	4	4	4	4	4	-	24	CON_DA	IFAD (85%)
Baseline, mid-term, impact surveys	each	1	-	-	1	-	-	1	3	2,000,000	28,571	30	-	-	32	-	-	34	97	CON_DA	IFAD (85%)
Other surveys and studies	year	1	1	1	1	1	1	1	7	800,000	11,429	12	12	13	13	13	13	14	90	CON_DA	IFAD (85%)
Learning & dissemination workshops	each	-	2	2	2	2	2	2	12	300,000	4,286	-	9	9	10	10	10	10	58	CON_DA	IFAD (85%)
Assessment of groundwater economy in Anantapur and Chittor districts	study	-	0.5	0.5	-	-	-	-	1	8,120,000	116,000	-	63	64	-	-	-	-	127	CON_DA	IFAD (85%)
Pilot implementation of registration of wells in Ananthapur	LS	-	1	-	-	-	-	-	1	5,000,000	71,429	-	77	-	-	-	-	-	77	CON_DA	IFAD (85%)
Subtotal Surveys and studies												46	166	90	59	27	28	58	473		
B. State Project Management Unit																					
1. Office equipment																					
Computers and priters	sets	14	-	-	-	14	-	-	28	50,000	714	11	-	-	-	11	-	-	22	GSI_DA	IFAD (85%)
Office furniture and equipment	set	16	-	-	-	-	-	-	16	12,000	171	3	-	-	-	-	-	-	3	GSI_DA	IFAD (85%)
GIS system including printers	LS	-	1	-	-	-	-	-	1	700,000	10,000	-	11	-	-	-	-	-	11	GSI_DA	IFAD (85%)
Accounting software and customisation /a	each	6	-	-	-	-	-	-	6	200,000	2,857	18	-	-	-	-	-	-	18	GSI_DA	IFAD (85%)
Subtotal Office equipment												32	11	-	-	11	-	-	54		
2. MIS development																					
MIS development	LS	0.5	0.5	-	-	-	-	-	1	2,000,000	28,571	15	15	-	-	-	-	-	31	CON_DA	IFAD (85%)
MIS support	year	-	0.5	1	1	1	1	0.5	5	550,000	7,857	-	4	9	9	9	9	5	45	CON_DA	IFAD (85%)
Subtotal MIS development												15	20	9	9	9	9	5	75		
3. Audits /b	Year	1	1	1	1	1	1	1	7	1,000,000	14,286	15	15	16	16	16	17	17	113	TCB_DA	IFAD (100%)
4. Workshops, training, TA																					
Short-term TA	pers_month	1	1	2	2	1	1	1	9	80,000	1,143	1	1	3	3	1	1	1	12	CON_DA	IFAD (85%)
Training courses for staff	persons	40	40	20	20	-	-	-	120	15,000	214	9	9	5	5	-	-	-	28	CON_DA	IFAD (85%)
Workshops and meetings	each	5	15	15	15	15	10	5	80	20,000	286	2	5	5	5	5	3	2	26	CON_DA	IFAD (85%)
Project Start up workshop	each	1	-	-	-	-	-	-	1	500,000	7,143	8	-	-	-	-	-	-	8	TCB_DA	IFAD (100%)
Project completion workshop and report preparation	each	-	-	-	-	-	-	1	1	1,000,000	14,286	-	-	-	-	-	-	17	17	TCB_DA	IFAD (100%)
Subtotal Workshops, training, TA												19	15	12	12	6	5	20	90		
Subtotal State Project Management Unit												81	61	36	37	43	31	42	332		
C. District Project Management Unit /c																					
1. Office equipment & facilities																					
Computers and printers	sets	40	-	-	-	40	-	-	80	50,000	714	30	-	-	-	33	-	-	63	GSI_DA	IFAD (85%)
Office furniture and equipment	sets	40	-	-	-	-	-	-	40	10,000	143	6	-	-	-	-	-	-	6	GSI_DA	IFAD (85%)
Training courses for project staff	persons	-	35	35	-	-	-	-	70	15,000	214	-	8	8	-	-	-	-	16	TCB_DA	IFAD (100%)
Workshops and meetings	each	-	15	15	15	15	10	5	75	20,000	286	-	5	5	5	5	3	2	24	GSI_DA	IFAD (85%)
Short term TA	pers_month	1	1	2	2	1	1	1	9	80,000	1,143	1	1	3	3	1	1	1	12	CON_DA	IFAD (85%)
Subtotal Office equipment & facilities												38	14	16	7	39	5	3	121		
D. Lead Technical Agency /d	LS											195	256	257	253	258	220	165	1,604	CON_DA	IFAD (85%)
E. Support from international TA																					
FAO and other	LS											120	160	120	120	120	80	80	800	CON_DA	IFAD (100%)
Total Investment Costs												480	656	519	476	487	363	348	3,330		

…..continued

INDIA
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Table 3.1. Lesson learning and management

Detailed Costs	Unit	Quantities								Unit Cost (INR)	Unit Cost (US$)	Totals Including Contingencies (US$ '000)								Other Accounts	
		17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total			17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total	Disb. Acct.	Fin. Rule
II. Recurrent Costs																					
A. State Project Management Unit																					
1. Salaries - staff seconded from GoAP																					
Additional Project Director	pers_month	12	12	12	12	12	12	12	84	150,000	2,143	27	28	28	29	30	30	31	203	SAA_DA	GOVT
Agricultural Specialist	pers_month	9	12	12	12	12	12	12	81	100,000	1,429	14	19	19	19	20	20	20	131	SAA_DA	GOVT
Livestock Specialist	pers_month	9	12	12	12	12	12	12	81	100,000	1,429	14	19	19	19	20	20	20	131	SAA_DA	GOVT
Administrative manager	pers_month	12	12	12	12	12	12	12	84	100,000	1,429	18	19	19	19	20	20	20	135	SAA_DA	GOVT
Accounts Officer	pers_month	12	12	12	12	12	12	12	84	90,000	1,286	16	17	17	17	18	18	18	122	SAA_DA	GOVT
Monitoring officer	pers_month	9	12	12	12	12	12	12	81	60,000	857	8	11	11	12	12	12	12	78	SAA_DA	GOVT
Accounts Assistant	pers_month	9	12	12	12	12	12	12	81	60,000	857	8	11	11	12	12	12	12	78	SAA_DA	GOVT
Subtotal Salaries - staff seconded from GoAP												105	122	125	127	130	132	135	877		
2. PMU contracted staff	LS											123	162	165	169	172	175	179	1,145	SAA_DA	IFAD (90%)
3. Office running costs																					
Office rental	month	12	12	12	12	12	12	12	84	60,000	857	11	11	11	12	12	12	12	81	O&M_DA	IFAD (90%)
Hiring of vehicles	pers_month	24	48	48	48	48	48	48	312	30,000	429	11	22	23	23	24	24	25	151	O&M_DA	IFAD (90%)
Travel and other costs	pers_month	90	108	108	108	108	108	108	738	10,000	143	14	17	17	17	18	18	18	119	O&M_DA	IFAD (90%)
Miscellaneous costs	month	9	12	12	12	12	12	12	81	80,000	1,143	11	15	15	15	16	16	16	104	O&M_DA	IFAD (90%)
Subtotal Office running costs												46	65	66	68	69	70	72	456		
Subtotal State Project Management Unit												275	349	356	363	371	378	386	2,479		
B. District Project Management Unit																					
1. Salaries - staff seconded from GoAP																					
Deputy Project Director	pers_month	45	60	60	60	60	60	60	405	100,000	1,429	68	93	95	96	98	100	102	653	SAA_DA	GOVT
Assistant Project Director	pers_month	60	120	120	120	120	120	120	780	75,000	1,071	68	139	142	145	148	151	154	945	SAA_DA	GOVT
Subtotal Salaries - staff seconded from GoAP												136	232	236	241	246	251	256	1,599		
2. Contracted staff at DPMUs	LS											47	66	68	69	70	72	73	466	SAA_DA	IFAD (90%)
3. Office operating costs																					
Office rental	Month	60	60	60	60	60	60	60	420	40,000	571	36	37	38	39	39	40	41	270	O&M_DA	IFAD (90%)
vehicle hiring	Month	18	36	36	36	36	36	36	234	40,000	571	11	22	23	23	24	24	25	151	O&M_DA	IFAD (90%)
Travel and other costs	pers_month	36	48	48	48	48	48	48	324	5,000	71	3	4	4	4	4	4	4	26	O&M_DA	IFAD (90%)
Office runing costs	Month	6	12	12	12	12	12	12	78	50,000	714	5	9	9	10	10	10	10	63	O&M_DA	IFAD (90%)
Subtotal Office operating costs												55	72	74	75	77	78	80	511		
Subtotal District Project Management Unit												238	371	378	385	393	401	409	2,575		
Total Recurrent Costs												513	720	734	749	764	779	795	5,054		
Total												993	1,376	1,253	1,225	1,251	1,142	1,143	8,384		

\a Includes cost of software, license and customisation
\b cost covers auditing of SAMETI, ATMAs and all community organisations
\c 5 DPMUs will be set up
\d Costs cover office set up, training, workshop,
staff salaries, travel, office runing costs, institutional overheads etc

Contracted Staff at DPMU level include Accounts Officer, Accounts Assistant, Administrative Assistant, General support staff, Office Assistant.

Appendix 10: Economic and financial analysis[56]

I. FINANCIAL ANALYSIS[57]

A. Assumptions for Financial Analysis

1. Key assumptions were:

- Conventional technologies (cultivation, processing, etc.) are available for most of the agricultural produce, although the target group farmers have access to the emerging technologies as well.
- The project area a good network of roads and agricultural markets and this has favourable impact on prices of agricultural inputs and output to the best advantage of the project area households.
- There are a good number of local NGOs working in the project area but with varied interest, targets and coverage and there is scope for using their services for the project.
- With training, technology support and better input services, the farmers are capable of undertaking improved farming practices and thereby enhancing productions at farm level.
- There are skills and practices for rainfed horticulture, small ruminants, cultivation of off-season vegetables, etc which can be expanded with improved farm management practices.
- Average size of landholding of the project area districts is 1.62[58]. It varies between districts: Anantapur 2.12 ha, Chittoor 1.13 ha, Kadapa 1.48 ha, Kurnool 2.0 ha and Prakasam 1.57 ha.
- Crop models are common to all the 5 drought-prone districts but the cropping patterns vary different in accordance to the dominant soil conditions such as red soils (latosol and alfisol) and black cotton soils (vertisol).
- Soil health is invariably poor and as a result overall production potential is far lower than the established research outcomes. Therefore continued application of FYM, composts and other organic manure is necessary to restore the soil health and their fertility and sustaining productions.
- Common cropping patterns are paddy, groundnut with red gram, millets, maize etc as cereal crops, pulses, seasonal vegetables and spices and their combinations under rainfed conditions. On an average, a household cultivates about 95% of land during main khariff season and about 10% during winter season. For all farm operations, animal drawn ploughs and implements in combination with mechanised ploughing and harvesting are widely used.
- Of the total landholding, a household may have some 20% area under irrigation[59] during the kharif main season and another 7% area during the following winter season. These irrigation intensities are increased to 25% and 8% during khariff and Rabi respectively under the project.
- Average size of a cluster is 1070 ha, of which 70% are cultivated with some 400 farmers and 30% area under other land uses.
- The households carry forward sufficient seed to the following season but these are often of poor quality. While timely availability of quality seed remains an issue to most of the farmers, with the support of the Farmer Producer Organisations (FPOs) and FFS , there is scope that this situation will have some improvements.
- Nearly all households produce both for own consumption and markets. Poor households survive by augmenting their farm incomes from wage employment and other sources but no quantitative data are available.

[56] Prepared by A M Alam, IFAD Consultant
[57] Farmode data file: "APDMP2.mod"
[58] According to AP State Agricultural Statistics 2013-14, average land holding size is 0.72 ha but as per National Sample Survey Organisation, it is 1.67 ha which reported that only 80% are active farmers.
[59] The term irrigation here refers to only life-saving protective irrigation and this accomplished through existing tube-wells, wells, seasonal water bodies such as tanks, ponds etc.

- Input and output prices were obtained from farmers, private traders, agricultural markets during April/May 2016 and these are compared with market prices available on web sites for major commodities and updated during August 2016. Output prices fluctuate considerably throughout the year.
- Generally, post-harvest losses are always high and estimated at 20%. These losses are even higher with vegetables and fruits. But these have not been factored in to the analysis; instead low and conservative productivity levels have been assumed.
- About 73% of households cultivate crops only, another 25% rear livestock only whereas 6-7% of farmers cultivate crops and rear livestock. Small ruminants are the predominant livestock of the area.
- The households manage their livestock along traditional lines. They have limited access to vaccination or parasite control; these households meet their fodder requirements from nearby rangeland or common resource property (CRP) areas but the carrying capacity of these CRP are very low and facilities are provided for enhancing their productivity.
- The project area is drought-prone with varying rainfall distribution patterns and thus has a very limiting scope for irrigated agriculture. But irrigation infrastructure facilities such as water harvesting structure (farm ponds of about 250 m3 capacity) and soil and water conservation works are proposed for augmenting the existing irrigation infrastructure. These are expected to enhance farm production by about 25 to 30%.
- Productivity increases under rainfed cultivation are assumed at conservative levels ranging no more than 20% over the existing levels and these increases are achieved due to in situ soil and moisture conservation practices and improved agronomic practices.
- In all 40 large scale farmer producer organisations and several GP level FPOs, 475 farmer field schools and in addition 330 climate information centres are established with a view to providing services to the farmers.
- About 30% of farmers cultivate "leased in" land. Average lease rents are 30% of the value of the produce in case of irrigated farms and 20% in case of rainfed farms[60]
- Proxy labour has been valued at INR 175 both for male and female labour although there are variations between the rates paid to them.

2. For the APDMP, following production models were developed and used in EFA:

Table 1: Production Models Developed[61]

Production Models	Model Size (ha or unit)	Average landholding size/ household
Groundnut+Redgram inter-cropping, rainfed	1 ha	1.62 ha
Groundnut+Redgram inter-cropping, irrigated	1 ha	
Sorghum rainfed	1 ha	
Cotton, rainfed	1 ha	
Chick pea, rainfed	1 ha	

[60] Source: Report of the Expert Committee on Land Leasing, NITI Ayog, GOI, March 31, 2016
[61] Please refer to Annex-4.1 to 4.8 for detailed crop models and Annex-3.3 to 3.6 for livestock models

Paddy, kharif, irrigated	1 ha
Maize irrigated	1 ha
Tomato, rabi irrigated	1 ha
Backyard poultry	5 bird unit
Poultry breeder farm	1000 chick unit
Sheep fattening unit	20 sheep unit
Sheep rearing unit	30sheep+1 unit

3. Yield increments are achieved in the year following the adoption of improved practices including the application of inputs. For the groundnut and red crop inter-cropping 850 kg/ha of pods assumed together with 50 kg/ha of red gram. Yield of sorghum is assumed at 1,000 kg/ha although the yield ranges between 750 to 2050 kg/ha in the project area districts. Yields of chick pea, cotton are assumed at 1,560 kg/ha and 2,100 kg/ha respectively. In case of irrigated agriculture, yield increments are achieved in the year following the completion of the infrastructure facilities and the productivity levels assumed are: irrigated groundnut at 1,200 kg/ha, maize 3,000 kg/ha, tomato 13,000 kg/ha and paddy rice 3,900 kg/ha.

B. Farm / Household Models

4. Using indicative crop and activity models, several Farm and Household Models were prepared using FARMOD. These models were designed to pattern the landholdings and livelihood options and resource availability of the target group in the project area. The models broadly illustrate the project's expected impact on the incomes, and labour use of households adopting and/or adapting both on-farm and non-farm technology options. These models are indicative and assumed for assessing the project performance indicators. These are briefly described below.

Red soil crop farm model: Total area is 1.62 ha/household and only major crops are considered under the model: groundnut and red gram inter-cropping 0.90 ha, irrigated groundnut and red gram inter-cropping 0.40 ha, sorghum 0.33 ha and irrigated tomato in 0.14 ha. Overall cropping intensity remains same while the irrigated area is increased from 0.45 ha to 0.54 ha under with project situation.

Black soil crop farm model: Total area is 1.62 ha/household and only major crops are considered under the model: cotton 0.39 ha, chick pea 0.83 ha, irrigated maize 0.24 ha, irrigated paddy 0.16 ha and irrigated tomato on 0.14 ha. Overall irrigated area is increased from 0.43 ha to 0.54 ha. See Table-2 below showing the present and with project situation.

Table-2: Farm models

Soil type and crops	Present (ha)		With project (ha)	
Red soil crops	Khariff	Rabi	Khariff	Rabi
Ground nut+red gram	1.30	-	0.90	-
Ground nut+red gram, irrigated	0.32	-	0.40	-
Sorghum	-	-	0.33	-
Tomato, irrigated	-	0.13	-	0.14
Total red soil cropped area	***1.62***	***0.13***	***1.62***	***0.14***
Black soil crops				
Cotton	0.65	0.65	0.39	0.39
Chick pea	0.65	-	0.83	-
Maize, irrigated	-	-	0.24	-
Paddy, irrigated	0.32	-	0.16	-
Tomato, irrigated	-	0.11	-	0.14
Total Black soil cropped area	***1.62***	***0.76***	***1.62***	***0.53***

Backyard poultry: This is a 5 bird unit model per household. Eight month old layers are kept for eggs and hatching. After allowing for mortality, the household is able to sell 63 birds a year. Facilities provided by the project include night shelter for birds, egg-laying box and start up chicks for rearing. As the model is graduated from a 2 birds unit to 5 birds unit, no proxy labour has been considered (Annex-3.3).

Poultry breeder farm: This is a 1000 chick unit per household. Facilities supported by the project include night shelter for the chicks, deep litter equipment such as waterer and feeders. At full development, each household is able to sell 456 chicks, 226 growers and 206 adult birds after allowing for mortality. As it is a new activity a proxy labour value of 50 person-days has been assumed under without project situation (Annex-3.4).

Sheep fattening unit: This is an ongoing activity and a household increases the flock size from 15 to 20. Some 20 ram lambs are procured and fattened for sale. Facilities provided by the project include sheep shelter, fodder storage, AH drenching, castration, weighing of animal at the time of sale, etc. Mortality is reduced from 1.5 lambs per year to 1 due to the project support (Annex-3.6)

Sheep rearing unit: This is also an ongoing activity and each household rear some 30 sheep with one or two breeding rams. Support provided under the project includes sheep shelter, water trough, AH drenching, vaccination, marketing linkages, etc. At full development, a household is able to sell 47 lambs, 11 culled ewes and one or two breeding ram. All sheep units have access to CRP area which is developed under the project with soil and water conservation works including the construction of water bodies (Annex-3.5).

5. Details of the financial analysis of each model are presented in Annex-3.1 to 3.6 and summarised in Table-3 below:

Table 3: Summary Results of WP unit farm or activity model (Financial)

Farm or Activity models	Income (INR)	Input Cost (INR)	Labour (INR)	FIRR (%)	NPV (INR)
-Red soils agricultural farm	94,302	37,387	20,500	2.05 a/	101,680
-Black soils agricultural farm	131,306	39,334	41,120	2.00a/	233,070
-Backyard poultry unit(5 bird unit)	130,000	2,925	2,625	200%	53,094
-Breeder farm unit (1,000 chick unit)	99,500	72,200	17,500	10%	67,522
-Sheep fattening unit (20 sheep unit)	113,400	87,330	14,000	34%	63,596
-Sheep breeding unit (30+1 ram unit)	247,275	192,394	54,600	22%	165,039

a/ BCR
NPV estimated at 12% discount rate on incremental costs and benefits streams.

7. The household models described above assume a given level of technology: the proposed activities are entirely demand-driven, iterative and market-dictated, incorporating lessons learned from past experience and technologies preferred by the target groups over time. Second, the farmer groups FPOs and FFS undertake a problem analysis and decide on the options within available resources. Third, the inputs to be used depend on the problem analysis undertaken by the groups and the needs at each specific location; and emphasis is usually on using locally available bio-inputs such as FYM, vermin-compost, bio-pesticides, IPM etc. Fourth, the target group farmers identify priority opportunities themselves facilitated by the NGOs or the technical agencies.

C. Subproject Models

8. Three subproject models were developed: (i) red soil crops subproject; (ii) black soil crops subproject and (iii) the livestock subproject. These are briefly below.

9. The Red-soil crops subproject includes some 92,400[62] households but assuming an adoption rate of 80%, only 73,920 households are accounted for in the analysis. These households participate in a phased manner over a six year period: 0, 3584, 10976,18592,18592,18592 and 3584 in year 1, 2, 3, 4, 5 and 6 respectively. Economic and financial budgets of the subproject are given in Annex-2.3 and 2.4.

10. The Black-soil crops subproject includes some 39,600[63] households but assuming an adoption rate of 80%, only 31680 households have been accounted for in the analysis. These households participate in a phased manner over a six year period: 0, 1536, 4704, 7968, 7968, 7968 and 1536 year 1, 2, 3, 4, 5 and 6 respectively. Economic and financial budgets of the subproject are given in Annex-2.3 and 2.4

11. Livestock subproject: This subproject includes 10,890 households under backyard poultry with a 90% adoption rate, 112 households under poultry breeder farms with a 100% adoption rate, 33,000 households under the sheep activity with a 70% adoption rate[64].

12. Summary results of these subproject in terms of incremental gross incomes, purchase of inputs, labour inputs and incremental net incomes are shown in Table-4 below and the details in Annex-2

Table 4: Summary Results of Subproject Financial Models: INR per household 1/

Details **(incremental)**	Red soil farm households (INR/hh)	Black soil farm households (INR/hh)	Livestock households (INR/hh)
	With project	With project	With project
Incremental Gross income (INR)	20,436	37,988	51,835
Incremental Purchased Inputs (INR)	5,434	3,140	31,569
Incremental Labour (INR) 3/	4,255	11,620	2,283
Incremental Net income (INR)	10,747	23,220	17,983

1/ At full development stage.

Household level food production and labour requirement at full development stage for the project are presented in Table-5 below.

Table-5: Household Food Production and labour inputs

Type of Farm Household	Food Production Kg/ hh **a/**		Labour-days/hh b/	
	WOP	WP	WOP	WP
-All Project households	713	1,120	94	128

a/ excludes vegetables, livestock products etc.
b/ includes labour-days for all interventions under the project.

[62] As 70% of the area is under red soil, 70% of the total 132,000 households have been accounted for.
[63] As 300% of the area is under black soils, 30% of the total 132,000 households have been accounted for under this subproject.
[64] Adoption rates assumed for each subproject are presented in Annex-D.

II.ECONOMIC ANALYSIS

A. Objectives of Economic Analysis

13. The objective of the economic analysis is to evaluate the expected contribution of the proposed project to the economic development of the project area districts. The purpose of such analysis is to determine whether the economic benefits sufficiently justify the use of the scarce resources that the project needs.

14. The analysis includes all incremental costs and incremental benefits that are quantifiable and associated with the project's investments in development. Target group households adopting and participating in project interventions contribute to increased production, besides ensuring their incomes increases.

B. Assumptions

15. The following assumptions underlie the economic analysis of the project.

- A twenty year analysis period has been assumed, which included the project investment period.
- Agricultural goods move freely within the project area in response to market signals.
- All agricultural inputs and outputs that are traded are valued at their border prices as of May 2016.
- Economic costs are net of duties, taxes and price contingencies, production inputs, etc. All costs directly associated with the incremental production are included in full, including incremental farm inputs and labour.
- Standard conversion factors (SCF) varying between 0.85 have been applied to both traded and non-traded items for adjusting financial prices and these prices are listed in Annex-7.
- The economic analysis includes only incremental benefits and including attributable benefits from all project supported interventions;
- All costs and benefits are relating to investments made on targeted project area households and the resultants benefits;
- Time required for the full development has been assumed over 9 years including farming system development, dissemination of information and technology transfer, and establishment of demonstrations for improved farming practices including changes at grassroots levels, etc;
- Modest changes or shifts in cropping patters are assumed such as reduction in irrigated paddy area and area under cotton but the key assumptions have been adoption of appropriate agronomic practices including inter-cropping, crop rotation, conservation farming etc;
- The analysis employs an Opportunity Cost of Capital (OCC) at 10%[65].

C. Costs - Benefits Streams and Analysis

16. **Investment and Recurrent Costs:** The incremental cost streams include all incremental on-farm investment and farm operating costs (total incremental production costs calculated using FARMOD) including the economic value of all the necessary incremental labour; and the project investment costs (calculated using COSTAB) and excluding the cost of the input packages, taxes and duties, risk fund, office rentals, price contingencies, etc. Refer Annex-1.3 for details.

[65] This is based on the average yields of long-term bonds of GOI

17. The project economic costs were calculated from the financial project costs excluding price contingencies, taxes and duties. Recurrent costs for continued extension/training support, operation and maintenance and periodic replacement of vehicles have been included.

18. **Production Benefits:** The farm productions are direct output from the respective models, which were based on the respective production models. It is assumed that about 92,400 households in receipt of facilities for improving the productivity of the red soil cropped areas and improved agriculture and farming practices achieve productivity increases ranging from 15 to 25% due to enhanced soil-moisture, better seeds and training and soil and water conservation practices. Likewise some 39,600 households are in receipt of facilities for improving the crop productivity of the black soil area. Under the livestock subproject 44,000 households are in receipt of facilities and supporting infrastructure for the overall development of backyard poultry and sheep sub-sector. Project benefits as are quantified in monetary terms are given in Annex-1.4 for details.

19. Environmentally-related aspects of the project are its soil and water conservation for enhancing the productivity of crops, pilots on groundwater recharge, a focus on community-based forest common property area management for improving its production and forage. All these aspects will yield substantial environmental benefits that have not been quantified in the economic analysis, for the following reasons: (i) farmers may not perceive degradation of their lands as a result of declining soil fertility and soil erosion and thus underestimate the potential benefits of soil and water conservation measures over the longer terms; and (ii) communities, lacking assured property rights over common property areas that they access to, for fodder, may not regulate their harvests to ensure sustainable use of these land, ie open access may result in overexploitation. Lined water harvesting ponds may not be environmentally adverse as these structures harvest and use only the run-off water. Similarly no attempts are made in increasing the livestock flock size thus avoiding any adverse impact on already a fragile natural resources management. Collectivisation of tube-wells will avoid over-exploitation of groundwater and provision of micro-irrigation equipment such as drip sets and mini-sprinklers help conserve water and improve crop productivity. These are seen as environmentally positive features

20. **Project Performance Indicators**: Cost-benefit analysis method was used for the economic analysis of the project and using three indicators to assess the overall performance of the project. These are (i) economic internal rate of return (IRR), (ii) net present value (NPV), and (iii) benefit cost ratio (BCR). These were estimated using a 20 year incremental cash flows of benefit and cost streams. Accordingly the overall Project IRR is 19%. The estimated NPV for a 10% discount rate is INR 4,606 million and the BCR of 1.24. A positive NPV under the current Opportunity Cost of Capital (OCC) of 10% and even at a 20% discounted rate indicates that the project investments are robust. See Table-6 below and details in Annex-1.1 & 1.2 and in EFA Data summary in Annex at the end of text.

Table-6: Base case and Sensitivity Analysis of NPV, IRR & BCR

Scenario	Base case	Cost Increases by		Benefits down by	
		10%	20%	10%	20%
NPV (million INR) at 10% a/	4,606	2,689	772	2,228	-149
IRR % b/	19%	15%	11%	15%	10%
BCR discounted at 10% c/	1.24	1.13	1.03	1.12	0.99

a/ The NPV is a very concise performance indicator of an investment project: it represents the present amount of the net benefits (i.e. incremental benefits less incremental costs) flow generated by the investment expressed in INR (a single value with the same unit of measurement used in the accounting tables). The Net Present Value is the sum of a 20 year discounted net cash flows.

b/ IRR is defined as the discount rate that zeroes out the net present value of flows of costs and net present value of flows of benefits of an investment. The IRR was computed using incremental net benefits streams for 20 year period. As IRR rankings can be misleading, and given that the informational requirements for computing a proper NPV and IRR are the same except for the discount rate, it is always worth calculating the NPV of a project. There are many reasons in favour of the NPV decision rule (see Lev, 2007).

C/ a/ The BCR was estimated using (i) the discounted incremental cost streams for a 25 year period and (ii) discounted incremental benefits streams for the same life period. The incremental costs and incremental benefits streams were discounted using a 10% discounted rate. The BCR is independent of the size of the investment, but in contrast to IRR it does not generate ambiguous cases and for this reason it can complement the NPV in ranking projects where budget constraints apply. Being a ratio, the indicator does not consider the total amount of net benefits and therefore the ranking can reward more projects that contribute less to the overall increase

in public welfare.

21. **Sensitivity analysis:** Sensitivity analysis of the project performance indicators has been carried out in order to test the robustness of project investments and benefits streams. NPV of net benefit streams discounted at varying rates indicate that discounting at 20% yields negative NPV. If benefits are delayed by two years, (in effect, if the project's production activities take longer to become established), then the IRR declines to 13% with a NPV of 1,793 million. The decline in benefits is more sensitive to the project than increases in costs. Likewise, the sensitivity analysis of BCR indicates that the project is more sensitive to decline in benefits than increases in costs. Annex-1.1 and 1.2.

22. **Summing up**: Sensitivity analysis confirms that the Project remains moderately robust both to decreases in benefits and increases in costs. None the less, the project is more sensitive to decline in benefits than increases in costs. Decrease in benefits may be brought about by a decline in output prices, or a failure in achieving projected yields or outputs. It is noted that the project area often experiences natural calamities such as droughts and therefore there are possibilities of decline in benefits happening more often than costs. Switching values[66] indicate that the investments are worthy even if costs increased over 24% and benefits declined by 19%. As the proposed investments are targeted at the households that are prone to frequent natural calamities and who largely depend upon rainfall for crop production, the resulting base case IRR of 19% is considered more than justified.

III. BENEFITS AND BENEFICIARIES

A. Benefits and Beneficiaries

23. **Beneficiaries:** The project covers some 165,000 households from 330 GP clusters in 5 drought-prone districts of Andhra Pradesh. All households who wish to participate from each GP will be directly benefited by one or more project interventions. Number of beneficiary households by subproject and year are shown in Table-7 below.

Table-7: Number of Benefited Households, cumulative by year

Subproject households	Project Year							
	1	2	3	4	5	6	7	Total
Red soil cropped households	0	4,480	18,200	41,440	64,680	87,920	92,400	92,400
Black soil cropped households	0	1,920	7,800	17,760	27,720	37,680	39,600	39,600
Livestock households	198	4,008	15,700	31,910	43,103	44,000	44,000	44,000
Total benefited households	198	10,408	41,700	91,110	135,503	169,600	176,000	176,000

See Annex-D for details.

24. Beneficiary participation has been phased in such a manner to permit flexibility in project interventions and also to prepare the vulnerable groups to gain confidence and adequate capacity. Accordingly, the project interventions commences in each district simultaneously.

25. **Income benefits:** The immediate benefits from the project are increased productivity-through the introduction of in situ water conservation practices, improved farming practices including moderate shift in cropping patterns in response to market demands and cultivation of vegetables. This response is expressed as increased household incomes, and improved food security. The benefit will come from modest increases in crop production due to training, demonstrations and capacity building. Farm incomes, including the value of labour will increase by INR 29,240 at full development stage.

[66] Switching values are yet another measure of sensitivity analysis They demonstrate by how much a variable would have to fall (if it is a benefit) or rise (if it is a cost) to make it not worth undertaking an option.

Table-8 Without project and with project incomes (INR/household) a/		
Description of type	WOP	With project
Overall income	59,365	93,750
-of which from agriculture	46,697	67,460
-of which from livestock	12,468	26,290
Average of all 165,000 participating households; See Annex-1.4 for details		

26. In qualitative terms, minimised soil erosion in the cropped area, reduced runoff and increased infiltration, and enhancement of organic contents of the soil are some of the benefits of the soil and water conservation measures, which have not been quantified. There are marginal increases on demand on family labour from the existing level of 94 person-days to 128 person-days. Improvement in farming practices and land management is brought in slowly and steadily.

27. **Other benefits:** Additional benefits will come from the project's capacity building interventions. First, at the end of the project, all participating GPs will have the benefit and advantages of the services of the FPOs, FFS and CLICs that are established under the project. Secondly, farmers will be participating in and managing their social and economic development and will have better access to markets and inputs. Thirdly, the grassroots CRP groups will have gained experience of developing the CRP areas to the best of their advantage and thereby ensuring the sustainability of the operations and maintenance of these area in meeting partly their fodder needs.

B. Risks and Sustainability

28. There are a number of risks associated with the project. These relate to uptake of farm technology, reluctance on the part of the farmers, inadequate extension support, inadequate market linkages and poor price margins to farmers, inadequate flow of funds from the convergence programme, lack of service providers, poor coordination and institutional support, These issues and risks are addressed in the design as described below:

Table-9: Project Risks and Sustainability

Risks	Risk description	Probability of occurrence	Mitigation measures in programme design	Comparative sensitivity analysis result (Proxy)
Institutional	Delay in technology transfer slowing down the uptake rates and production Weak technical and management capacities of the service providers	High to Medium	FFS promoted and facilitated; Extensive training and demonstrations of package of practices, Competent service providers recruited;	Benefits lag by 2 years: IRR= 13% NPV= 1,793 million BCR= 1.09
	Lack of financial capacity of the FPOs to invest in working capital requirements	High to Medium	Working capital facilities extended to these FPOs	Decline in benefits by 20%: IRR=10% NPV=-149 million BCR= 0.99
Market	Inadequate profit margins to farmers Lack of capacities of FPOs to negotiate fair deals with traders and suppliers	High to medium	Market information, improved technology advice. Empowering the producers' groups; training and capacity building; Facilities for linkages with private sector-producers groups for effective marketing support	Decline in benefits and increases in cost by 15%: IRR= 6% NPV=(1836) million BCR=0.92
	Lower market prices for commodities	Medium	Diversified production and improved market information; production of ready	

Table-9: Project Risks and Sustainability				
Risks	**Risk description**	**Probability of occurrence**	**Mitigation measures in programme design**	**Comparative sensitivity analysis result (Proxy)**
			to market commodities and provision of storage facilities	
Policy	Lack of commitment to investing in the welfare development and slowing down funds flow	Small	The project investments are fully supported by GoAP and adequate funds are committed;	Operating costs increase by 25%: IRR=10% NPV= (187) million BCR=0.99
Others	Climate change risks of droughts, floods, etc	High to Medium	Training farmers on climate change risks during the FFS on crops so as to develop their capacity to make informed choice of crops and of cropping pattern and itinerary	Decline in benefits by 25%: IRR= -7% NPV=(1,330) million BCR=0.93

ANNEX: EFA DATA FRAMEWORK

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A)

FINANCIAL ANALYSIS	Red soil agri farms		Black soil agri farms		Livestock farms		
	Net incremental benefits of Farm and Activity subproject models '000 INR						
PY1	0		0		0		
PY2	48,146		44,583		325		
PY3	195,596		181,120		-5,471		
PY4	445,357		412,397		-28,764		
PY5	695,118		643,674		-32,968		
PY6	944,679		874,950		9,600		
PY7	993,025		919,535		36,563		
PY8	883,025		919,535		66,985		
PY9	993,025		919,535		318,519		
PY10	883,025		919,535		650,840		
PY11	993,025		919,535		738,802		
PY12	883,025		919,535		765,490		
PY13	993,025		919,535		781,300		
PY14	883,025		919,535		772,929		
PY15	993,025		919,535		787,765		
PY16	883,025		919,535		813,620		
PY17	993,025		919,535		816,813		
PY18	883,025		919,535		788,852		
PY19	993,025		919,535		786,447		
PY20	883,025		919,535		790,350		
NPV (INR, 000)	4,494,044	0	4,322,891	0	1,749,762	0	0
NPV (USD 000)	67,075.3	0.0	64,520.8	0.0	26,115.8	0.0	0.0
FIRR (@ 12%)					91%		

B)

PROJECT COSTS AND INDICATORS FOR LOGFRAME						
TOTAL PROJECT COSTS (in million USD)		**151.88**	Base costs	139.15	PMU	7.35
Number of Beneficiaries	**165,000** Households	# of FFS 475	# of FPOs 370	# clusters 330	# of farm hh 121,110	# of other hh 43,890
Cost per beneficiary (IFAD resources)	**457** USD/ household				**Adoption rates**	**79%**

Components	Cost USD M	Outcomes	Indicators
Climate resilient production sys	112.20	improved production systems	# of farmers accepting CLIC services
Drought proofing thro' NRM	31.49	water budgets used for production plans	# of GP adopting water budgeting plan
Project management	8.18	Lessons discussed with Govt & public inst.	PMU progress reports
Total project costs	151.88		

C)

MAIN ASSUMPTIONS & SHADOW PRICES[1]					
FINANCIAL	**Output**	Incremental value (%)	Price (in INR)	**Input prices**	Price (INR)
	Crops, rainfed	25.0%	Sorghum, 25/kg	Fertilizer, average, per kg	14/kg
			redgram 80/kg; Gnut 50/	Pesticides, average, per lit	500/lit
	Crops, irrigated	35 -40%	rice 28/kg; maize13.5/kg		
			vegetables, 7/kg	Rural wage rate, pers_day	175/day
	Small ruminants	20.0%	sheep # 5,640		
	Backyard poultry	15.0%	poultry bird # 250		
ECONOMIC	Official Exchange rate,August	67		Discount rate (opportunity cost of capital)	10.0%
	Shadow Exchange rate b/	96		Long term bond rate	10.0%
	Standard Conversion Factor	1.43		Output conversion factor a/	0.85
	Labour Conversion factor	0.85		Input Conversion factor a/	0.85

[1] All prices expressed in INR Currency. a/ estimated from data generated from farmod
b/ arrived at using export and import values* OER

D)

BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES

Project year → / Interventions	PY1	PY 2	PY3	PY4	PY5	PY 6	PY 7	Total	Adoption rates
# of hh participating in red soil agri farms	0	4,480	18,200	41,440	64,680	87,920	92,400	92,400	
(groundnut+red gram, sorghum, tomato etc)		3,584	14,560	33,152	51,744	70,336	73,920	73,920	80%
# of hh participating in black soil agri farms	0	1,920	7,800	17,760	27,720	37,680	39,600	39,600	
(cotton,chick pea, paddy, maize, tomato)		1,536	6,240	14,208	22,176	30,144	31,680	31,680	80%
# of hh participating in Backyard poultry	198	2,327	5,347	7,773	10,000	10,890	10,890	10,890	
(5 bird unit)	178	2,094	4,812	6,996	9,000	9,800	9,800	9,800	90%
# of hh participating in Poultry breeder farm	5	29	57	80	103	112	112	112	
(1000 bird unit; chick production unit)	5	29	57	80	103	112	112	112	100%
# hh participating in Sheep fattening unit	0	866	5,148	12,029	16,500	16,500	16,500	16,500	
(20 sheep unit)	0	606	3,604	8,420	11,550	11,550	11,550	11,550	70%
# of hh participating in Sheep rearing unit	0	866	5,148	12,029	16,500	16,500	16,500	16,500	
(30+1 sheep unit)	0	606	3,604	8,420	11,550	11,550	11,550	11,550	70%
Total # of participating households	203	10,488	41,700	91,111	135,503	169,602	176,002	176,002	
Total # of hhs adopting interventions	183	8,456	32,877	71,276	106,123	133,492	138,612	138,612	79%

F)

SENSITIVITY ANALYSIS (SA)

	Δ%	Link with the risk matrix	IRR	NPV 1/
Basecase scenario			19%	4,606
Project benefits	-20%		10%	(-149)
Project costs	10%			
Project benefits	10%		11%	311
2 years lag in benefits.			13%	1,793
Project benefits	-25%	climate risks, cyclones, low rainfall, droughts	7%	(-1338)
Input prices	25%	lack of policy commitment	15%	1,730

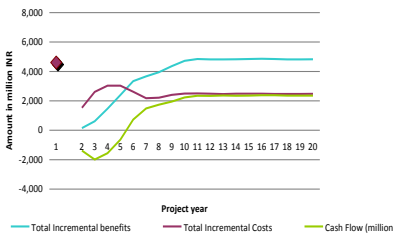
1/ NPV is in million INR discounted at 10%

E)

ECONOMIC ANALYSIS

Project year	NET INCREMENTAL BENEFITS: Redsoil farms	Black soil farms	livestock farms					Total Incremental benefits	NET INCREMENTAL COSTS: Economic investment Costs	Economic recurrent Costs	Total Incremental Costs	Cash Flow (million INR)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	573.7	0.0	573.7	-574
2	77.8	62.0	2.4					142.2	1,467.6	58.4	1,526.0	-1,384
3	316.1	251.9	43.3					611.3	2,328.2	281.6	2,609.8	-1,998
4	719.8	573.5	169.3					1462.6	2,299.1	729.8	3,028.9	-1,566
5	1,123.5	895.1	375.1					2393.7	1,790.6	1,241.6	3,032.2	-638
6	1,527.2	1216.7	593.1					3337.0	889.5	1,724.0	2,613.5	723
7	1,605.0	1278.7	777.3					3661.1	229.8	1,948.2	2,178.0	1,483
8	1,605.0	1278.7	1060.4					3944.2		2,207.5	2,207.5	1,737
9	1,605.0	1278.7	1472.3					4356.0		2,407.4	2,407.4	1,949
10	1,605.0	1278.7	1837.9					4721.7		2,489.0	2,489.0	2,233
11	1,605.0	1278.7	1958.8					4842.6		2,501.6	2,501.6	2,341
12	1,605.0	1278.7	1933.8					4817.5		2,487.1	2,487.1	2,330
13	1,605.0	1278.7	1933.8					4817.5		2,459.9	2,459.9	2,358
14	1,605.0	1278.7	1938.6					4822.4		2,480.0	2,480.0	2,342
15	1,605.0	1278.7	1957.8					4841.5		2,487.7	2,487.7	2,354
16	1,605.0	1278.7	1972.3					4856.1		2,480.6	2,480.6	2,375
17	1,605.0	1278.7	1958.8					4842.6		2,467.2	2,467.2	2,375
18	1,605.0	1278.7	1933.8					4817.5		2,467.7	2,467.7	2,350
19	1,605.0	1278.7	1933.8					4817.5		2,469.7	2,469.7	2,348
20	1,605.0	1278.7	1938.6					4822.4		2,471.2	2,471.2	2,351
		NPV at 7.8% ('million)	4,603		Current GoI Bond rate is applied as Discount rate							
		BCR	1.24					23,775			19,172	
		EIRR	19%									

G)



ANNEX-A: NET INCREMENTAL BENEFITS OF SUBPROJECTS, FINANCIAL

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A)		Red soil agri farms		Black soil agri farms		Livestock farms			
		Net incremental benefits of Farm and Activity subproject models in 000 INR							
FINANCIAL ANALYSIS	PY1	0		0		0			
	PY2	48,146		44,583		325			
	PY3	195,596		181,120		-5,471			
	PY4	445,357		412,397		-28,764			
	PY5	695,118		643,674		-32,968			
	PY6	944,679		874,950		9,600			
	PY7	993,025		919,535		36,563			
	PY8	883,025		919,535		66,985			
	PY9	993,025		919,535		318,519			
	PY10	883,025		919,535		650,840			
	PY11	993,025		919,535		738,802			
	PY12	883,025		919,535		765,490			
	PY13	993,025		919,535		781,300			
	PY14	883,025		919,535		772,929			
	PY15	993,025		919,535		787,765			
	PY16	883,025		919,535		813,620			
	PY17	993,025		919,535		816,813			
	PY18	883,025		919,535		788,852			
	PY19	993,025		919,535		786,447			
	PY20	883,025		919,535		790,350			
NPV (INR, 000)		4,494,044	0	4,322,891	0	1,749,762	0	0	
NPV (USD 000)		67,075.3	0.0	64,520.8	0.0	26,115.8	0.0	0.0	
FIRR (@ 12%)						91%			

ANNEX-B: PROJECT COSTS AND INDICATORS FOR LOGFRAME

B)

PROJECT COSTS AND INDICATORS FOR LOGFRAME						
TOTAL PROJECT COSTS (in million USD)		**151.88**	Base costs	139.15	PMU	7.35
Number of Beneficiaries	**165,000** Households	# of FFS 475	# of FPOs 370	# clusters 330	# of farm hh 121,110	# of other hh 43,890
Cost per beneficiary (IFAD resources)	**457** USD/ household				**Adoption rates**	**79%**

Components	**Cost USD M**	**Outcomes**	**Indicators**
Climate resilient production sys	112.20	improved production systems	# of farmers accepting CLIC services
Drought proofing thro' NRM	31.49	water budgets used for production plans	# of GP adopting water budgeting plan
Project management	8.18	Lessons discussed with Govt & public inst.	PMU progress reports
Total project costs	151.88		

ANNEX-C: MAIN ASSUMPTIONS AND SHADOW PRICES

C)	**MAIN ASSUMPTIONS & SHADOW PRICES[1]**					
FINANCIAL	**Output**	Incremental value (%)	Price (in INR)	**Input prices**	Price (INR)	
	Crops, rainfed	25.0%	Sorghum, 25/kg	Fertilizer, average, per kg	14/kg	
			redgram 80/kg; Gnut 50/	Pesticides, average, per lit	500/lit	
	Crops, irrigated	35 -40%	rice 28/kg; maize13.5/kg			
			vegetables, 7/kg	Rural wage rate, pers_day	175/day	
	Small ruminants	20.0%	sheep # 5,640			
	Backyard poultry	15.0%	polutry bird # 250			
ECONOMIC	Official Exchange rate,August	67		Discount rate (opportunity cost of capital)	10.0%	
	Shadow Exchange rate b/	96		Long term bond rate	10.0%	
	Standard Conversion Factor	1.43		Output conversion factor a/	0.85	
	Labour Conversion factor	0.85		Input Conversion factor a/	0.85	

[1] All prices expressed in INR Currency.

a/ estimated from data generated from farmod

b/ arrived at using export and import values* OER

ANNEX-D BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES

D)

BENEFICIARIES, PHASING BY INTERVENTION AND ADOPTION RATES

Project year → / **Interventions**	PY1	*PY 2*	PY3	PY4	PY5	PY 6	PY 7	Total	Adoption rates
# of hh participating in red soil agri farms	*0*	*4,480*	*18,200*	*41,440*	*64,680*	*87,920*	*92,400*	*92,400*	
(groundnut+red gram, sorghum, tomato etc)		*3,584*	*14,560*	*33,152*	*51,744*	*70,336*	*73,920*	*73,920*	*80%*
# of hh participating in black soil agri farms	*0*	*1,920*	*7,800*	*17,760*	*27,720*	*37,680*	*39,600*	*39,600*	
(cotton,chick pea, paddy, maize, tomato)		*1,536*	*6,240*	*14,208*	*22,176*	*30,144*	*31,680*	*31,680*	*80%*
# of hh participating in Backyard poultry	*198*	*2,327*	*5,347*	*7,773*	*10,000*	*10,890*	*10,890*	*10,890*	
(5 bird unit)	*178*	*2,094*	*4,812*	*6,996*	*9,000*	*9,800*	*9,800*	*9,800*	*90%*
# of hh participating in Poultry breeder farm	*5*	*29*	*57*	*80*	*103*	*112*	*112*	*112*	
(1000 bird unit; chick production unit)	*5*	*29*	*57*	*80*	*103*	*112*	*112*	*112*	*100%*
# hh participating in Sheep fattening unit	*0*	*866*	*5,148*	*12,029*	*16,500*	*16,500*	*16,500*	*16,500*	
(20 sheep unit)	*0*	*606*	*3,604*	*8,420*	*11,550*	*11,550*	*11,550*	*11,550*	*70%*
# of hh participating in Sheep rearing unit	*0*	*866*	*5,148*	*12,029*	*16,500*	*16,500*	*16,500*	*16,500*	
(30+1 sheep unit)	*0*	*606*	*3,604*	*8,420*	*11,550*	*11,550*	*11,550*	*11,550*	*70%*
Total # of participating households	203	10,488	41,700	91,111	135,503	169,602	176,002	176,002	
Total # of hhs adopting interventions	*183*	*8,456*	*32,877*	*71,276*	*106,123*	*133,492*	*138,612*	*138,612*	79%

ANNEX-E: NET INCREMENTAL BENEFITS & IRR

ECONOMIC ANALYSIS	E)	NET INCREMENTAL BENEFITS								NET INCREMENTAL COSTS			Cash Flow (million INR)
	Project year	Redsoil farms	Black soil farms	livestock farms					Total Incremental benefits	Economic investment Costs	Economic recurrent Costs	Total Incremental Costs	
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.0*	573.7	0.0	*573.7*	**-574**
	2	77.8	62.0	2.4					*142.2*	1,467.6	58.4	*1,526.0*	**-1,384**
	3	316.1	251.9	43.3					*611.3*	2,328.2	281.6	*2,609.8*	**-1,998**
	4	719.8	573.5	169.3					*1462.6*	2,299.1	729.8	*3,028.9*	**-1,566**
	5	1,123.5	895.1	375.1					*2393.7*	1,790.6	1,241.6	*3,032.2*	**-638**
	6	1,527.2	1216.7	593.1					*3337.0*	889.5	1,724.0	*2,613.5*	**723**
	7	1,605.0	1278.7	777.3					*3661.1*	229.8	1,948.2	*2,178.0*	**1,483**
	8	1,605.0	1278.7	1060.4					*3944.2*		2,207.5	*2,207.5*	**1,737**
	9	1,605.0	1278.7	1472.3					*4356.0*		2,407.4	*2,407.4*	**1,949**
	10	1,605.0	1278.7	1837.9					*4721.7*		2,489.0	*2,489.0*	**2,233**
	11	1,605.0	1278.7	1958.8					*4842.6*		2,501.6	*2,501.6*	**2,341**
	12	1,605.0	1278.7	1933.8					*4817.5*		2,487.1	*2,487.1*	**2,330**
	13	1,605.0	1278.7	1933.8					*4817.5*		2,459.9	*2,459.9*	**2,358**
	14	1,605.0	1278.7	1938.6					*4822.4*		2,480.0	*2,480.0*	**2,342**
	15	1,605.0	1278.7	1957.8					*4841.5*		2,487.7	*2,487.7*	**2,354**
	16	1,605.0	1278.7	1972.3					*4856.1*		2,480.6	*2,480.6*	**2,375**
	17	1,605.0	1278.7	1958.8					*4842.6*		2,467.2	*2,467.2*	**2,375**
	18	1,605.0	1278.7	1933.8					*4817.5*		2,467.7	*2,467.7*	**2,350**
	19	1,605.0	1278.7	1933.8					*4817.5*		2,469.7	*2,469.7*	**2,348**
	20	1,605.0	1278.7	1938.6					*4822.4*		2,471.2	*2,471.2*	**2,351**

NPV at 7.8% ('million)	**4,603**
BCR	**1.24**
EIRR	**19%**

Current GoI Bond rate is applied as Discount rate

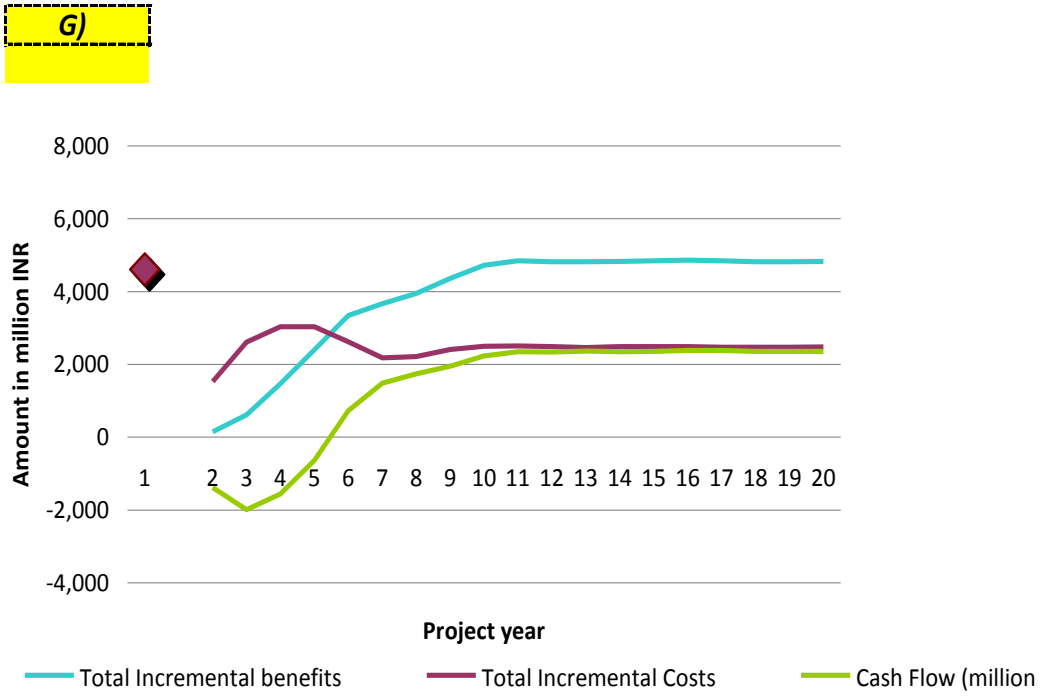
23,775 19,172

ANNEX-F SENSITIVITY ANALYSIS

F)

SENSITIVITY ANALYSIS (SA)				
	Δ%	**Link with the risk matrix**	**IRR**	**NPV 1/**
Basecase scenario			19%	4,606
Project benefits	-20%		10%	(-149)
Project costs	10%			
Project benefits	10%		11%	311
2 years lag in benefits.			13%	1,793
Project benefits	-25%	climate risks, cyclones, low rainfall, droughts	7%	(-1338)
Input prices	25%	lack of policy commitment	15%	1,730
1/ NPV is in million INR discounted at 10%				

ANNEX-G: GRAPH SHOWING INCREMENTAL BENEFITS, COSTS AND NET INCOME



V.

VI.PROJECT PERFORMANCE INDICATORS AND SENSITIVITY ANALYSIS

VII. ANNEX-1.1: PROJECT "INTERNAL RATE OF RETURN" & SENSITIVITY ANALYSIS

ECONOMIC ANALYSIS

Country:	INDIA	Discount rate:DR	**0.1**	10%
Project:	**Andhra Pradesh Drought Mitigation Project Design Completion**			
(amount in million INR)				

	Project Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Incremental benefits																				
Incremental benefits	0.0	142.2	611.6	1463.1	2394.3	3337.8	3661.9	3945.0	4356.9	4722.5	4843.4	4818.4	4818.4	4823.2	4842.4	4856.9	4843.4	4818.4	4818.4	4823.2
Total Incremental benefits	0.0	142.2	611.6	1463.1	2394.3	3337.8	3661.9	3945.0	4356.9	4722.5	4843.4	4818.4	4818.4	4823.2	4842.4	4856.9	4843.4	4818.4	4818.4	4823.2
Incremental costs																				
Investment costs	573.7	1467.6	2326.2	2299.1	1790.6	889.5	229.8													
Production costs, inputs	0.0	22.2	123.9	358.8	650.4	922.6	1107.3	1366.5	1566.5	1648.1	1660.6	1646.2	1628.9	1639.1	1646.8	1639.6	1626.2	1626.7	1628.7	1630.3
Production costs, labour	0.0	36.2	157.7	371.0	591.2	801.4	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9	840.9
Incremental costs	573.7	1526.0	2607.8	3028.9	3032.2	2613.5	2178.1	2207.5	2407.4	2489.0	2501.6	2487.1	2469.9	2480.0	2487.7	2480.6	2467.2	2467.7	2469.7	2471.2
Incremental net benefits	-573.7	-1383.7	-1996.3	-1565.8	-637.9	724.2	1483.8	1737.6	1949.4	2233.4	2341.8	2331.2	2348.5	2343.2	2354.6	2376.4	2376.2	2350.7	2348.7	2352.0

Basecase results discounted:		10%
NPV of benefit streams discounted at	10%	23,780
NPV of costs stream discounted at	10%	19,173
NPV of project discounted at	10%	4,606
BCR- discounted benefits & costs at	10%	1.24
IRR		19%

Benefits lagged by 2 year DR at	10%	
NPV of benefit streams discounted at	10%	20,966
NPV of costs stream discounted at	10%	19,173
NPV of project discounted at	10%	1,793
BCR- discounted benefits & costs at	10%	1.09
IRR		13%

VIII. ANNEX-1.2: SENSITIVITY TESTS: "SWITCHING VALUES" & BCR

Results of Sensitivity Analysis using 10% discount rate:

		Costs increased by				Benefits down by				Both cost increase & benefits down			
Project Performance indicators		10%	15%	20%	25%	10%	15%	20%	25%	10%	15%	20%	25%
NPV of at discount rate of	10%	2,689	1,730	772	-187	2,228	1,039	-149	-1,338	311	-1,836	-3,984	-6,132
BCR at discount rate of	10%	1.13	1.08	1.03	0.99	1.12	1.05	0.99	0.93	1.01	0.92	0.83	0.74
IRR		15%	13%	11%	10%	15%	12%	10%	7%	11%	6%	1%	#DIV/0!

Switching Value Analysis:

Switching Value:	Appraisal	Switching value	% change
Total Benefits at 10% DR	23,780	19,173	-19
Total Costs at 10% DR	19,173	23,780	24

IX. *ANNEX-1.3: PROJECT INVESTMENT COSTS (ECONOMIC)*

INDIA
ANDHARA PRADESH DOUGHT MITIGATION PROJECT

Expenditure Accounts by Years -- Base Costs	**Base Cost (INR '000)**							
	17/18	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**Total**
I. Investment Costs								
A. Works	60,813	272,315	564,646	640,630	608,074	211,004	-	2,357,481
B. Training and capacity building	36,668	68,583	71,038	64,536	45,586	19,630	2,600	308,640
C. Consultancies, studies & TA	244,357	244,025	232,184	229,156	226,696	216,422	159,872	1,552,711
D. Goods Services and Inputs	185,578	824,009	1,416,279	1,315,277	869,896	382,588	10,821	5,004,447
E. Grants and Subsidies	14,325	37,250	40,200	34,725	22,400	11,400	-	160,300
Total Investment Costs	541,740	1,446,181	2,324,347	2,284,324	1,772,652	841,044	173,292	9,383,580
II. Recurrent Costs								
A. Salaries and allowances	27,198	37,704	37,704	37,704	37,704	37,704	37,704	253,422
B. Office operating costs	10,303	16,175	20,855	20,855	20,855	14,915	8,915	112,871
Total Recurrent Costs	37,501	53,879	58,559	58,559	58,559	52,619	46,619	366,293
Total BASELINE COSTS	579,241	1,500,060	2,382,905	2,342,882	1,831,211	893,663	219,911	9,749,872
Physical Contingencies	24,826	57,933	88,430	81,879	63,332	33,362	10,716	360,476
Price Contingencies								
Subtotal Price Contingencies	13,034	94,882	252,551	343,588	354,804	233,038	84,070	1,375,966
Total PROJECT COSTS	617,100	1,652,875	2,723,886	2,768,349	2,249,346	1,160,063	314,696	11,486,315
Taxes	14,939	60,999	111,112	108,834	90,727	32,271	780	419,662
Economic cost								
Total project costs	617,100	1,652,875	2,723,886	2,768,349	2,249,346	1,160,063	314,696	11,486,315
Less								
Price contingences	13,034	94,882	252,551	343,588	354,804	233,038	84,070	1,375,966
Taxes	14,939	60,999	111,112	108,834	90,727	32,271	780	419,662
Inputs	15390	29440	34010	16837	13246	5270	0	
Total	43,362	185,321	397,673	469,259	458,777	270,578	84,850	
Economic cost	573,737	1,467,554	2,326,213	2,299,090	1,790,569	889,484	229,846	

X. *ANNEX-1.4: PROJECT INCREMENTAL BENEFITS STREAMS & COSTS STREAMS*

India
AP Drought Mitigation Project
Project Summary

ECONOMIC BUDGET (AGGREGATEI	Without Project	WP	Increments											
(In INR Million)	1 to 20	20	1	2	3	4	5	6	7	8	9	10	15	20
Main Production														
Cereals, pulses and oilseeds	4,579.3	7,486.4	-	141.0	572.6	1,303.8	2,035.0	2,766.2	2,907.1	2,907.1	2,907.1	2,907.1	2,907.1	2,907.1
Cotton	1,148.6	827.0	-	-15.6	-63.3	-144.2	-225.1	-306.0	-321.6	-321.6	-321.6	-321.6	-321.6	-321.6
Vegetables	849.4	1,147.6	-	14.5	58.7	133.8	208.8	283.8	298.3	298.3	298.3	298.3	298.3	298.3
Sheep	1,724.9	3,545.8	-	-	17.7	111.3	291.0	484.9	659.6	942.7	1,354.5	1,720.1	1,840.0	1,820.8
Poultry	22.9	141.5	-	2.4	25.8	58.4	84.7	108.9	118.6	118.6	118.6	118.6	118.6	118.6
Sub-total Main Production	8,325.1	13,148.3	-	142.2	611.6	1,463.1	2,394.3	3,337.8	3,661.9	3,945.0	4,356.9	4,722.5	4,842.4	4,823.2
Production Cost														
Purchased Inputs														
Seeds and planting materials	1,092.1	1,008.6	-	-4.0	-16.4	-37.4	-58.4	-79.4	-83.5	-83.5	-83.5	-83.5	-83.5	-83.5
Fertilisers and PPC	819.8	1,272.6	-	22.0	89.2	203.1	317.0	430.9	452.9	452.9	452.9	452.9	452.9	452.9
Materials and equipment	735.0	788.4	-	2.6	10.5	23.9	37.3	50.8	53.3	53.3	53.3	53.3	53.3	53.3
Feed & medicine	-	10.0	-	-	0.3	1.6	3.8	5.4	6.0	7.0	8.4	9.7	10.0	10.0
Sheep unit	1,600.2	2,741.7	-	-	23.1	132.9	305.1	458.3	620.6	880.8	1,079.4	1,159.8	1,158.0	1,141.6
Poultry unit	6.9	62.8	-	1.7	17.3	34.7	45.6	56.6	58.0	55.9	55.9	55.9	56.0	55.9
Sub-Total Purchased Inputs	4,253.9	5,884.2	-	22.2	123.9	358.8	650.4	922.6	1,107.3	1,366.5	1,566.5	1,648.1	1,646.8	1,630.3
Labor														
Farm labour	2,305.6	3,146.5	-	36.2	157.7	371.0	591.2	801.4	840.9	840.9	840.9	840.9	840.9	840.9
Sub-Total Production Cost	6,559.4	9,030.7	-	58.4	281.6	729.8	1,241.6	1,724.0	1,948.3	2,207.5	2,407.4	2,489.0	2,487.7	2,471.2
Other Costs														
Project investments	-	-	573.7	1,467.6	2,326.2	2,299.1	1,790.6	889.5	229.8	-	-	-	-	-
OUTFLOWS	6,559.4	9,030.7	573.7	1,526.0	2,607.8	3,028.9	3,032.2	2,613.5	2,178.1	2,207.5	2,407.4	2,489.0	2,487.7	2,471.2
Cash Flow	1,765.7	4,117.6	-573.7	-1,383.7	-1,996.3	-1,565.8	-637.9	724.2	1,483.8	1,737.6	1,949.4	2,233.4	2,354.6	2,352.0

IRR = 19.1%, NPV = 4,606.43

XI. ANNEX-1.5: PROJECT INCREMENTAL LABOUR REQUIREMENT

India
AP Drought Mitigation Project
Project Summary

LABOR BUDGET (In Units '000)		**Without Project**		**Increments**						
	Unit	**1 to 20**	**7 to 20**	**1**	**2**	**3**	**4**	**5**	**6**	**7 to 20**
Labor Requirements										
Field preparation	pers_day	1,225	1,642	-	20	82	187	291	396	416
Sowing	pers_day	505	644	-	7	27	62	97	132	139
Planting	pers_day	497	444	-	-3	-11	-24	-38	-51	-54
Transplanting	pers_day	385	193	-	-9	-38	-86	-135	-183	-193
Ridging	pers_day	297	296	-	-0	-0	-0	-1	-1	-1
Weeding	pers_day	2,483	3,013	-	26	105	238	371	505	531
Fertiliser application	pers_day	738	1,136	-	19	78	179	279	379	398
Irrigation	pers_day	202	637	-	21	86	195	305	414	435
Harvesting	pers_day	2,332	2,786	-	22	89	204	318	432	454
Threshing	pers_day	1,366	3,256	-	92	372	847	1,323	1,798	1,890
Nursery preparation	pers_day	166	148	-	-1	-4	-8	-13	-17	-18
Spraying	pers_day	1,093	1,316	-	11	44	100	156	212	223
Transporting	pers_day	-	657	-	32	129	295	460	625	657
Operations and maintenance	pers_day	4,210	4,985	-	7	99	307	560	746	776
Sub-Total Labor Requirements		15,500	21,153	-	243	1,060	2,494	3,974	5,388	5,653

XII. ANNEX-1.6: PROJECT PRODUCTION - TOTAL & INCREMENTAL

India
AP Drought Mitigation Project
Project Summary

PRODUCTION AND INPUTS (Detailed) (In Units '000)	Unit	Without Project 1 to 20	WP 20	INCREMENTAL 20
Main Production				
Paddy rice	ton	30.4	19.8	-10.6
Paddy straw	ton	60.8	45.6	-15.2
Sorghum	ton	-	30.5	30.5
Sorghum byproduct	ton	-	48.8	48.8
Chick pea	ton	-	41.0	41.0
Groundnut pods	ton	83.8	88.7	5.0
Groundnut straw	ton	-	95.2	95.2
Redgram	ton	3.6	5.0	1.4
Maize	ton	-	29.7	29.7
Maize byproduct	ton	-	22.8	22.8
Cotton	ton	36.0	25.9	-10.1
Tomato	ton	142.2	192.2	49.9
Ram lambs (3-4 month old)	animal	161.7	404.3	242.6
Ram lambs, 8-9 month old	animal	173.3	231.0	57.8
Ewe lamb, 3 -4 month old	animal	23.1	242.6	219.5
Ewe lamb 1-2 year old	animal	-	0.6	0.6
culled ewe	animal	69.3	127.1	57.8
Breeding ram	animal	11.6	11.6	-
Chicks	bird	-	51.1	51.1
Grower	bird	-	25.5	25.5
Adult birds	bird	107.8	640.5	532.7
Operating				
Purchased Inputs				
Urea	kg	6,758	8,670	1,912
SSP	kg	8,538	11,009	2,471
MOP	kg	5,396	7,519	2,123
DAP	kg	3,557	6,268	2,711
NPK complex	kg	2,471	4,483	2,012
Pesticides, fungicides	litre	725	1,025	299
Herbicides	litre	26	49	23
weedicides	lit	20	15	-5
Plant protection chemicals	lit	-	23	23
Farm yard manure	kg	83,456	125,690	42,235
Gypsum	kg	-	4,805	4,805
Zinc sulphate	kg	-	480	480
Labor				
Total pers_days		15,500	21,153	5,653

XIII. ANNEX-1.7: PRICES ASSUMED IN EFA

India
AP Drought Mitigation Project
ECONOMIC AND FINANCIAL PRICES
(In INR)

	Unit	ECONOMIC	FINANCIAL
Outputs			
Cereals, pulses and oilseeds			
Paddy rice	ton	23,800	28,000
Paddy straw	ton	850	1,000
Sorghum	ton	21,250	25,000
Sorghum byproduct	ton	2,550	3,000
Chick pea	ton	35,700	42,000
Groundnut pods	ton	42,500	50,000
Groundnut straw	ton	2,550	3,000
Redgram	ton	68,000	80,000
Bajra, millet	ton	10,837.5	12,750
Bajra byproduct	ton	1,275	1,500
Maize	ton	11,220	13,200
Maize byproduct	ton	2,550	3,000
Cotton			
Cotton	ton	31,875	37,500
Fruits			
Pomegranate	ton	34,000	40,000
Vegetables			
Tomato	ton	5,971.25	7,025
Sheep			
Ram lambs (3-4 month old)	animal	3,723	4,380
Ram lambs, 8-9 month old	animal	4,819.5	5,670
Ewe lamb, 3 -4 month old	animal	2,278	2,680
Ewe lamb 1-2 year old	animal	8,007	9,420
culled ewe	animal	2,333.25	2,745
Breeding ram	animal	6,375	7,500
Poultry			
Chicks	bird	63.75	75
Grower	bird	85	100
Adult birds	bird	212.5	250
Culled hens	bird	212.5	250
Eggs	each	3.4	4
Proxy value of labour	pers_day	148.75	175
Common property rangeland			
CRP fodder	ton/ha	1,500	2,000
Inputs			
Seeds and planting materials			
Paddy seed	kg	23.8	28
Sorghum seed	kg	38.25	45
Blackgram seeds	kg	34	40
Cotton seeds	pocket	807.5	950
Groundnut planting material	kg	51	60
Groundnut improved seed	kg	59.5	70
Red gram seeds	kg	127.5	150
Bajra seeds	kg	63.75	75
Maize seeds	kg	212.5	250
Tomato seeds	g	13.6	16
Seed treatment	kg	0.85	1
Pomegranate seedlings	each	31.45	37

India
AP Drought Mitigation Project
ECONOMIC AND FINANCIAL PRICES
(In INR)

	Unit	ECONOMIC	FINANCIAL
Inputs			
Fertilisers and PPC			
Urea	kg	6	6
SSP	kg	5.25	5.25
MOP	kg	18	18
DAP	kg	24.5	24.5
NPK complex	kg	14	14
Pesticides, fungicides	litre	500	500
Herbicides	litre	350	350
weedicides	lit	500	500
Plant protection chemicals	lit	500	500
Farm yard manure	kg	1.6	2
Vermi-compost	kg	5	5
Neem cake	kg	20	20
Gypsum	kg	7	7
Zinc sulphate	kg	58	58
Copper sulphate	kg	190	190
Magnesium sulphate	kg	110	110
Borax	lit	20	20
Materials and equipment			
Small sacks	each	17	20
Medium sacks	each	29.75	35
Plastic crates	each	212.5	250
Machine harvesting & threshing	hr	255	300
Weeder	hr	850	1,000
Sprinkler/dripper	set	50,000	50,000
Tractor ploughing	hr	595	700
Machine threshing	hr	595	700
Animal ploughing	day	510	600
Animal work for threshing	day	510	600
Pump rentaing	each	425	500
Feed & medicine			
Chick feed, maize and bajra	kg	12.75	15
Concentrate for sheep	kg	12.75	15
Calcium supplement	ml	0.0935	0.11
Supplementary feed for layers	kg	620.5	730
30	each	30	30
Drenching sheep	each	3	3
Medicines	sheep	30	30
Medicines for poultry	bird	10	10
Castration	animal	50	50
weighing	animal	10	10
Medicines & vaccination for layers	unit	60	60
Medicines & vaccination for chicks	unit	1,500	1,500
Sheep unit			
Ram lamb, 3 to 4 month old	animal	3,264	3,840
Breeding ram	animal	6,375	7,500
Breeding ewe	animal	2,550	3,000
Juveniles	animal	1,275	1,500
Sheep shelter	unit	1,700	2,000
Fodder storage	each	1,700	2,000
Manger	each	425	500
Fencing	unit	850	1,000
Lamb mortality	1	4,819.5	5,670
Medicine	sheep	25.5	30
Supplement	animal	153	180
feed, female	animal	127.5	150
Feed, male	animal	637.5	750
Marketing & transport	animal	25.5	30
AHD drenching	animal	2.55	3
castration	animal	42.5	50
weighing	animal	8.5	10
Water trough	each	850	1,000

India
AP Drought Mitigation Project
ECONOMIC AND FINANCIAL PRICES
(In INR)

	Unit	ECONOMIC	FINANCIAL
Inputs			
Poultry unit			
Layers 8 month old	each	85	100
Rooster	bird	85	100
Supplementary feed	kg	21.25	25
Medicines and vaccines	chick	4.25	5
Medicines and vaccines	layer	8.5	10
Chicks	each	38.25	45
culled layers	bird	170	200
Fencing & forage	per unit	2,210	2,600
Night shelter	each	3,400	4,000
Feeders	unit	127.5	150
Waterers	unit	127.5	150
Egg laying box	each	17	20
Night shelter for BYP	unit	2,550	3,000
Labor			
Field preparation	pers_day	148.75	175
Pitting	pers_day	148.75	175
Deep ploughing	pers_day	148.75	175
Sow ing	pers_day	148.75	175
Planting	pers_day	148.75	175
Transplanting	pers_day	148.75	175
Ridging	pers_day	148.75	175
Removal of crop residue	pers_day	148.75	175
Weeding	pers_day	148.75	175
Fertiliser application	pers_day	148.75	175
Irrigation	pers_day	148.75	175
Pruning	pers_day	148.75	175
Harvesting	pers_day	148.75	175
Threshing	pers_day	148.75	175
Nursery preparation	pers_day	148.75	175
Spraying	pers_day	148.75	175
Transporting	pers_day	148.75	175
Operations and maintenance	pers_day	148.75	175

SUBPROJECT MODELS

XIV. ANNEX-2.1: RED SOIL CROPS SUBPROJECT – (ECONOMIC)

India
AP Drought Mitigation Project
Red soil farms subproject Subproject Model

ECONOMIC BUDGET (AGGREGATED) (In INR '000) /a	**Without Project**	**WP**	**Increments**						
	1 to 20	**7 to 20**	**1**	**2**	**3**	**4**	**5**	**6**	**7 to 20**
Main Production									
Cereals, pulses and oilseeds	3,803,723.6	5,121,844.7	-	63,908.9	259,629.9	591,157.3	922,684.8	1,254,212.2	1,318,121.1
Vegetables	516,431.9	803,338.5	-	13,910.6	56,511.9	128,673.3	200,834.6	272,996.0	286,906.6
Sub-total Main Production	4,320,155.5	5,925,183.3	-	77,819.5	316,141.8	719,830.6	1,123,519.4	1,527,208.2	1,605,027.7
Production Cost									
Purchased Inputs									
Seeds and planting materials	990,923.5	915,572.2	-	-3,653.4	-14,841.9	-33,793.9	-52,745.9	-71,697.9	-75,351.3
Fertilisers and PPC	421,214.6	712,781.0	-	14,136.6	57,429.7	130,763.1	204,096.4	277,429.8	291,566.4
Materials and equipment	399,297.4	551,979.1	-	7,402.8	30,073.7	68,475.5	106,877.2	145,279.0	152,681.8
Sub-Total Purchased Inputs	1,811,435.5	2,180,332.3	-	17,885.9	72,661.5	165,444.6	258,227.8	351,010.9	368,896.8
Labor									
Farm labour	963,434.5	1,297,590.8	-	16,201.5	65,818.7	149,864.0	233,909.4	317,954.8	334,156.3
Sub-Total Production Cost	2,774,869.9	3,477,923.1	-	34,087.4	138,480.2	315,308.7	492,137.2	668,965.7	703,053.1
OUTFLOWS	2,774,869.9	3,477,923.1	-	34,087.4	138,480.2	315,308.7	492,137.2	668,965.7	703,053.1
Cash Flow	1,545,285.6	2,447,260.2	-	43,732.1	177,661.7	404,521.9	631,382.2	858,242.5	901,974.6

IRR = None, NPV = 5,073,093.97
\a About 70% area is under red soils

XV.ANNEX-2.2: REDSOILS CROPS SUBPROJECT – (FINANCIAL)

India
AP Drought Mitigation Project
Red soil farms subproject Subproject
FINANCIAL BUDGET (AGGREGATED

(In INR '000) /a	WOP	WP	Increments								
	20		1	2	3	4	5	6	7	8 to 19	20
Main Production											
Cereals, pulses and oilseeds	4,474,969.0	6,025,699.7	-	75,186.9	305,447.0	695,479.2	1,085,511.5	1,475,543.8	1,550,730.7	1,550,730.7	1,550,730.7
Vegetables	607,567.0	945,104.2	-	16,365.4	66,484.6	151,380.3	236,276.0	321,171.8	337,537.2	337,537.2	337,537.2
Sub-total Main Production	5,082,535.9	6,970,803.8	-	91,552.4	371,931.6	846,859.6	1,321,787.5	1,796,715.5	1,888,267.9	1,888,267.9	1,888,267.9
Production Cost											
Purchased Inputs											
Seeds and planting materials	1,165,792.3	1,077,143.8	-	-4,298.1	-17,461.1	-39,757.5	-62,054.0	-84,350.4	-88,648.6	-88,648.6	-88,648.6
Fertilisers and PPC	443,508.9	746,710.3	-	14,700.7	59,721.5	135,981.2	212,241.0	288,500.7	303,201.4	303,201.4	303,201.4
Materials and equipment	469,761.6	649,387.2	-	8,709.1	35,380.8	80,559.4	125,737.9	170,916.5	179,625.6	179,625.6	179,625.6
Sub-Total Purchased Inputs	2,079,062.8	2,473,241.2	-	19,111.7	77,641.2	176,783.0	275,924.9	375,066.7	394,178.4	394,178.4	394,178.4
Hired Labor											
Farm labour	1,133,452.3	1,526,577.4	-	19,060.6	77,433.7	176,310.6	275,187.5	374,064.4	393,125.0	393,125.0	393,125.0
Sub-Total Production Cost	3,212,515.2	3,999,818.6	-	38,172.3	155,074.9	353,093.7	551,112.4	749,131.2	787,303.4	787,303.4	787,303.4
OUTFLOWS	3,212,515.2	3,999,818.6	-	38,172.3	155,074.9	353,093.7	551,112.4	749,131.2	787,303.4	787,303.4	787,303.4
Cash Flow Before Financing	1,870,020.8	2,970,985.2	-	53,380.1	216,856.6	493,765.9	770,675.1	1,047,584.4	1,100,964.5	1,100,964.5	1,100,964.5

IRR = None, NPV = 6,223,725.23
\a About 70% area is under red soils

XVI. ANNEX-2.3: BLACKSOIL CROPS SUBPROJECT – ECONOMIC

India
AP Drought Mitigation Project
Black soil farms subproject Subproject Model

ECONOMIC BUDGET (AGGREGATED) (In INR '000) /a	**Without Project**	**WP**	**Increments**						
	1 to 20	**7 to 20**	**1**	**2**	**3**	**4**	**5**	**6**	**7 to 20**
Main Production									
Cereals, pulses and oilseeds	775,526.4	2,364,515.4	-	77,041.9	312,982.7	712,637.5	1,112,292.3	1,511,947.1	1,588,989.0
Cotton	1,148,647.5	827,026.2	-	-15,593.8	-63,349.7	-144,242.3	-225,134.9	-306,027.5	-321,621.3
Vegetables	332,937.8	344,287.9	-	550.3	2,235.6	5,090.4	7,945.1	10,799.8	11,350.2
Sub-total Main Production	2,257,111.7	3,535,829.5	-	61,998.4	251,868.7	573,485.6	895,102.5	1,216,719.4	1,278,717.8
Production Cost									
Purchased Inputs									
Seeds and planting materials	101,130.8	93,030.9	-	-392.7	-1,595.4	-3,632.7	-5,670.0	-7,707.2	-8,099.9
Fertilisers and PPC	398,547.1	559,845.0	-	7,820.5	31,770.8	72,339.7	112,908.5	153,477.4	161,297.9
Materials and equipment	335,711.4	236,374.0	-	-4,816.4	-19,566.5	-44,551.3	-69,536.2	-94,521.0	-99,337.4
Sub-Total Purchased Inputs	835,389.2	889,249.8	-	2,611.4	10,608.9	24,155.7	37,702.4	51,249.2	53,860.6
Labor									
Farm labour	715,907.8	1,107,319.8	-	18,977.5	77,096.3	175,542.3	273,988.4	372,434.4	391,411.9
Sub-Total Production Cost	1,551,297.1	1,996,569.6	-	21,589.0	87,705.2	199,698.0	311,690.8	423,683.6	445,272.5
OUTFLOWS	1,551,297.1	1,996,569.6	-	21,589.0	87,705.2	199,698.0	311,690.8	423,683.6	445,272.5
Cash Flow	705,814.6	1,539,259.9	-	40,409.5	164,163.5	373,787.6	583,411.7	793,035.8	833,445.3

IRR = None, NPV = 4,687,655.47
\a ABout 30% area is under black soils

XVII. ANNEX-2.4: BLACKSOIL CROPS SUBPROJECT – FINANCIAL

India
AP Drought Mitigation Project
Black soil farms subproject Subproject Mod
FINANCIAL BUDGET (AGGREGATED)

(In INR '000) /a	WOP	WP	Increments								
	20		1	2	3	4	5	6	7	8 to 19	20
Main Production											
Cereals, pulses and oilseeds	912,384.0	2,781,782.8	-	90,637.5	368,214.9	838,397.0	1,308,579.1	1,778,761.3	1,869,398.8	1,869,398.8	1,869,398.8
Cotton	1,351,350.0	972,972.0	-	-18,345.6	-74,529.0	-169,696.8	-264,864.6	-360,032.4	-378,378.0	-378,378.0	-378,378.0
Vegetables	391,691.5	405,044.6	-	647.4	2,630.2	5,988.7	9,347.2	12,705.7	13,353.1	13,353.1	13,353.1
Sub-total Main Production	2,655,425.5	4,159,799.4	-	72,939.3	296,316.1	674,688.9	1,053,061.7	1,431,434.6	1,504,373.9	1,504,373.9	1,504,373.9
Production Cost											
Purchased Inputs											
Seeds and planting materials	118,977.4	109,448.1	-	-462.0	-1,877.0	-4,273.8	-6,670.5	-9,067.3	-9,529.3	-9,529.3	-9,529.3
Fertilisers and PPC	409,635.1	576,191.9	-	8,075.5	32,806.6	74,698.2	116,589.8	158,481.3	166,556.8	166,556.8	166,556.8
Materials and equipment	394,954.6	278,087.0	-	-5,666.3	-23,019.4	-52,413.3	-81,807.3	-111,201.2	-116,867.5	-116,867.5	-116,867.5
Sub-Total Purchased Inputs	923,567.0	963,727.0	-	1,947.1	7,910.3	18,011.1	28,112.0	38,212.8	40,159.9	40,159.9	40,159.9
Labor											
Farm labour	842,244.5	1,302,729.1	-	22,326.5	90,701.5	206,520.4	322,339.2	438,158.1	460,484.6	460,484.6	460,484.6
Sub-Total Production Cost	1,765,811.5	2,266,456.1	-	24,273.7	98,611.8	224,531.5	350,451.2	476,370.9	500,644.6	500,644.6	500,644.6
OUTFLOWS	1,765,811.5	2,266,456.1	-	24,273.7	98,611.8	224,531.5	350,451.2	476,370.9	500,644.6	500,644.6	500,644.6
Cash Flow Before Financing	889,614.0	1,893,343.3	-	48,665.7	197,704.3	450,157.4	702,610.5	955,063.7	1,003,729.3	1,003,729.3	1,003,729.3

IRR = None, NPV = 5,706,567.60
\a ABout 30% area is under black soils

XVIII. ANNEX-2.5: LIVESTOCK SUBPROJECT – ECONOMIC

India
AP Drought Mitigation Project
Livestock subproject Subproject Model

ECONOMIC BUDGET (AGGREGATED) (In INR '000)	**Without Project**		**Increments**											
	WOP	**WP**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**
Main Production														
Sheep	1,724,934.8	3,545,779.1	-	-	17,734.9	111,336.3	291,013.9	484,897.7	659,561.2	942,654.2	1,354,488.9	1,720,126.7	1,839,989.0	1,820,844.3
Poultry	23,745.2	141,529.7	-	2,389.8	25,591.4	57,993.4	84,060.8	108,161.2	117,784.5	117,784.5	117,784.5	117,784.5	117,784.5	117,784.5
Sub-total Main Production	1,748,679.9	3,687,308.7	-	2,389.8	43,326.3	169,329.7	375,074.7	593,059.0	777,345.7	1,060,438.7	1,472,273.4	1,837,911.2	1,957,773.5	1,938,628.8
Production Cost														
Purchased Inputs														
Feed & medicine	-	10,048.5	-	-	260.6	1,567.5	3,759.0	5,429.6	6,017.2	7,014.9	8,433.8	9,658.5	10,048.5	10,048.5
Sheep unit	1,600,154.3	2,741,743.6	-	-	23,064.6	132,884.8	305,089.6	458,336.1	620,557.8	880,837.7	1,079,371.4	1,159,786.4	1,157,967.1	1,141,589.3
Poultry unit	5,249.0	36,562.8	-	1,642.0	16,341.9	28,683.9	32,926.1	38,483.8	35,207.6	31,314.0	31,304.4	31,313.8	36,277.9	31,313.8
Sub-Total Purchased Inputs	1,605,403.3	2,788,354.9	-	1,642.0	39,667.1	163,136.1	341,774.7	502,249.4	661,782.6	919,166.7	1,119,109.6	1,200,758.7	1,204,293.4	1,182,951.6
Labor														
Farm labour	626,210.7	711,597.7	-	471.5	8,348.7	30,878.7	61,886.7	83,463.6	85,387.0	85,387.0	85,387.0	85,387.0	85,387.0	85,387.0
Sub-Total Production Cost	2,231,614.0	3,499,952.5	-	2,113.5	48,015.8	194,014.8	403,661.4	585,713.0	747,169.5	1,004,553.6	1,204,496.6	1,286,145.6	1,289,680.4	1,268,338.5
OUTFLOWS	2,231,614.0	3,499,952.5	-	2,113.5	48,015.8	194,014.8	403,661.4	585,713.0	747,169.5	1,004,553.6	1,204,496.6	1,286,145.6	1,289,680.4	1,268,338.5
Cash Flow	-482,934.1	187,356.2	-	276.2	-4,689.5	-24,685.1	-28,586.7	7,345.9	30,176.2	55,885.1	267,776.9	551,765.6	668,093.1	670,290.3

IRR = 90.8%, NPV = 1,913,078.69

XIX.ANNEX-2.6: LIVESTOCK SUBPROJECT – FINANCIAL

India
AP Drought Mitigation Project
Livestock subproject Subproject Model
FINANCIAL BUDGET (AGGREGATED)
(In INR '000)

			Increments											
	WOP	**WP**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**
Main Production														
Sheep	2,029,335.0	4,171,504.8	-	-	20,864.6	130,983.9	342,369.3	570,467.9	775,954.4	1,109,004.9	1,593,516.4	2,023,678.5	2,164,693.0	2,142,169.8
Poultry	27,935.5	166,505.5	-	2,811.5	30,107.5	68,227.5	98,895.0	127,248.5	138,570.0	138,570.0	138,570.0	138,570.0	138,570.0	138,570.0
Sub-total Main Production	2,057,270.5	4,338,010.3	-	2,811.5	50,972.1	199,211.4	441,264.3	697,716.4	914,524.4	1,247,574.9	1,732,086.4	2,162,248.5	2,303,263.0	2,280,739.8
Production Cost														
Purchased Inputs														
Feed & medicine	-	10,048.5	-	-	260.6	1,567.5	3,759.0	5,429.6	6,017.2	7,014.9	8,433.8	9,658.5	10,048.5	10,048.5
Sheep unit	1,882,534.5	3,225,580.7	-	-	27,134.9	156,335.1	358,929.0	539,218.9	730,068.0	1,036,279.7	1,269,848.7	1,364,454.6	1,362,314.2	1,343,046.2
Poultry unit	6,175.3	43,015.0	-	1,931.8	19,225.7	33,745.7	38,736.5	45,275.1	41,420.7	36,840.1	36,828.8	36,839.8	42,679.9	36,839.8
Sub-Total Purchased Inputs	1,888,709.8	3,278,644.2	-	1,931.8	46,621.2	191,648.2	401,424.5	589,923.5	777,505.9	1,080,134.6	1,315,111.2	1,410,952.8	1,415,042.6	1,389,934.5
Labor														
Farm labour	736,718.5	837,173.8	-	554.8	9,822.1	36,327.9	72,807.9	98,192.5	100,455.3	100,455.3	100,455.3	100,455.3	100,455.3	100,455.3
Sub-Total Production Cost	2,625,428.3	4,115,818.0	-	2,486.5	56,443.2	227,976.1	474,232.4	688,116.0	877,961.1	1,180,589.9	1,415,566.5	1,511,408.1	1,515,497.8	1,490,389.7
OUTFLOWS	2,625,428.3	4,115,818.0	-	2,486.5	56,443.2	227,976.1	474,232.4	688,116.0	877,961.1	1,180,589.9	1,415,566.5	1,511,408.1	1,515,497.8	1,490,389.7
Cash Flow Before Financing	-568,157.8	222,192.3	-	325.0	-5,471.1	-28,764.7	-32,968.1	9,600.4	36,563.3	66,985.0	316,519.9	650,840.4	787,765.2	790,350.1

IRR = None, NPV = 1,933,263.85

FARM AND HOUSEHOLD MODELS (FINANCIAL)

XX.ANNEX-3.1: FARM MODEL: REDSOIL CROPS

XXI. (1.62 ha/household)

India
AP Drought Mitigation Project
Red soil farm area

FINANCIAL BUDGET (DETAILED)	April -- March							
(In INR)	Without Project		With Project			Increments		
	1 to 19	20	1	2 to 19	20	1	2 to 19	20
Main Production								
Sorghum	-	-	10,312.5	10,312.5	10,312.5	10,312.5	10,312.5	10,312.5
Sorghum byproduct	-	-	1,980.0	1,980.0	1,980.0	1,980.0	1,980.0	1,980.0
Groundnut pods	56,650.0	56,650.0	60,000.0	60,000.0	60,000.0	3,350.0	3,350.0	3,350.0
Groundnut straw	-	-	3,864.0	3,864.0	3,864.0	3,864.0	3,864.0	3,864.0
Redgram	3,888.0	3,888.0	5,360.0	5,360.0	5,360.0	1,472.0	1,472.0	1,472.0
Tomato	8,219.3	8,219.3	12,785.5	12,785.5	12,785.5	4,566.3	4,566.3	4,566.3
Sub-total Main Production	68,757.3	68,757.3	94,302.0	94,302.0	94,302.0	25,544.8	25,544.8	25,544.8
Production Cost								
Purchased Inputs								
Sorghum seed	-	-	222.8	222.8	222.8	222.8	222.8	222.8
Groundnut planting material	15,060.0	15,060.0	4,200.0	4,200.0	4,200.0	-10,860.0	-10,860.0	-10,860.0
Groundnut improved seed	-	-	9,450.0	9,450.0	9,450.0	9,450.0	9,450.0	9,450.0
Red gram seeds	243.0	243.0	195.0	195.0	195.0	-48.0	-48.0	-48.0
Tomato seeds	468.0	468.0	504.0	504.0	504.0	36.0	36.0	36.0
Urea	156.0	156.0	309.0	309.0	309.0	153.0	153.0	153.0
SSP	204.8	204.8	362.3	362.3	362.3	157.5	157.5	157.5
MOP	234.0	234.0	612.0	612.0	612.0	378.0	378.0	378.0
DAP	436.1	436.1	1,158.9	1,158.9	1,158.9	722.8	722.8	722.8
Pesticides, fungicides	3,370.0	3,370.0	4,410.0	4,410.0	4,410.0	1,040.0	1,040.0	1,040.0
Herbicides	91.0	91.0	122.5	122.5	122.5	31.5	31.5	31.5
Farm yard manure	1,508.0	1,508.0	2,295.0	2,295.0	2,295.0	787.0	787.0	787.0
Gypsum	-	-	455.0	455.0	455.0	455.0	455.0	455.0
Zinc sulphate	-	-	377.0	377.0	377.0	377.0	377.0	377.0
Tractor ploughing	682.5	682.5	3,010.0	3,010.0	3,010.0	2,327.5	2,327.5	2,327.5
Animal ploughing	4,860.0	4,860.0	3,900.0	3,900.0	3,900.0	-960.0	-960.0	-960.0
Pump rentaing	812.5	812.5	1,875.0	1,875.0	1,875.0	1,062.5	1,062.5	1,062.5
Sub-Total Purchased Inputs	28,125.9	28,125.9	33,458.4	33,458.4	33,458.4	5,332.5	5,332.5	5,332.5
Labor								
Field preparation	1,645.0	1,645.0	1,960.0	1,960.0	1,960.0	315.0	315.0	315.0
Sow ing	708.8	708.8	857.5	857.5	857.5	148.8	148.8	148.8
Planting	682.5	682.5	735.0	735.0	735.0	52.5	52.5	52.5
Ridging	455.0	455.0	490.0	490.0	490.0	35.0	35.0	35.0
Weeding	3,736.3	3,736.3	4,707.5	4,707.5	4,707.5	971.3	971.3	971.3
Fertiliser application	1,132.3	1,132.3	1,545.3	1,545.3	1,545.3	413.0	413.0	413.0
Irrigation	227.5	227.5	1,085.0	1,085.0	1,085.0	857.5	857.5	857.5
Harvesting	1,816.5	1,816.5	2,324.0	2,324.0	2,324.0	507.5	507.5	507.5
Threshing	2,947.0	2,947.0	4,200.0	4,200.0	4,200.0	1,253.0	1,253.0	1,253.0
Nursery preparation	227.5	227.5	245.0	245.0	245.0	17.5	17.5	17.5
Spraying	1,755.3	1,755.3	2,502.5	2,502.5	2,502.5	747.3	747.3	747.3
Sub-Total Labor	15,333.5	15,333.5	20,651.8	20,651.8	20,651.8	5,318.3	5,318.3	5,318.3
Sub-Total Production Cost	43,459.4	43,459.4	54,110.1	54,110.1	54,110.1	10,650.8	10,650.8	10,650.8
OUTFLOWS	43,459.4	43,459.4	54,110.1	54,110.1	54,110.1	10,650.8	10,650.8	10,650.8
Cash Flow Before Financing	25,297.9	25,297.9	40,191.9	40,191.9	40,191.9	14,894.0	14,894.0	14,894.0

IRR = None, NPV = 118,701.68

Net Present Value = 126,801.02
Internal rate of return = None
Benefits cost ratio = 1.70

XXII. ANNEX-3.2: FARM MODEL: BLACK SOIL CROPS (1.62 Ha per household)

India
AP Drought Mitigation Project
Black soil farm area

FINANCIAL BUDGET (DETAILED) (In INR)	April -- March							
	Without Project		With Project			Increments		
	1 to 19	20	1	2 to 19	20	1	2 to 19	20
Main Production								
Paddy rice	26,880.0	26,880.0	17,472.0	17,472.0	17,472.0	-9,408.0	-9,408.0	-9,408.0
Paddy straw	1,920.0	1,920.0	1,440.0	1,440.0	1,440.0	-480.0	-480.0	-480.0
Chick pea	-	-	54,381.6	54,381.6	54,381.6	54,381.6	54,381.6	54,381.6
Maize	-	-	12,355.2	12,355.2	12,355.2	12,355.2	12,355.2	12,355.2
Maize byproduct	-	-	2,160.0	2,160.0	2,160.0	2,160.0	2,160.0	2,160.0
Cotton	42,656.3	42,656.3	30,712.5	30,712.5	30,712.5	-11,943.8	-11,943.8	-11,943.8
Tomato	12,364.0	12,364.0	12,785.5	12,785.5	12,785.5	421.5	421.5	421.5
Sub-total Main Production	83,820.3	83,820.3	131,306.8	131,306.8	131,306.8	47,486.6	47,486.6	47,486.6
Production Cost								
Purchased Inputs								
Paddy seed	537.6	537.6	268.8	268.8	268.8	-268.8	-268.8	-268.8
Cotton seeds	2,470.0	2,470.0	1,482.0	1,482.0	1,482.0	-988.0	-988.0	-988.0
Maize seeds	-	-	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0
Tomato seeds	748.0	748.0	504.0	504.0	504.0	-244.0	-244.0	-244.0
Urea	915.9	915.9	921.0	921.0	921.0	5.1	5.1	5.1
SSP	937.1	937.1	979.1	979.1	979.1	42.0	42.0	42.0
MOP	2,520.0	2,520.0	2,844.0	2,844.0	2,844.0	324.0	324.0	324.0
DAP	1,733.4	1,733.4	2,143.8	2,143.8	2,143.8	410.4	410.4	410.4
NPK complex	1,092.0	1,092.0	1,981.0	1,981.0	1,981.0	889.0	889.0	889.0
Pesticides, fungicides	3,585.0	3,585.0	5,880.0	5,880.0	5,880.0	2,295.0	2,295.0	2,295.0
Herbicides	77.0	77.0	259.0	259.0	259.0	182.0	182.0	182.0
w eedicides	320.0	320.0	240.0	240.0	240.0	-80.0	-80.0	-80.0
Plant protection chemicals	-	-	360.0	360.0	360.0	360.0	360.0	360.0
Farm yard manure	1,750.0	1,750.0	2,580.0	2,580.0	2,580.0	830.0	830.0	830.0
Tractor ploughing	3,965.5	3,965.5	2,947.0	2,947.0	2,947.0	-1,018.5	-1,018.5	-1,018.5
Machine threshing	2,240.0	2,240.0	1,344.0	1,344.0	1,344.0	-896.0	-896.0	-896.0
Animal ploughing	4,806.0	4,806.0	2,628.0	2,628.0	2,628.0	-2,178.0	-2,178.0	-2,178.0
Animal w ork for threshing	768.0	768.0	384.0	384.0	384.0	-384.0	-384.0	-384.0
Pump rentaing	687.5	687.5	1,475.0	1,475.0	1,475.0	787.5	787.5	787.5
Sub-Total Purchased Inputs	29,153.0	29,153.0	30,420.7	30,420.7	30,420.7	1,267.7	1,267.7	1,267.7
Labor								
Field preparation	2,931.3	2,931.3	4,495.8	4,495.8	4,495.8	1,564.5	1,564.5	1,564.5
Sow ing	1,137.5	1,137.5	1,559.3	1,559.3	1,559.3	421.8	421.8	421.8
Planting	1,155.0	1,155.0	735.0	735.0	735.0	-420.0	-420.0	-420.0
Transplanting	2,128.0	2,128.0	1,064.0	1,064.0	1,064.0	-1,064.0	-1,064.0	-1,064.0
Ridging	577.5	577.5	490.0	490.0	490.0	-87.5	-87.5	-87.5
Weeding	4,996.3	4,996.3	5,661.3	5,661.3	5,661.3	665.0	665.0	665.0
Fertiliser application	1,433.3	1,433.3	2,668.8	2,668.8	2,668.8	1,235.5	1,235.5	1,235.5
Irrigation	584.5	584.5	987.0	987.0	987.0	402.5	402.5	402.5
Harvesting	8,643.3	8,643.3	9,966.3	9,966.3	9,966.3	1,323.0	1,323.0	1,323.0
Threshing	672.0	672.0	8,186.5	8,186.5	8,186.5	7,514.5	7,514.5	7,514.5
Nursery preparation	385.0	385.0	245.0	245.0	245.0	-140.0	-140.0	-140.0
Spraying	1,942.5	1,942.5	1,431.5	1,431.5	1,431.5	-511.0	-511.0	-511.0
Transporting	-	-	3,631.3	3,631.3	3,631.3	3,631.3	3,631.3	3,631.3
Sub-Total Hired Labor	26,586.0	26,586.0	41,121.5	41,121.5	41,121.5	14,535.5	14,535.5	14,535.5
Sub-Total Production Cost	55,739.0	55,739.0	71,542.2	71,542.2	71,542.2	15,803.2	15,803.2	15,803.2
OUTFLOWS	55,739.0	55,739.0	71,542.2	71,542.2	71,542.2	15,803.2	15,803.2	15,803.2
Cash Flow Before Financing	28,081.3	28,081.3	59,764.6	59,764.6	59,764.6	31,683.4	31,683.4	31,683.4

IRR = None, NPV = 257,720.95

Net Present Value = 269,738.43
Internal rate of return = None
Benefits cost ratio = 2.00

XXIII. ANNEX-3.3: ACTIVITY MODEL: BACKYARD POULTRY (5 BIRDS UNIT)

India
AP Drought Mitigation Project
Backyard poultry activity
FINANCIAL BUDGET (DETAILED)
(In INR)

	April -- March													
	ithout Project		With Project						Increments					
	1 to 19	20	1	2 to 9	10	11	12 to 19	20	1	2 to 9	10	11	12 to 19	20
Main Production														
Adult birds	2,750.0	2,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	13,000.0	13,000.0	13,000.0	13,000.0	13,000.0	13,000.0
Production Cost														
Purchased Inputs														
Chicks	630.0	630.0	3,555.0	3,555.0	3,555.0	3,555.0	3,555.0	3,555.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0
Fencing & forage	-	-	2,600.0	-	-	2,600.0	-	-	2,600.0	-	-	2,600.0	-	-
Egg laying box	-	-	20.0	-	-	-	-	-	20.0	-	-	-	-	-
Night shelter for BYP	-	-	3,000.0	-	-	-	-	-	3,000.0	-	-	-	-	-
Sub-Total Purchased Inputs	630.0	630.0	9,175.0	3,555.0	3,555.0	6,155.0	3,555.0	3,555.0	8,545.0	2,925.0	2,925.0	5,525.0	2,925.0	2,925.0
Labor														
Operations and maintenance	1,750.0	1,750.0	4,375.0	4,375.0	4,375.0	4,375.0	4,375.0	4,375.0	2,625.0	2,625.0	2,625.0	2,625.0	2,625.0	2,625.0
Sub-Total Production Cost	2,380.0	2,380.0	13,550.0	7,930.0	7,930.0	10,530.0	7,930.0	7,930.0	11,170.0	5,550.0	5,550.0	8,150.0	5,550.0	5,550.0
OUTFLOWS	2,380.0	2,380.0	13,550.0	7,930.0	7,930.0	10,530.0	7,930.0	7,930.0	11,170.0	5,550.0	5,550.0	8,150.0	5,550.0	5,550.0
Cash Flow Before Financing	370.0	370.0	2,200.0	7,820.0	7,820.0	5,220.0	7,820.0	7,820.0	1,830.0	7,450.0	7,450.0	4,850.0	7,450.0	7,450.0

IRR = 200.3%, NPV = 53,094.06

Net Present Value = 57,405.67
Internal rate of return = None
Benefits cost ratio = 2.08

XXIV. ANNEX-3.4: ACTIVITY MODEL: BREEDER FARM (1000 CHICKS UNIT)

India
AP Drought Mitigation Project
Breeder farm activity

FINANCIAL BUDGET (DETAILED) (In INR)	**Without Project**	**Increments**											
	WOP	**WP**	**1**	**2 to 3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**
Main Production													
Chicks	-	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0	34,200.0
Grower	-	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0	22,800.0
Adult birds	-	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0	51,250.0
Proxy value of labour	8,750.0	-	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0	-8,750.0
Sub-total Main Production	8,750.0	108,250.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0	99,500.0
Production Cost													
Purchased Inputs													
Layers 8 month old	-	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0	50,000.0
Rooster	-	-	2,500.0	-	-	2,500.0	-	-	-	2,500.0	-	-	-
Supplementary feed	-	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0	16,250.0
Medicines for chicks	-	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0	5,000.0
Medicines for layers	-	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Fencing & forage	-	-	2,600.0	-	-	-	-	-	-	-	-	-	-
Night shelter	-	-	4,000.0	-	-	-	-	-	-	-	-	-	-
Feeders	-	-	150.0	-	-	-	150.0	-	-	-	-	-	-
Waterers	-	-	150.0	-	-	-	150.0	-	-	-	-	-	-
Egg laying box	-	-	500.0	-	-	-	-	-	-	-	-	-	-
Sub-Total Purchased Inputs	-	72,250.0	82,150.0	72,250.0	72,250.0	74,750.0	72,550.0	72,250.0	72,250.0	74,750.0	72,250.0	72,250.0	72,250.0
Labor													
Operations and maintenance	-	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0	17,500.0
Sub-Total Production Cost	-	89,750.0	99,650.0	89,750.0	89,750.0	92,250.0	90,050.0	89,750.0	89,750.0	92,250.0	89,750.0	89,750.0	89,750.0
OUTFLOWS	-	89,750.0	99,650.0	89,750.0	89,750.0	92,250.0	90,050.0	89,750.0	89,750.0	92,250.0	89,750.0	89,750.0	89,750.0
Cash Flow Before Financing	8,750.0	18,500.0	-150.0	9,750.0	9,750.0	7,250.0	9,450.0	9,750.0	9,750.0	7,250.0	9,750.0	9,750.0	9,750.0

IRR = 9.8%, NPV = -1,375.69

Net Present Value = 67,522.89
Internal rate of return = 10%
Benefits cost ratio = 1.09

XXV. ANNEX-3.5: ACTIVITY MODEL: SHEEP BREEDING UNIT

India
AP Drought Mitigation Project
Sheep rearing activity
FINANCIAL BUDGET (DETAILED)

(In INR)	WOP	With Project										
	20	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8 to 9**	**10**	**15**	**20**
Main Production												
Ram lambs (3-4 month old)	61,320.0	70,080.0	78,840.0	91,980.0	105,120.0	127,020.0	153,300.0	153,300.0	153,300.0	153,300.0	153,300.0	153,300.0
Ewe lamb, 3 -4 month old	5,360.0	2,680.0	5,360.0	8,040.0	10,720.0	37,520.0	56,280.0	56,280.0	56,280.0	56,280.0	56,280.0	56,280.0
Ewe lamb 1-2 year old	-	-	-	-	-	-	9,420.0	-	-	-	-	9,420.0
culled ewe	16,470.0	16,470.0	16,470.0	19,215.0	19,215.0	24,705.0	30,195.0	30,195.0	30,195.0	30,195.0	30,195.0	30,195.0
Breeding ram	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0	7,500.0
Sub-total Main Production	90,650.0	96,730.0	108,170.0	126,735.0	142,555.0	196,745.0	256,695.0	247,275.0	247,275.0	247,275.0	247,275.0	256,695.0
Production Cost												
Purchased Inputs												
weighing	-	230.0	260.0	310.0	360.0	530.0	680.0	670.0	670.0	670.0	670.0	670.0
Breeding ram	-	7,500.0	-	-	7,500.0	-	-	7,500.0	-	-	-	-
Breeding ewe	90,000.0	90,000.0	102,000.0	120,000.0	147,000.0	174,000.0	174,000.0	174,000.0	174,000.0	174,000.0	174,000.0	174,000.0
Sheep shelter	-	2,000.0	-	-	-	-	-	-	-	-	-	-
Manger	-	1,000.0	-	-	-	-	-	-	-	-	-	-
Fencing	-	1,000.0	-	-	-	-	1,000.0	-	-	-	-	-
Medicine	1,710.0	1,770.0	1,920.0	2,160.0	2,520.0	3,030.0	3,300.0	3,240.0	3,240.0	3,240.0	3,240.0	3,240.0
feed, female	-	6,300.0	6,750.0	7,500.0	8,700.0	10,350.0	10,950.0	10,650.0	10,650.0	10,650.0	10,650.0	10,650.0
Feed, male	-	750.0	750.0	750.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0
Marketing & transport	630.0	690.0	780.0	930.0	1,080.0	1,590.0	2,040.0	2,010.0	2,010.0	2,010.0	2,010.0	2,010.0
AHD drenching	-	177.0	192.0	216.0	252.0	303.0	330.0	324.0	324.0	324.0	324.0	324.0
Water trough	-	1,000.0	-	-	-	-	-	-	-	-	-	-
Sub-Total Purchased Inputs	92,340.0	112,417.0	112,652.0	131,866.0	168,912.0	191,303.0	193,800.0	199,894.0	192,394.0	192,394.0	192,394.0	192,394.0
Labor												
Operations and maintenance	52,500.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0	54,600.0
Sub-Total Production Cost	144,840.0	167,017.0	167,252.0	186,466.0	223,512.0	245,903.0	248,400.0	254,494.0	246,994.0	246,994.0	246,994.0	246,994.0
OUTFLOWS	144,840.0	167,017.0	167,252.0	186,466.0	223,512.0	245,903.0	248,400.0	254,494.0	246,994.0	246,994.0	246,994.0	246,994.0
Cash Flow Before Financing	-54,190.0	-70,287.0	-59,082.0	-59,731.0	-80,957.0	-49,158.0	8,295.0	-7,219.0	281.0	281.0	281.0	9,701.0

IRR = 21.6%, NPV = 160,063.57

Net Present Value = 165,039.93
Internal rate of return = 25.07%
Benefits cost ratio = 1.12

XXVI. ANNEX-3.6: ACTIVITY MODEL: SHEEP FATTENING UNIT

India
AP Drought Mitigation Project
Sheep fattening activity
FINANCIAL BUDGET (DETAILED)
(In INR)

	April -- March							
	Without Project		With Project			Increments		
	1 to 19	20	1	2 to 19	20	1	2 to 19	20
Main Production								
Ram lambs, 8-9 month old	85,050.0	85,050.0	113,400.0	113,400.0	113,400.0	28,350.0	28,350.0	28,350.0
Production Cost								
Purchased Inputs								
weighing	-	-	200.0	200.0	200.0	200.0	200.0	200.0
Ram lamb, 3 to 4 month old	57,600.0	57,600.0	76,800.0	76,800.0	76,800.0	19,200.0	19,200.0	19,200.0
Sheep shelter	2,000.0	2,000.0	3,200.0	-	-	1,200.0	-2,000.0	-2,000.0
Fodder storage	2,000.0	2,000.0	4,000.0	-	-	2,000.0	-2,000.0	-2,000.0
Manger	-	-	250.0	-	-	250.0	-	-
Fencing	500.0	500.0	1,000.0	-	-	500.0	-500.0	-500.0
Lamb mortality	8,505.0	8,505.0	5,670.0	5,670.0	5,670.0	-2,835.0	-2,835.0	-2,835.0
Supplement	-	-	3,600.0	3,600.0	3,600.0	3,600.0	3,600.0	3,600.0
AHD drenching	45.0	45.0	60.0	60.0	60.0	15.0	15.0	15.0
castration	-	-	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Sub-Total Purchased Inputs	70,650.0	70,650.0	95,780.0	87,330.0	87,330.0	25,130.0	16,680.0	16,680.0
Labor								
Operations and maintenance	9,800.0	9,800.0	14,000.0	14,000.0	14,000.0	4,200.0	4,200.0	4,200.0
Sub-Total Production Cost	80,450.0	80,450.0	109,780.0	101,330.0	101,330.0	29,330.0	20,880.0	20,880.0
OUTFLOWS	80,450.0	80,450.0	109,780.0	101,330.0	101,330.0	29,330.0	20,880.0	20,880.0
Cash Flow Before Financing	4,600.0	4,600.0	3,620.0	12,070.0	12,070.0	-980.0	7,470.0	7,470.0

IRR = 34.2%, NPV = 40,036.36

Net Present Value = 63,596.32
Internal rate of return = None
Benefits cost ratio = 1.18

CROP MODELS (ONE ha each)

XXVII. ANNEX-4.1: GROUNDNUT + RED GRAM UNDER RAINFED CONDITIONS

Groundnut+Redgram, rainfed Crop Model	April -- March		
FINANCIAL BUDGET	**Existing**	**New**	
(In INR Per ha)	**Technology**	**Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue			
Groundnut pods	32,500	40,000	7,500
Redgram	2,400	4,000	1,600
Groundnut straw	-	2,760	2,760
Sub-total Revenue	34,900	46,760	11,860
Input costs			
Groundnut planting material	9,000	-	-9,000
Groundnut improved seed	-	10,500	10,500
Red gram seeds	150	150	-
Farm yard manure	200	650	450
DAP	245	490	245
Gypsum	-	350	350
Zinc sulphate	-	290	290
Pesticides, fungicides	1,500	2,500	1,000
Animal ploughing	3,000	3,000	-
Tractor ploughing	-	1,750	1,750
Sub-total Input costs	14,095	19,680	5,585
Income (Before Labor Costs)	20,805	27,080	6,275
Labor costs			
Field preparation	875	875	-
Sowing	438	438	-
Weeding	1,750	2,625	875
Fertiliser application	438	438	-
Spraying	525	1,400	875
Harvesting	875	875	-
Threshing	1,750	2,625	875
Sub-total Labor costs	6,650	9,275	2,625
Income (After Labor Costs)	14,155	17,805	3,650

Income Before Labor: IRR = None, NPV = 53,422.61
Income After Labor: IRR = None, NPV = 31,074.51

AP Drought Mitigation Project				
Groundnut+Redgram, rainfed Crop Mc		April -- March		
YIELDS AND INPUTS		**Existing**	**New**	
(Per ha)		**Technology**	**Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Main Production				
Groundnut pods	ton	0.65	0.80	0.15
Redgram	ton	0.03	0.05	0.02
Groundnut straw	ton	-	0.92	0.92
Operating				
Inputs				
Groundnut planting material	kg	150.00	-	-150.00
Groundnut improved seed	kg	-	150.00	150.00
Red gram seeds	kg	1.00	1.00	-
Farm yard manure	kg	100.00	325.00	225.00
DAP	kg	10.00	20.00	10.00
Gypsum	kg	-	50.00	50.00
Zinc sulphate	kg	-	5.00	5.00
Pesticides, fungicides	litre	3.00	5.00	2.00
Animal ploughing	day	5.00	5.00	-
Tractor ploughing	hr	-	2.50	2.50
Labor				
Field preparation	pers_day	5.00	5.00	-
Sowing	pers_day	2.50	2.50	-
Weeding	pers_day	10.00	15.00	5.00
Fertiliser application	pers_day	2.50	2.50	-
Spraying	pers_day	3.00	8.00	5.00
Harvesting	pers_day	5.00	5.00	-
Threshing	pers_day	10.00	15.00	5.00

XXVIII. ANNEX-4.2: SORGHUM UNDER RAINFED CONDITION

Sorghum, rainfed Crop Model	April -- March		
FINANCIAL BUDGET	**Existing**	**New**	
(In INR Per ha)	**Technology**	**Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue			
Sorghum	-	31,250	31,250
Sorghum byproduct	-	6,000	6,000
Sub-total Revenue	-	37,250	37,250
Input costs			
Sorghum seed	-	675	675
Urea	-	300	300
DAP	-	1,225	1,225
MOP	-	900	900
SSP	-	263	263
Farm yard manure	-	1,000	1,000
Sub-total Input costs	-	4,363	4,363
Income (Before Labor Costs)	-	32,888	32,888
Labor costs			
Field preparation	-	1,750	1,750
Sow ing	-	875	875
Weeding	-	1,750	1,750
Fertiliser application	-	1,050	1,050
Harvesting	-	1,750	1,750
Threshing	-	1,750	1,750
Sub-total Labor costs	-	8,925	8,925
Income (After Labor Costs)	-	23,963	23,963

Income Before Labor: IRR = None, NPV = 279,989.83
Income After Labor: IRR = None, NPV = 204,006.27

Sorghum, rainfed Crop Model		April -- March		
YIELDS AND INPUTS		**Existing**	**New**	
(Per ha)		**Technology**	**Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Main Production				
Sorghum	ton	-	1.25	1.25
Sorghum byproduct	ton	-	2.00	2.00
Operating				
Inputs				
Sorghum seed	kg	-	15.00	15.00
Urea	kg	-	50.00	50.00
DAP	kg	-	50.00	50.00
MOP	kg	-	50.00	50.00
SSP	kg	-	50.00	50.00
Farm yard manure	kg	-	500.00	500.00
Labor				
Field preparation	pers_day	-	10.00	10.00
Sow ing	pers_day	-	5.00	5.00
Weeding	pers_day	-	10.00	10.00
Fertiliser application	pers_day	-	6.00	6.00
Harvesting	pers_day	-	10.00	10.00
Threshing	pers_day	-	10.00	10.00

XXIX. ANNEX-4.3: COTTON UNDER RAINFED CONDITIONS

AP Drought Mitigation Project

Cotton, rainfed Crop Model	April -- March		
FINANCIAL BUDGET	**Existing**	**New**	
(In INR Per ha)	**Technology**	**Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue	65,625	78,750	13,125
Input costs			
Cotton seeds	3,800	3,800	-
Tractor ploughing	2,800	2,800	-
Animal ploughing	6,000	6,000	-
Urea	750	900	150
DAP	858	1,225	368
MOP	1,800	2,700	900
SSP	788	1,050	263
Farm yard manure	1,000	1,000	-
NPK complex	1,680	2,100	420
Pesticides, fungicides	4,500	3,000	-1,500
Herbicides	-	350	350
Sub-total Input costs	23,975	24,925	950
Income (Before Labor Costs)	41,650	53,825	12,175
Labor costs			
Field preparation	2,625	2,625	-
Sowing	1,750	1,225	-525
Fertiliser application	875	875	-
Weeding	3,500	3,500	-
Spraying	2,100	2,100	-
Harvesting	11,375	11,375	-
Sub-total Labor costs	22,225	21,700	-525
Income (After Labor Costs)	19,425	32,125	12,700

Income Before Labor: IRR = None, NPV = 103,652.64
Income After Labor: IRR = None, NPV = 108,122.26

Cotton, rainfed Crop Model		April -- March		
YIELDS AND INPUTS		**Existing**	**New**	
(Per ha)		**Technology**	**Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Yields	ton	1.75	2.10	0.35
Operating				
Inputs				
Cotton seeds	pocket	4.00	4.00	-
Tractor ploughing	hr	4.00	4.00	-
Animal ploughing	day	10.00	10.00	-
Urea	kg	125.00	150.00	25.00
DAP	kg	35.00	50.00	15.00
MOP	kg	100.00	150.00	50.00
SSP	kg	150.00	200.00	50.00
Farm yard manure	kg	500.00	500.00	-
NPK complex	kg	120.00	150.00	30.00
Pesticides, fungicides	litre	9.00	6.00	-3.00
Herbicides	litre	-	1.00	1.00
Labor				
Field preparation	pers_day	15.00	15.00	-
Sowing	pers_day	10.00	7.00	-3.00
Fertiliser application	pers_day	5.00	5.00	-
Weeding	pers_day	20.00	20.00	-
Spraying	pers_day	12.00	12.00	-
Harvesting	pers_day	65.00	65.00	-

XXX.ANNEX-4.4: CHICK PEA UNDER RAINFED CONDITIONS

AP Drought Mitigation Project
Chick Pea, rainfed Crop Model
FINANCIAL BUDGET
(In INR Per ha)

	April -- March		
	Existing Technology	**New Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue	-	65,520	65,520
Input costs			
NPK complex	-	1,400	1,400
Pesticides, fungicides	-	5,000	5,000
Farm yard manure	-	1,000	1,000
Sub-total Input costs	-	7,400	7,400
Income (Before Labor Costs)	-	58,120	58,120
Labor costs			
Sow ing	-	1,050	1,050
Field preparation	-	2,100	2,100
Weeding	-	2,625	2,625
Fertiliser application	-	1,750	1,750
Harvesting	-	4,900	4,900
Threshing	-	8,750	8,750
Transporting	-	4,375	4,375
Sub-total Labor costs	-	25,550	25,550
Income (After Labor Costs)	-	32,570	32,570

Income Before Labor: IRR = None, NPV = 494,808.32
Income After Labor: IRR = None, NPV = 277,286.77

AP Drought Mitigation Project
Chick Pea, rainfed Crop Model
YIELDS AND INPUTS
(Per ha)

		April -- March		
		Existing Technology	**New Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Yields	ton	-	1.56	1.56
Operating				
Inputs				
Chickpea seeds	kg	-	110.00	110.00
NPK complex	kg	-	100.00	100.00
Pesticides, fungicides	litre	-	10.00	10.00
Farm yard manure	kg	-	500.00	500.00
Labor				
Sow ing	pers_day	-	6.00	6.00
Field preparation	pers_day	-	12.00	12.00
Weeding	pers_day	-	15.00	15.00
Fertiliser application	pers_day	-	10.00	10.00
Harvesting	pers_day	-	28.00	28.00
Threshing	pers_day	-	50.00	50.00
Transporting	pers_day	-	25.00	25.00

XXXI. ANNEX-4.5: GROUNDNUT + RED GRAM UNDER IRRIGATED CONDITION

Groundnut+Redgram, irrigated Crop Model	April -- March		
FINANCIAL BUDGET	**Existing**	**New**	
(In INR Per ha)	**Technology**	**Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue			
Groundnut pods	45,000	60,000	15,000
Redgram	2,400	4,400	2,000
Groundnut straw	-	3,450	3,450
Sub-total Revenue	47,400	67,850	20,450
Input costs			
Groundnut planting material	10,500	10,500	-
Red gram seeds	150	150	-
Farm yard manure	650	650	-
DAP	368	784	417
Gypsum	-	350	350
Zinc sulphate	-	290	290
Pesticides, fungicides	2,000	4,000	2,000
Animal ploughing	3,000	3,000	-
Tractor ploughing	-	1,750	1,750
Pump rentaing	-	2,500	2,500
Sub-total Input costs	16,668	23,974	7,307
Income (Before Labor Costs)	30,733	43,876	13,144
Labor costs			
Field preparation	875	875	-
Sow ing	438	438	-
Weeding	3,500	3,500	-
Fertiliser application	1,050	1,400	350
Spraying	1,575	1,575	-
Irrigation	-	2,100	2,100
Harvesting	700	1,050	350
Threshing	2,100	3,150	1,050
Sub-total Labor costs	10,238	14,088	3,850
Income (After Labor Costs)	20,495	29,789	9,294

Income Before Labor: IRR = None, NPV = 111,898.02
Income After Labor: IRR = None, NPV = 79,120.80

AP Drought Mitigation Project				
Groundnut+Redgram, irrigated Crop Model		April -- March		
YIELDS AND INPUTS		**Existing**	**New**	
(Per ha)		**Technology**	**Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Main Production				
Groundnut pods	ton	0.90	1.20	0.30
Redgram	ton	0.03	0.06	0.03
Groundnut straw	ton	-	1.15	1.15
Operating				
Inputs				
Groundnut planting material	kg	175.00	175.00	-
Red gram seeds	kg	1.00	1.00	-
Farm yard manure	kg	325.00	325.00	-
DAP	kg	15.00	32.00	17.00
Gypsum	kg	-	50.00	50.00
Zinc sulphate	kg	-	5.00	5.00
Pesticides, fungicides	litre	4.00	8.00	4.00
Animal ploughing	day	5.00	5.00	-
Tractor ploughing	hr	-	2.50	2.50
Pump rentaing	each	-	5.00	5.00
Labor				
Field preparation	pers_day	5.00	5.00	-
Sow ing	pers_day	2.50	2.50	-
Weeding	pers_day	20.00	20.00	-
Fertiliser application	pers_day	6.00	8.00	2.00
Spraying	pers_day	9.00	9.00	-
Irrigation	pers_day	-	12.00	12.00
Harvesting	pers_day	4.00	6.00	2.00
Threshing	pers_day	12.00	18.00	6.00

XXXII. ANNEX-4.6: MAIZE UNDER IRRIGATED CONDITIONS

AP Drought Mitigation Project
Maize, khariff, irrigated Crop Model
FINANCIAL BUDGET
(In INR Per ha)

	April -- March		
	Existing Technology	New Technology	Increments
	1 to 20	1 to 20	1 to 20
Revenue			
Maize	-	51,480	51,480
Maize byproduct	-	9,000	9,000
Sub-total Revenue	-	60,480	60,480
Input costs			
Maize seeds	-	5,000	5,000
Urea	-	900	900
SSP	-	525	525
DAP	-	3,675	3,675
MOP	-	3,150	3,150
Plant protection chemicals	-	1,500	1,500
Farm yard manure	-	1,000	1,000
Pump rentaing	-	2,500	2,500
Sub-total Input costs	-	18,250	18,250
Income (Before Labor Costs)	-	42,230	42,230
Labor costs			
Field preparation	-	3,850	3,850
Sow ing	-	875	875
Weeding	-	2,625	2,625
Fertiliser application	-	1,225	1,225
Irrigation	-	2,275	2,275
Harvesting	-	2,100	2,100
Threshing	-	2,100	2,100
Sub-total Labor costs	-	15,050	15,050
Income (After Labor Costs)	-	27,180	27,180

Income Before Labor: IRR = None, NPV = 359,527.80
Income After Labor: IRR = None, NPV = 231,398.66

AP Drought Mitigation Project
Maize, khariff, irrigated Crop Model
YIELDS AND INPUTS
(Per ha)

		April -- March		
		Existing Technology	New Technology	Increments
	Unit	1 to 20	1 to 20	1 to 20
Main Production				
Maize	ton	-	3.90	3.90
Maize byproduct	ton	-	3.00	3.00
Operating				
Inputs				
Maize seeds	kg	-	20.00	20.00
Urea	kg	-	150.00	150.00
SSP	kg	-	100.00	100.00
DAP	kg	-	150.00	150.00
MOP	kg	-	175.00	175.00
Plant protection chemicals	lit	-	3.00	3.00
Farm yard manure	kg	-	500.00	500.00
Pump rentaing	each	-	5.00	5.00
Labor				
Field preparation	pers_day	-	22.00	22.00
Sow ing	pers_day	-	5.00	5.00
Weeding	pers_day	-	15.00	15.00
Fertiliser application	pers_day	-	7.00	7.00
Irrigation	pers_day	-	13.00	13.00
Harvesting	pers_day	-	12.00	12.00
Threshing	pers_day	-	12.00	12.00

XXXIII. ANNEX-4.7: PADDY UNDER IRRIGATED CONDITIONS

Paddy, kharif, irrigated Crop Model	April -- March		
FINANCIAL BUDGET	**Existing**	**New**	
(In INR Per ha)	**Technology**	**Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue			
Paddy rice	84,000	109,200	25,200
Paddy straw	6,000	9,000	3,000
Sub-total Revenue	90,000	118,200	28,200
Input costs			
Tractor ploughing	4,900	7,000	2,100
Animal ploughing	1,800	1,800	-
Paddy seed	1,680	1,680	-
Urea	720	900	180
DAP	3,675	4,900	1,225
MOP	3,600	4,500	900
SSP	788	1,050	263
weedicides	1,000	1,500	500
Machine threshing	7,000	8,400	1,400
Animal work for threshing	2,400	2,400	-
Sub-total Input costs	27,563	34,130	6,568
Income (Before Labor Costs)	62,438	84,070	21,633
Labor costs			
Field preparation	2,625	3,500	875
Transplanting	6,650	6,650	-
Irrigation	1,225	1,225	-
Fertiliser application	2,100	2,100	-
Weeding	7,000	7,000	-
Harvesting	2,100	2,625	525
Threshing	2,100	2,625	525
Sub-total Labor costs	23,800	25,725	1,925
Income (After Labor Costs)	38,638	58,345	19,708

Income Before Labor: IRR = None, NPV = 184,169.67
Income After Labor: IRR = None, NPV = 167,781.06

AP Drought Mitigation Project

Paddy, kharif, irrigated Crop Model		April -- March		
YIELDS AND INPUTS		**Existing**	**New**	
(Per ha)		**Technology**	**Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Main Production				
Paddy rice	ton	3.00	3.90	0.90
Paddy straw	ton	6.00	9.00	3.00
Operating				
Inputs				
Tractor ploughing	hr	7.00	10.00	3.00
Animal ploughing	day	3.00	3.00	-
Paddy seed	kg	60.00	60.00	-
Urea	kg	120.00	150.00	30.00
DAP	kg	150.00	200.00	50.00
MOP	kg	200.00	250.00	50.00
SSP	kg	150.00	200.00	50.00
weedicides	lit	2.00	3.00	1.00
Machine threshing	hr	10.00	12.00	2.00
Animal work for threshing	day	4.00	4.00	-
Labor				
Field preparation	pers_day	15.00	20.00	5.00
Transplanting	pers_day	38.00	38.00	-
Irrigation	pers_day	7.00	7.00	-
Fertiliser application	pers_day	12.00	12.00	-
Weeding	pers_day	40.00	40.00	-
Harvesting	pers_day	12.00	15.00	3.00
Threshing	pers_day	12.00	15.00	3.00

ANNEX-4.8: TOMATO UNDER IRRIGATED CONDITION

Tomato, rabi, irrigated Crop Model	April -- March		
FINANCIAL BUDGET	**Existing**	**New**	
(In INR Per ha)	**Technology**	**Technology**	**Increments**
	1 to 20	**1 to 20**	**1 to 20**
Revenue	63,225	91,325	28,100
Input costs			
Tomato seeds	3,600	3,600	-
Urea	1,200	1,500	300
SSP	1,575	1,969	394
MOP	1,800	2,250	450
Farm yard manure	8,000	8,000	-
Herbicides	700	875	175
Pesticides, fungicides	6,000	4,000	-2,000
Tractor ploughing	5,250	5,250	-
Pump rentaing	6,250	6,250	-
Sub-total Input costs	34,375	33,694	-681
Income (Before Labor Costs)	28,850	57,631	28,781
Labor costs			
Field preparation	1,750	1,750	-
Nursery preparation	1,750	1,750	-
Planting	5,250	5,250	-
Ridging	3,500	3,500	-
Weeding	2,625	2,625	-
Fertiliser application	1,750	1,750	-
Spraying	4,375	4,375	-
Irrigation	1,750	1,750	-
Harvesting	3,500	3,850	350
Sub-total Labor costs	26,250	26,600	350
Income (After Labor Costs)	2,600	31,031	28,431

Income Before Labor: IRR = None, NPV = 245,031.01
Income After Labor: IRR = None, NPV = 242,051.26

AP Drought Mitigation Project				
Tomato, rabi, irrigated Crop Model		April -- March		
YIELDS AND INPUTS		**Existing**	**New**	
(Per ha)		**Technology**	**Technology**	**Increments**
	Unit	**1 to 20**	**1 to 20**	**1 to 20**
Yields	ton	9.00	13.00	4.00
Operating				
Inputs				
Tomato seeds	g	225.00	225.00	-
Urea	kg	200.00	250.00	50.00
SSP	kg	300.00	375.00	75.00
MOP	kg	100.00	125.00	25.00
Farm yard manure	kg	4,000.00	4,000.00	-
Herbicides	litre	2.00	2.50	0.50
Pesticides, fungicides	litre	12.00	8.00	-4.00
Tractor ploughing	hr	7.50	7.50	-
Pump rentaing	each	12.50	12.50	-
Labor				
Field preparation	pers_day	10.00	10.00	-
Nursery preparation	pers_day	10.00	10.00	-
Planting	pers_day	30.00	30.00	-
Ridging	pers_day	20.00	20.00	-
Weeding	pers_day	15.00	15.00	-
Fertiliser application	pers_day	10.00	10.00	-
Spraying	pers_day	25.00	25.00	-
Irrigation	pers_day	10.00	10.00	-
Harvesting	pers_day	20.00	22.00	2.00

Appendix 11: Draft Project Implementation Manual

Table of Contents

Currency Equivalent

Weights and Measures

Financial Year

Abbreviations and Acronyms

Chapter 1: Introduction and background (one page)

Describe the purpose and objectives of Project Implementation Manuel (PIM), mention who are going to use this PIM, indicate the advantages of using PIM, list documents referred in developing the PIM and also include the project team which worked on the document and date of preparation. Write a paragraph acknowledging the support and cooperation received from senior staff and IFAD CPM. Please state that PIM is a dynamic document and it should be updated as and when required by the PMU staff.

Chapter 2: APDMP Summary (about 6-10 pages)

Briefly describe the background to the project (refer to the Project Design Report), outline key factors for the success of the project such critical staff, fund flow, procurement, community participation etc,

Describe the project area, target groups and project goal and objectives.

Describe the project components, their phasing and financing plan; outline the risks and mitigation measures; describe the environmental impact of the project.

Indicate expected project outputs and outcomes. Describe the exit strategy of the project.

Include a matrix to show selection criteria for project interventions with columns: type of intervention, facilities offered, targeting criteria, role of community, PMU and local community in the selection and identification of target activities and beneficiaries etc.

Attachment: Project Log-frame .

Chapter 3: Project Cost Estimates

Insert Tables showing the project cost estimates by components and year.

Insert key summary cost tables as reference.

Add commentary notes on unit costs used and scope for flexibility during implementation.

Ensure cost estimates contain both physical and financial units.

Chapter 4: Project Organization and Management

Briefly describe coordination arrangements, composition of project steering committee, and its roles and functions, frequency of meetings etc.,

Describe organisational structure of the state PMU and district PMU, staff structure and their duties and responsibilities. Responsibilities of DoA/ATMA staff who have been assigned APDMP responsibilities.

Roles of support agencies: LTA, DFA - along with staffing plan and budgets.

Arrangements for implementation of project interventions, agencies responsible for the implementation of various project components and subcomponents, etc.

Develop and provide a matrix with following columns: project intervention, coverage, implementation responsibility, procurement, timeline and schedule of implementation etc.

Attachments:

- ToR for individual members of staff
- ToR for LTA and DFA.
- Guidelines for a gender strategy

Chapter 5: Procurement Procedures

Describe general conditions of procurement and methods of procurement regulations;

Describe the procurement procedures in detail and as applicable to APDMP.

Describe approval procedures and appropriate authorities, review mechanisms: prior and ex-post review, review of pre-qualification bidders or tenders, describe the procurement committees and thresholds for approvals at different level. Prepare a 18-month procurement plan and attach it at the end of the chapter.

Attachments:

- Procurement process templates.
- Procurement plan for first 18 months of operation

Chapter 6: Finance Management (to be extracted from LTB)

Provide a brief introduction regarding purpose of this section.

One or two paragraphs on project costs and financing arrangements.

Describe in brief the flow of fund mechanism.

Describe type of accounts: designated account, project account, district cell account etc., its operations and accountability.

Describe the disbursement procedures, withdrawals and Withdrawal Applications (WA) (details of the attachments to WA).

Include checklist for compiling a withdrawal application.

Describe audit procedures and arrangements in place for conducting effective audit for each year and also describe arrangement for internal audit and its procedures.

Identify annual audit statements and indicate how these statements are prepared and forwarded to IFAD and other entities.

Indicate how project completion report will be carried out.

Indicate a list of registers and records to be maintained at PMU (state and district) such as contract records, individual contract monitoring form etc., and inventory register. Indicate about accounting software to be used in both state PMU and district PMUs.

Summary details are provided in Appendix-7

Attachment:

- ToR for internal and external auditors
- Guidelines for preparation of PCR

Chapter 16: Monitoring and Evaluation Guidelines

M&E framework: (i) first level activity/output monitoring; (ii) second level outcome monitoring and (iii) third level impact evaluation.

M&E matrix showing performance questions, indicators, data to be collected, collection methods and responsibilities.

M&E implementation - M&E unit staffing, roles and responsibilities, outsourcing of M&E data collection and surveys

Attachments:

- Annual RIMS table showing RIMS level 1 and 2 indicators;
- Terms of reference for an M&E support agency
- Terms of reference for baseline and impact evaluation surveys
- Table of contents of an annual progress report
- Guidelines for AOS
- Guidelines for KM and communications strategy

Chapter 17: Guidelines for preparing Annual Work Plan and Budget

Purpose and objective of this section,

General introduction on the preparation of AWPB,

Draft AWPB for first year of project implementation

Chapter 18: Guidelines for cluster-level planning

Process for participatory planning workshop / meetings at cluster level

Data to be included in a cluster profile

Format for identification of priority constraints and opportunities

Maps to be produced - via participatory mapping, Google Earth, other remote sensing

Chapter 19: Guidelines for implementation at the community level

Start-up and operational processes for:

- Climate Information Centres
- GP Water Management Committees
- Groundwater sharing groups
- Community Seed Multiplication Groups
- Farm Machinery Hire Centres
- Organic input production and sales centres
- Farmer Interest Groups
- Farmer Producer Organisations
- Sheep producer / range management groups

Chapter 20: Guidelines for capacity building

Overall training plan - list of courses, who will be trained, who will organise training, training providers, course location and duration

Standard budgets for different types of training and exposure visits

Training materials and publicity material - list of material to be produced or supplied from existing sources.

Training evaluation - end of course feedback forms and ToR for KAP evaluations of training effectiveness

Chapter 21: Guidelines for use of innovation funds

Proforma MoU with a research agency to implement an innovation sub-project

Guidelines for operation of a challenge fund.

Appendix 12: Compliance with IFAD Policies

Overview

1. IFAD's Strategic Framework provides the overall goal and objectives of the Fund and its key policy guidelines provide the parameters of project design and implementation. The Country Strategic Opportunities Programme (COSOP) for India (2011-2016[67]) aimed at strengthening people's organizations and service providers to empower poor rural people and facilitate their access to markets, services and central and to state government-funded development schemes. This objective will be achieved through two strategic objectives (i) increased access to agricultural technologies and natural resources through strengthening the capacity of people's organizations and service institutions; promoting sustainable, climate variability-resilient agricultural practices and other livelihoods; and enabling community-based sustainable management of natural resources and (ii) Increased access to financial services and value chains.

2. The design of the Andhra Pradesh Drought Mitigation Project (APDMP) builds on IFAD's relevant policies and frameworks particularly the 2016-2025 Strategic Frameworks, the targeting and gender mainstreaming policy, the Environment and Natural Resources Management Strategy, the climate change strategy, the nutrition action plan. the scaling up framework and the engagement with Indigenous Peoples policy.

Strategic Frameworks (2016-2025)

3. IFAD's Strategic Framework (2016-2025) reiterates its unique mandate of improving rural food security and nutrition through remunerative, sustainable and resilient livelihoods and to enable rural poor overcome poverty. The Framework identifies five principles of engagement namely targeting, empowerment, gender equality, innovation, learning and scaling up and partnerships are all relevant to the current project. The Project would empower farmers by (i) strengthening their organizations, capacities and skills through existing community platforms such as the SHGs, different forms of farmers producers organizations (FPOs), Farmers interest groups (FIGs), watershed committees, groundwater management committees etc., (ii) enabling them to improve the management of the watersheds and groundwater for multipurpose water uses, (iii) improve the resilience and productivity of farming systems by increasing the resilience of crop and livestock production systems to drought and climate change and (iv) strengthen the market linkages and sales of millet, groundnut, pulses, horticulture, etc.

Targeting and Gender Mainstreaming (2012)

4. The project activities, implementation arrangements and M&E system have been designed in compliance with the IFAD Targeting Policy as well as the IFAD policy on gender equality and women's empowerment. The project will intervene in the most drought-affected villages in the poorest mandals. Within these mandals, the project would opt for social targeting based on the wealth of farmers and their landholding. The target group will include all farmers who rely on rainfed agriculture and groundwater-based irrigation. Most farmers relying on rainfed agriculture cultivate less than 3 ha and have 1-2 standard livestock units. Their cropping systems include millet, groundnut and pigeon pea; off-farm income can represent up to 50 per cent of farm income. Groundwater-based farmers also tend to cultivate less than 3 ha and hold 1-2 livestock units; their cropping systems include rice, groundnut, millet and pigeon pea.

5. For water demand management interventions, it is important to target all farmers irrespective of their land size, as the larger farmers are likely to possess bore wells which affect the groundwater situation. Small and marginal farmers who operate less than two hectares of land as well as the landless will be specifically targeted to improve the resilience and productivity of their farming systems. Among these, a special attention will be given to women to guarantee their participation in water management committees and in farmer organizations as well as in providing them with

[67] The COSOP 2011-2015 has been extended by one year to cover the design of the current project.

extension services on improved practices and less water-intensive nutritious crops. Livestock is by definition a feminine domain, as such women will be supported to undertake lucrative livestock especially for landless and ST/SCs women.

6. Though the scheduled caste (SC) and scheduled tribe (ST) populations are not very significant in AP, (16.4 per cent and 5.3 per cent respectively), the project will ensure that these groups benefit from all project interventions through the socio-economic targeting approach. Therefore all categories of farmers and landless including the SC & ST and vulnerable households such as women-headed households will be targeted. For each category and subcategory of farmers, a tailored package of support will be provided based on their vulnerability and needs. Farmers HHs would benefit from crop-livestock development, rainwater harvesting (at household and field levels), soil and water conservation techniques, and improved water management systems thereby laying the foundation for groundwater-recharge planning. Activities related to crop and livestock extension services, demonstrations of sustainable agriculture practices and farmers' organizations will be common to all groups of farmers. In addition the project will ensure that the capacities of project staff for gender equity and social inclusion are adequate so that the staff would pay a special attention to increase the participation of marginalized groups through programme implementation, to maximize outputs and outcomes.

7. When relevant, the project will use the SHGs as the most appropriate platforms to carry out rigorous targeting and social inclusion. The participation of women would also be carefully monitored throughout the implementation process. Gender disaggregated data would be included in the log-frame, in each component and in the targeting strategy. The appendix on poverty targeting and gender outlines the Project approach to these two important aspects. Women and youth will form two major target groups to benefit from most project interventions as active members of FPO and farmers institutions and GP groundwater governance institutions. It is expected that between 50% and 80% of APDMP livestock activities will involve young men and women as Pashu sakhi/mitra, breeder, paravets or fatteners. The project innovations are also likely to concern primarily young men and women who are more mobile and most likely to be attracted by new technologies and viable farming activities.

Environment and Natural Resources Management Strategy (2011)

8. IFAD's ENRM strategy approved in May 201168 is at the core of delivering IFAD's poverty reduction and sustainable agriculture mandate because of its target group's dependence on environment and natural resources for their livelihoods. The goal of the ENRM policy is "to enable poor rural people to escape from and remain out of poverty through more-productive and resilient livelihoods and ecosystems." The purpose is "to integrate the sustainable management of natural assets across the activities of IFAD and its partners. In addition, the strategy highlights the need to maximize the positive environmental impact of value chains, assess the downside risks and build on its comparative advantage of working through community-based approaches. IFAD recognizes that poor farm HHs are in the front line of climate change impacts; the ecosystems and biodiversity on which they rely are increasingly degraded. This is particularly true as the Rayalaseema region in Andhra Pradesh is one of the most vulnerable regions in India due to the persistent droughts, heavy dependence on rain-fed agriculture, limited coping capacity, climate sensitive resources and widespread poverty (SAPCC 2009; UNFCCC, 2007). Extreme weather events are likely to threaten development gains across a variety of sectors and intensify existing natural hazard burdens. Agriculture's sensitivity to climate-induced water stress is likely to intensify the existing problems of declining agricultural outputs, declining economic productivity, poverty and food insecurity with smallholder farmers. Climate change adaptation is, therefore, a principal development challenge in the project area.

[68] IFAD's Environment and Natural Resource Management Policy: Resilient livelihoods through the sustainable use of natural assets. May 2011.

9. The project is aligned to IFAD ENRM strategy as it aims to mitigate the extent of drought and create the condition for increased agricultural productivity. In that perspective, the project will undertake the conservation and development of common property resources which will result in the regeneration and vegetation of about 30,000 ha of uncultivated land. The project will intervene on water demand and water supply sides management. The demand-side approach was tested from 2004 to 2009 through the FAO-supported Andhra Pradesh Farmers Managed Groundwater Systems (APFAMGS) project. The project will upscale this approach for farmers participation in the monitoring of the groundwater resources with the formation of groundwater monitoring committees (GMC). It is expected that the hydrological and meteorological monitoring and the engagement all water users around shared water management plans will increase groundwater governance in the Gram Panchayat (GP) and facilitate decision making. From the supply side the project will invest rainwater harvesting, water conservation infrastructure including farm ponds, check dams and groundwater recharge in order to increase water availability. These activities will be funded with MGNREGS which presents a unique convergence opportunity.

IFAD Climate Change Strategy (2010) and IFAD's Social, Environmental and Climate Assessment Procedures (2014)

10. IFAD's climate change strategy (May 2010) recognizes that the speed and intensity of climate change are outpacing the ability of poor rural people and societies to cope. IFAD recognizes that climate-related risks, and potential opportunities, can be addressed more systematically within its projects and policy advice. The goal of this strategy is to maximize IFAD's impact on rural poverty in the context of climate change.

11. The project design assessed the environmental impacts of the project components (i.e. project activities, locations and magnitude of components) against the "IFAD's Social, Environmental and Climate Assessment Procedures (2014)". The following are the main findings of the assessment: There are no negative environmental impacts (e.g. soil erosion, displacement of people, loss of unprotected natural forests and biodiversity, impact on protected areas) resulting from the proposed water management approach. On the contrary, the project is expected to increase the agriculture water efficiency and the ''crop per drop'' potential. The proposed project will also have positive direct impact on water resources through a better use of irrigation schemes and groundwater recharging in the five districts. The project will promote an integrated crop/livestock system, CPR interventions and in doing so, it supports many of IFAD's ENRM 10 principles such as climate-smart approaches to rural development, improved governance of natural assets for poor rural people; livelihood diversification to reduce vulnerability and build resilience for sustainable natural resource management, equality and empowerment for women and indigenous peoples in managing natural resources. As such, the environmental and social category is considered B.

12. About 63 percent of the rural population is dependent on rain-fed agriculture in AP and the project districts are drought prone and subject to climate change associated risks. In the absence of the project, these risks can be estimated to have a strong toll on the livelihoods and lives of the smallholders. The state has been receiving lower rainfall that the normal rainfall of 966 mm. Considering that drought related crop losses and damages are common in the target districts, the **climate risk classification is deemed High Risk**. As such, an in-depth climate risk analysis will be undertaken during project initial implementation stage.

Engagement with Indigenous Peoples policy

13. IFAD's policy on Engagement with Indigenous Peoples (2009) aims to enhance development effectiveness and to ensure that indigenous peoples' communities in rural areas are empowered to improve their well-being, income and food security through self-driven development that builds on their identity and culture.

14. In AP state, the scheduled castes and scheduled tribes represent respectively around 17 percent and 5.3 percent of the population. However, their socio-economic and human development conditions are worse compared to other population groups as 17-27% landless are found in SC and

ST groups and the vast majority of STs are BPL. Though the ST and SC population is not as important than in other states, in its engagement with indigenous peoples, the project will be guided by the fundamental principles of IFAD policy engagement with indigenous people of : (i) community-driven development; (ii) environmental issues and climate change; (iii) access to markets; (iv) empowerment; and (v) gender equality.

15. The project will be mindful of ST situation all its interventions especially on livelihoods and economic opportunities. Many STs were found in livestock activities and will therefore benefit from the improved livestock productivity and income to mitigate drought and build their resilience. Livestock raising will be a complementary income generating activity for the poorest households including smallholders, landless, and widows. It will include backyard poultry, small ruminant rearers (sheep) and fatteners. ST will also be involved in the common property resources (CPR) activities to get access to fodder and water. The rights of the CPR are secured through entry into the Prohibitory Order Book (POB) maintained at the mandal level.

Mainstreaming Nutrition-Sensitive Agriculture - Action plan, 2016-2018

16. According to recent data from the Rapid Survey on Children (RSoC, 2014), 38,7 percent of Indian children under the age of five are stunted, 19,8 percent are wasted, and 42,5 percent are underweight. Stunting, wasting and underweights rates of India's children have declined during last decade, but still exceed levels observed in countries with similar income levels as well as levels in many Sub-Saharan Africans countries much poorer than India. Anaemia prevalence among children from 6 to 59 months is 69,5 percent and 55,3 percent among 15 – 49 years women as a consequence of micronutrient deficiencies. Despite a steady economic growth and significant gains in agriculture productivity during recent decades, the country still faces multifaceted nutrition challenges.

17. The nutrition situation in Andhra Pradesh reflects the Indian paradox because the state economic gains have barely improved the nutrition and health situation of children and women. The nutrition situation had not keep pace with the economic growth of the state, with persistent high prevalence of acute malnourishment among the children under three years as 38.4 percent were stunted, 14.9 percent wasted, and 29.8 percent under-weight from the 2013 Rapid Survey on Children (RSoC, 2013). The wasting prevalence has even worsened for children under five with moderate wasting increasing from 12,2 percent in 2006 to 19 percent in 2013 and severe wasting rising from 3,5 percent to 6 percent in the same period.

18. The state infant Mortality Rate (IMR) is 39 (per 1000 live birth)[69] and ranks from 37 to 45 in the 5 districts of the project area. The Maternal Mortality Ratio (MMR) is 92 (2011-13)[70] and is much severe in the 5 districts (102 – 129). Though the infant/child mortality rates have declined over the past decade along with the maternal mortality rate, Andhra Pradesh performance is lagging behind when compared to the other States in India especially the other Southern State. The incidence of stunting, wasting and under-weight among the SC and the ST children is substantially higher as 42,7 % of SC children are stunted, 9,5 % wasted and 43,4 are under-weight. In schedules tribes communities 4,2 % of children are stunted, 7,5 % wasted and 45,9 are under-weight.

19. The access to basic services like drinking water, sanitation and improved energy sources, especially for the SC and ST households remains significantly lower than the overall average for the State. In rural areas, 79% of SC and 90% of ST don't have access to sanitation against 50% in the state. There is now a genuine concern regarding the social and political consequences of rising inequalities. Given the demographic composition of the state – where nearly 28 million people or 37% of the population is between the ages of 6-18 – the implications of a lagging social sector for the overall well-being of children is a major issue of concern (UNICEF 2016).

20. APDM will not have direct intervention on nutrition because of the massive coverage of nutrition schemes in the state. Therefore, convergence on software activities such as nutrition will come from

[69] National statistics
[70] MMR in the state is still higher that of Tamil Nadu (79) and Kerala (61) as per SRS 2013

major state intervention such as the Integrated Child Development Services (ICDS) Scheme, the Supplementary Nutrition Programme (SNP), the Anna Amrutha Hastham (AAH) programme to name the few which reach 98% of women and 83% of children in the state. The mechanism for convergence to these schemes will be proposed by the state government as part of the activities to be implemented from September 2016 to April 2017.

21. The annual outcome survey from year 2 will systematically assess the nutrition status among project beneficiaries by assessing diet diversity and consumption of coarse cereals, vegetables, pulses and eggs, poultry/sheep meat from commodities promoted by the project.

Scaling up operational framework (2015)

22. The project is an attempt to scale-up and improve past experiences of groundwater management in AP in order to provide an holistic and integrated response to the multifaceted and complex acute drought situation of many districts. The project will opt for an integrated approach of water demand and supply side management building on past experiences in the state. The project will expand and adapt the participatory hydrological monitoring programme of the Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) implemented with assistance of FAO and combine it with the groundwater water sharing and water supply investments from public and private funds. It is expected that the results and knowledge of the intervention will be able to influence enabling policies and leverage resources and partners to deliver larger results for a greater number of rural poor in a sustainable way.

23. The scaling up strategy is summarized below according to the operational framework:

Vision

1. What is to be scaled up? Are the lessons learned from previous interventions sufficiently rigorous to justify bringing them to scale?

The State of AP has carried out a number of successful pilot projects over the last decade to better manage the groundwater resource. These will be scaled up and further adapted:

- Watershed development through the Watershed Development Fund (WDF) Programme implemented by the National Bank for Agriculture and Rural Development (NABARD).
  - Results are : rise in ground water level by 2 to 3 Meters; increase in agricultural productivity and production - maize (28%), jowar/ bajra (50%), ground nut (18%), pulses (36 - 42%); drinking water scarcity in villages has been overcome.
- Groundwater water sharing approach for life saving irrigation through the Andhra Pradesh Drought Adaptation Initiative (APDAI) implemented with assistance from WASSAN network.
  - Results are: arresting the competitive digging of bore wells; increase in cropped area under the pooled bore wells; on an average 25 to 30 per cent of pumping hours were saved through resting of wells resulting in saving of the groundwater and power consumption.
- Participatory hydrological monitoring programme through the Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) implemented with assistance of FAO.
  - Results are : reduction in groundwater draft; replacement of bananas, rice and cotton by other crops that need less water such as peanuts and a locally bred variety of green lentils; farmers demonstrated their ability to collect and record rainfall and associated groundwater data; farmers understood the seasonal occurrence and distribution of groundwater in their villages and in the HU as a whole; farmers mastered the concept of groundwater as a common property resource and were willing to manage it for the collective benefit. The approach is replicable as no authoritative leadership is required for enforcement of compacts.

Lessons and adjustments: In the scaling up process of APFAMGS approach, APDMP will take into consideration key lessons learned in terms of i) payable inputs and technical advisory to farmers, ii) building the legitimacy of water management by embedding the water planning, monitoring and audit

within the Gram Panchayat, iii) adopting a voluntary compliance with the GP by-laws, capacity building on water use efficiency through the farmer field schools and audit of water utilization. On the latter, the impact studies of APFAMGs revealed that despite its success, some of the APFAMGS community platforms have not lasted after the project because of the lack of graduated sanctions to farmers who break the rule of groundwater management. The project will therefore ensure the sustainability of the demand side water management in promoting mutually agreed sanctions and remedial actions for breaking the rule of water conservation

The project will improve the water governance for better decision making and increase the potential for supplementary irrigation. Groundwater management, borewell sharing and lined farm ponds will enable farmers to provide supplementary irrigation for kharif crops – a vital mean of mitigating the effect of drought. A total of 60 lined farm ponds and at least 30 ha of interconnected shared borewell are planned for each cluster covering 160 ha of crop land per cluster..

In addition to the rainwater harvesting and groundwater recharge, there may be opportunity to access new sources of groundwater. A pilot hydrological mapping of aquifers is proposed with technical assistance from the National Geophysical Research Institute (NGRI). This high resolution aquifer mapping involves airborne electromagnetic surveys complemented with ground investigations. The exercise will produce maps of the fractured pathways that control the groundwater movement to a depth of up to 500 meters. This will provide precise information on groundwater prospects, which can be utilized for setting sustainable borehole sites for pumping as wells for constructing artificial recharge structures.

The project will also expand the scope for common property resources to allow to regenerate and revegetate the land resulting in increased supplies of fodder and forest products, along with ecological services for resource conservation, recharge of groundwater and sustainability of agro-ecological systems, including pollination of food crops. CPR has a direct impact on livestock as each hectare of CPR is expected to provide an extra four tons of fodder and 250,000 litres of water (for rainfall of 500mm), reducing the need for shepherds to migrate. The project would vegetate about 30000- ha across the 5 districts. Investments would support: (a) regeneration and revegetation of CPR though soil and water conservation and planting of fodder plants, along with supplies of livestock drinking water (partly funded though MGNREGS).

2. What is the appropriate ultimate scale of the intervention the IFAD project or programme supports in the country? In other words, how many people, households, districts, etc., could and should ultimately be reached? What will be the economic impact?

A total of 165,000 HHs will be reached during the 7-year project. The project will require a long term approach and given the large number of clusters, it would not be feasible to start work on all clusters in a single year, so the 330 clusters would be divided into four phases, each with a one year start-up period, four-years of intensive implementation, and between one and two of phasing out of support during which community institutions take over the supporting role.

The first replication will take place through the present project. The pilot had tested the approach in 640 villages, and the present project replicates it in village clusters that, more or less equate to a Gram Panchayat (GP), the lowest level of local government in India approx. Gram Panchayat typically comprises of around two or three villages, and covers an area of a bit over 1000 ha, of which 70% is cropped by about 500 farmers with an average farm size of 1.6 ha. The project will cover 330 clusters in 5 districts that will be selected according to the following criteria:

(g) In one of the 90 declared drought mandals

(h) In one of the poorest mandals as defined by the District Administration

(i) At a location where some relevant initiatives have already taken place (so the project can build on what has already been achieved).

The 7-year project will be phased as follows:

	Clusters	PY-1	PY-2	PY-3	PY-4	PY-5	PY-6	PY-7
IFAD	90	Prepare	------- intensive implementation -----				----phase out --	
	150		Prepare	------- intensive implementation -----				-P-out
RIDF	60	---- intensive implementation ---						

One immediate opportunity for scaling up is the application by GoAP for funding of USD 85 million from the Green Climate Fund. If these funds are used alongside GoAP and convergence resources, this could allow the outreach of APDMP to be doubled to 330,000 households.

3. Where will sustainability come from in the future and what is the rationale in the choice of the key partners?

As mentioned in point 2, community institutions will ultimately take over the supporting role once the project ends.

The project funding mechanism which involves government schemes MGNREGS and RKVY and NABARD as co-financiers provide the primary level of partnership with key stakeholders. Moreover, the project's holistic approach building on past experiences provides a wide range of partnership opportunities: i) technical with FAO and ICRISAT and the Small Farmer Agri business Consortium (SFAC), ii) operational with the Watershed Support Services and Activity Network (WASSAN), the Foundation for Ecological Security (FES), the BAIF development research foundation, the Bharati Integrated Rural Development Society (BIRDS) among others.

Pathways

4. What is the likelihood that the key drivers of the scaling-up process will be able to lead and sustain the efforts beyond the project?

The State Government and the Secretary's Office of the Department of Agriculture, the National Bank for Agriculture and Rural Development (NABARD), the Watershed Support Services and Activities Network (WASSAN) and Bharati Integrated Rural Development Society (BIRDS) are the main champions of ground water management in AP as well as the numerous watershed committees and groundwater committees which have been critical in their respective roles and responsibilities and through effective partnership to address the acute drought situation in AP. Beyond these institutions there other local drivers (ICRISAT, SERP, Gram Panchayat, the Mandal Mahila Samakhyas, the Sasyamithra Sanghas, the Village Watershed Committees, the Hydrological Unit Networks) and the project's facilitating agencies which will play an important role in capacity strengthening, project delivery, knowledge sharing and policy engagement at different levels.

5. Are the economic and financial benefits sufficiently attractive to drive expansion and sustain the initiative in the long term?

Effectively addressing the problem of low productivity and the high risk of farming in the drought-prone districts of southern AP and increasing farmers' incomes in such a difficult environment is expected to be sufficiently attractive to drive expansion.

6. Has the project identified the right "spaces" that will permit the intervention to grow to the desired scale? Is the project sufficiently integrating policy engagement and knowledge to open the necessary spaces?

Policy, legal and regulatory space: Andhra Pradesh development policies such as (i) the State Water Policy on Irrigation, ii) the Andhra Pradesh Vision 2020 and different poverty reduction initiatives and programmes such as the Indira Kranthi Patham (IKP) for women's empowerment there is a potential convergence with these policies

Financial and fiscal space: GoAP has confirmed that their contribution to the cost of APDMP is adequate within their fiscal resources

Political space: Drought mitigation and rainfed agricuture is a priority area for the central and state

governments

Institutional / organisation space: The evaluation of the APFAMGS project post completion pointed out to the need for the following measures to strengthen the demand side management of water: i) formalize community based water management institutions and link these to the State Government institutions for monitoring and regulating the use of groundwater resources, ii) establish a graduated sanction mechanism for violators. This is now covered in APDMP design.
ATMA will be strengthened with additional staff in order to implement the project

Natural Resource / environmental space: The natural resources base is depleted and given the strategic role of water for productive uses, the water needs to be managed more effectively from the demand side. Supply side interventions will also be considered to improve the water balance at village/ watershed levels.

Partnerships: The key technical partner identified so far is FAO for the groundwater management and governance. It would be possible to bring in additional expertise for other areas and this will be determined as project implementation progresses.

Knowledge / learning space: There is a large body of knowledge within India on water management. The detailed design mission will identify existing learning spaces and the IWMI programme on water policy may well provide an adequate venue.

Managing the process

7. Are there adequate procedures for documenting the progress, lessons learned and impacts of the scaling-up effort?

In relation to outcome monitoring the project will adopt **process monitoring** involving the monitoring of the processes leading to outputs and outcomes. Examples of specific areas where progress monitoring will be useful in APDMP may include adoption and effectiveness of groundwater management plans, the mechanism and effectiveness of groundwater sharing among farmers, functioning of FPOs and other farmers' organisations.

8. Does the project's M&E system track whether the scaling-up process is moving in the right direction, as identified at the design stage?

The increased adaptive capacity of farmers and their resilience to drought will be measured by the expansion of protective irrigation, the adoption of more drought resilient production systems (crops and livestock), the improvement in productivity and agricultural incomes. These indicators are reflected in the project logframe which is the foundation for the project M&E.

9. How will the information generated by M&E be fed back to key stakeholders and the broader public, and used to make necessary course corrections?

Outcome 3 of the logframe indicates that the lessons learned from the project will be identified and utilized to inform future development strategies. The participatory monitoring proposed in the project (see appendix 6) coupled with knowledge sharing events would ensure dissemination of best practices. The application of the annual outcome survey by the project and the water monitoring at GP levels provide sufficient information for the timely implementation of corrective action.

10. Have obstacles and risks been identified and addressed through mitigation measures?

Yes, under risk section of the PDR.

Spaces (policy, financial, institutional and natural environmental).

<table>
<tr><td colspan="2">Spaces:</td></tr>
<tr><td>Policy, legal and regulatory space</td><td>Andhra Pradesh development policies such as (i) the State Water Policy on Irrigation, ii) the Andhra Pradesh Vision 2020 and different poverty reduction initiatives and programmes such as the Indira Kranthi Patham (IKP) for women's empowerment there is a potential convergence with these policies and</td></tr>
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<tr><td>Natural Resource / environmental space</td><td>The natural resources base is depleted as explained in the concept note and given the strategic role of water for productive uses, the water needs to be managed more effectively from the demand side. Supply side interventions will also be considered to improve the water balance at village/ watershed levels.</td></tr>
<tr><td>Cultural space</td><td>Not a problem - no cultural issues</td></tr>
<tr><td>Partnerships</td><td>The key technical partner identified so far is FAO for the groundwater management and governance. It would be possible to bring in additional expertise for other areas and this will be determined at final design stage.</td></tr>
<tr><td>Knowledge / learning space</td><td>There is a large body of knowledge within India on water management. The detailed design mission will identify existing learning spaces and the IWMI programme on water policy may well provide an adequate venue.</td></tr>
<tr><td>Implementing space</td><td>ATMA will be strengthened with additional staff in order to implement the project</td></tr>
<tr><td colspan="2">Pathways:</td></tr>
<tr><td>Time horizon</td><td>7 years, in three phases.
<table>
<tr><th></th><th>Clusters</th><th>PY-1</th><th>PY-2</th><th>PY-3</th><th>PY-4</th><th>PY-5</th><th>PY-6</th><th>PY-7</th></tr>
<tr><td rowspan="2">IFAD</td><td>90</td><td>Prepare</td><td colspan="3">------- intensive implementation -----</td><td colspan="2">----phase out --</td></tr>
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<tr><td>RIDF</td><td>60</td><td colspan="4">---- intensive implementation ---</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Scaling up milestones</td><td>APFAMS model of the water demand will be scaled up right the beginning of the project, in addition to the water sharing model. The project proposed package interventions will be scaled by the additional green climate fund when available.</td></tr>
<tr><td>IFAD's role</td><td>Financing institution and knowledge broker (based on body of knowledge on climate change adaptation/mitigation, NRM, conservation agriculture, etc…)</td></tr>
<tr><td>Impact of scaling up processes</td><td>Water security for productive uses : the indicators will be identified during detailed design and will likely include : reduced groundwater draft, improved water balance at village and mandal levels.</td></tr>
</table>

Annex 1 : Women and Welfare interventions in Prakasam, Chittor and Kurnool

- **PRAKASAM**

I.C.D.S Activities :

ICDS Projects	21
No. of Urban Projects	04
No. of Rural Projects	17
No. of Municipalities Covered	08
No. of Mandals Covered	56
Main Anganwadi Centers existing	4009
Mini Anganwadi Centers existing	235
Total AWC	**4,244**

Stake Holders

6 Months to 3 Years Children	123,898
3- 6years	90,297
Pregnant	28,438
Lactating Mothers	24,553
Pre-School Children (3-6 years)	90,297
18 to 45 years women participated	117,043

Nutritional Status

Total No. of Children weighed under Growth Monitoring	231,289
No.of.Children in Normal Grade	197,524
Moderately Malnourished	33143
Severely Malnourished	617
Moderately Acute Malnourished	1318
Severely Acute Malnourished	585
Infant Deaths April '16 to July'2016	35
Maternal Deaths April'16 to July'2016	3
Pregnant women with anemia	7,413

Anna Amrutha Hastam: One full meal programme for Pregnant and Lactating mothers to reduce IMR, MMR and low birth weight.

No. of ICDS Projects covered under AAH : 6

(Kanigiri, Markapur (R), Y.Palem & B.Peta,Giddalur, Tharlupadu)

No of the Project	Total Centers			Pregnant	Lactating	3-6 Yrs
	Main	Mini	Total			
06	1142	161	1303	7871	8223	31960

- **Chittor**

1 - Integrated Child Development Services (ICDS)

The ICDS Scheme was started in the year 1980 with one Project Thambalapalle in Chittoor District. Later on the schemes were extend all over in the District.

No. of ICDS Projects – 21

No. of AWCs – 4768 (Main-3640 and Mini-1128)

Details of ICDS Beneficiaries

Sl. No	Name of the Project	No. of AWC's	SNP Beneficiaries		Pregnant & Lactating	Pre school
			6 M - 3 Yr	3-6 Yrs		
1	2	3	4	5	6	7
1	Bangarupalem	251	6107	3272	2341	3272
2	Chandragiri	186	6903	2612	2746	2612
3	Chinnagottigallu	261	7478	3479	2140	3479
4	Chittoor	299	8613	4681	3150	4681
5	Chowdepalle	170	4195	2870	1755	2870
6	G.D.Nellore	218	4818	2567	1050	2567
7	Karvetinagar	234	6093	3110	2099	3110
8	Kuppam	428	12147	7510	3955	7510
9	Madanapalle	309	10078	4586	3259	4586
10	Nagari	145	4320	1879	1558	1879
11	Palamaner	332	10876	6317	3803	6317
12	Pichatur	155	2842	1910	921	1910
13	Pulicherla	141	3346	1771	1204	1771
14	Punganur	252	8018	4585	3029	4585
15	Puttur	186	4828	2457	1841	2457
16	Sathyavedu	160	5041	2709	1700	2709
17	Srikalahasthi	205	6296	2922	1691	2922
18	Thamballapalle	273	5695	3735	1906	3735
19	Thottambedu	200	4734	2897	1559	2897
20	Tirupathi (RASS)	121	10658	2412	3941	2412
21	Valmikipuram	242	6305	3850	2076	3550
Total		4768	139391	72131	47724	72131

2 - Supplementary Nutrition Programme (SNP):

Supplementary Nutrition Programme is one of the prime services rendered under ICDS.

Entitlement of Nutrition support to the beneficiaries:

Category	**SNP (per Beneficiary)**	**Cost norms**
7m-3yrs Children	➢ THR (Take Home Ration) consists of 2.7 Kgs. Rice, ½ Kg. Red Gram Dal & ½ Kg. Oil per beneficiary per month distributed on first day of every month ➢ 8 Eggs per month	Rs.6/- per beneficiary per day

Category	SNP (per Beneficiary)	Cost norms
3-6yrs Children	➢ Hot Meal consists of Rice, Dal, Oil, Vegetables, Condiments every day at AWC ➢ 16 Eggs per month weekly 4 days	Rs.6/- per beneficiary per day
Pregnant Women & Lactating Mothers (Non Amrutha Hastham)	➢ THR consists of 3 Kgs. Rice, 1 Kg. Red Gram Dal & ½ Kg. Oil per beneficiary per month distributed on first day of every month ➢ 16 Eggs per month	Rs.7/- per beneficiary per day
Pregnant Women & Lactating Mothers (Spot feeding, One full meal) (Amrutha Hastham)	➢ Spot feeding, One Full Meal consists of Rice, Dal, Oil, vegetables, Condiments, Milk & Eggs every day	Rs.20/- per beneficiary per day
Severely underweight children (7M-3years)	➢ Additional supplementation of 100ml Milk, Mini meal consisting of Rice, Dal, Vegetables, Oil & Condiments every day along with normal SNP ➢ 25 eggs per month along with normal SNP	Rs.9 paisa per beneficiary per day
Severely underweight children (3-6 years)	➢ Additional supplementation of 100ml Milk, Oil every day along with normal SNP ➢ 25 eggs per month along with normal SNP	Rs.9 paisa per beneficiary per day

3 - Anna Amrutha Hastham (AAH):

One full meal programme has been introduced in the year 2013 to improve nutritional and health status of women and to reduce low birth weight of children and IMR & MMR. It has been carried out in 10 ICDS Projects. They are:

1. Palamaner
2. Kuppam
3. Madanapalle
4. Thambalapalle
5. Vayalpadu
6. Thottambedu
7. Srikalahasthi
8. Pichatur
9. Chinnagottigallu
10. Gangadhara Nellore

Health and Nutrition indicators

Indicators	Beneficiaries	Andhra Pradesh	Chittoor	Target
Supplementary Nutrition Programme	259246			100
6-3 Yrs. Children	139391		82%	
3-6 Yrs. Children	72131		75%	
Preg. & Lactating	47724		85%	
Nutritional status-Children < 3 Years (%)				
Normal	136744		68	80
Moderate	24679	29.8	23	20
Severe	728	38.4	1	
Nutritional status-Children < 5 Years (%)				
Normal	203694		58	80
Moderate	38072		15	20
Severe	900		3	
SAM	383	3.5	6	
Child Feeding Practices (%)				
Children Under 3 years breastfed within one hour of birth	3025	47.8	68	80
Children age 0-5 months exclusively breastfed	16929	43.9	65	80
Antenatal Care (%)				
Mothers who had taken Antenatal care	7851	95.9	80	100
Mothers who had visited within the first three months of their pregnancy		67.3	80	100
Mothers who had three or more ANC	7851	89.4	79	100
Mothers who consumed 100 IFA tablets	26379	45.8	48	100
Maternity Care & Child Health (%)				
Institutional delivery	4814	71.8	66	100
Low birth weight	742	19.4	15	
Immunization	7862	80	87	100
Other Indicators (%)				
Women married before 18 years		54.8		47.4
Maternal Mortality Ratio (MMR)	0.2	110	92	61
Infant Mortality rate (IMR)	2.6	41	45	25
Deliberies				
Gas Connections	4293	-	4293	4768
Infrastructure to AWCs		-		

- **kurnool**

1 - Integrated Child Development Services (ICDS):The ICDS Scheme was started in the year 1978 with one Project in Kurnool (Urban) of Kurnool District. Later on the schemes were extend all over in the District.

ICDS Projects

S. No.	Name of the Project	No.AWC Sanctioning	
		Main	Mini
1	Atmakur	202	12
2	Allagadda	248	6
3	Adoni Rural	226	0
4	Kodumur	173	0
5	Pathikonda	322	7
6	Yemmiganur	336	0
7	Alur	229	5
8	Nandikotkur	238	0
9	Banaganapalli	209	8
10	Nandyal (Rural)	266	7
11	Koilakuntla	180	5
12	Kurnool (Urban)	137	2
13	Dhone	278	5
14	Kurnool (Rural)	210	4
15	Nandyal U	106	1
16	Adoni (Urban)	126	0
Total		3486	62

2 - Supplementary Nutrition Programme (SNP):

Entitlement of Nutrition support to the beneficiaries:

Category	SNP (per Beneficiary)
7m-3yrs Children	➢ MTF/Balamrutham consists of Roasted Wheat, Bengal gram, Milk powder, Sugar & Oil @100g every day for 25 days in 2 ½KG per pack distributed on first day of every month ➢ 8 Eggs per month
3-6yrs Children	➢ Hot Meal consists of Rice, Dal, Oil, Vegetables, Condiments & Snacks every day at AWC ➢ 16 Eggs per month weekly 4 days
Pregnant Women & Lactating Mothers	➢ THR consists of 3 Kgs. Rice, 1 Kg. Red Gram Dal &½ Kg. Oil per beneficiary per month distributed on first day of every month ➢ 16 Eggs per month
Pregnant Women & Lactating Mothers (Spot feeding, One full meal)	➢ Spot feeding, One Full Meal consists of Rice, Dal, Oil, vegetables, Condiments, Milk & Eggs every day
Severely underweight children (7M-3years)	➢ Additional supplementation of Milk, Mini meal consisting of Rice, Dal, Vegetables, Oil & Condiments every day along with normal SNP ➢ 17 eggs per month along with normal SNP
Severely underweight children (3-6 years)	➢ Additional supplementation of Milk, Oil & Balamrutham every day along with normal SNP ➢ 9 eggs per month along with normal SNP

3 - AAH Project stake holders :

S. No.	Name of the Project	Children				Total Population 0-6 Yrs	Pregnant & Lactating		
		Below 6 Months	6M-1Yr	1-3 Yrs	3-6 Yrs		Preg.	Lact.,	Total
1	2	3	4	5	6	7	8	9	10
1	Atmakur	1671	1608	6051	6173	15503	1760	1620	3380
2	Allagadda	2815	2815	9665	9465	24760	2792	2774	5566
3	Adoni Rural	3991	3991	12749	10861	31592	3543	3575	7118
4	Pathikonda	4267	3990	13359	11465	33081	4020	4299	8319
5	Alur	2947	3075	10526	8829	25377	2827	2717	5544
6	Banaganapalli	2664	2537	8408	7259	20868	2502	2707	5209
7	Nandyal (Rural)	2915	1732	9133	9865	23645	2714	2974	5688
Total		21270	19748	69891	63917	174826	20158	20666	40824

4 - Nutritional Status :

Normal	254364	72.42 %
Moderately under weight	94645	26.95 %
Severely under weight	2736	0.78 %