Indian Council of Agricultural Research

National Agricultural Innovation Project

(Component 3)

Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas

FINAL REPORT

Central Research Institute for Dryland Agriculture

Santoshnagar, Hyderabad 500 059, Andhra Pradesh, India.

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Contents

Acronyms

ARS	Agricultural Research Stations
CA	Cluster Anchor
CAC	Consortium Advisory Committee
CCMT	Cluster Coordination and Monitoring Team
CCTs	Continuous Contour Trenches
CG Center/ CGIAR	Consultative Group on International Agricultural Research Center
DRDA	District Rural Development Agency
DWACRA	Development Of Women And Children In Rural Areas
GP	Gram Panchayat
HDT	Hill Lock Deep Trenches
HDPE	High Density Poly Ethylene
ICAR	Indian Council of Agricultural Research
ICT	Information and Communication Technology
IVRS	Interactive Voice Response System
NEDCAP	Non Conventional Energy Development Corporation of A.P.
MNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
SHGs	Self Help Groups
SRL	Sustainable Rural Livelihood
TSG	Thematic Support Group
VRC	Village Resource Center
RMG	Rythu Mitra Groups
FYM	Farm Yard Manure
VKC	Village Knowledge Center
AICI	Agricultural Insurance Corporation of India
NTFP	Non Timber Forest Product
INM	Integrated Nutrient Management
NPM	Non Pesticidal Management
SSNM	Site Specific Nutrient Management
RWH	Rain Water Harvesting
GCS	Gully Control Structures
CD	Check Dams
CCB	Continuous Contour Bunds
MPT	Mini Percolation Tank
FP	Farm Pond

Foreword

Dr. B. Venkateswarlu
Director and Consortium Leader
Central Research Institute for Dryland Agriculture

"Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas" was a sub project implemented under component 3 of the National Agricultural Innovation Project. It was implemented in eight backward districts of Andhra Pradesh by a consortium of ten organizations led by CRIDA. In many ways the consortium was unique, as it consisted of a CG institute, SAU, NGOs & private sector. The area of implementation was also varied in terms of soils, rainfall, crops and socio economic settings. It was indeed a challenge for the consortium to come together as a team and implement a complex project of this scale. This was one of the first sponsored projects to take off and provide leadership to many projects that came to be implemented in different parts of the country later.

During the past four and half years of its implementation, this project brought out many significant outcomes that have bearing on future course of development of rainfed areas in our country. It showed that it takes much more than technologies alone to make a difference to the livelihoods of the poor and this was demonstrated in the form of innovative institutions, community organizations with novel systems and processes of operation. This project strongly believed in application of prudent resource management technologies as a means of improving the livelihoods of the poor in rainfed areas. This philosophy was ably blended with institutional interventions that involved developing farmers capacity for continued adoption of resource conservation technologies.

Many departments of the government of Andhra Pradesh have noted the outcomes of this project with keen interest and with an intent to draw cue for policy formulation, especially in the areas of water resource management. I consider this project as a milestone in the area of sustainable rural livelihoods and hope that the future projects and programmes will draw liberally from the outcomes of this project. I congratulate the entire project team for bringing out key learnings and compiling them in the form of this comprehensive report.

(B.Venkateswarlu)
Director & Consortium Leader

Hyderabad
March 25, 2012

Preface

Dr. Sreenath Dixit
Consortium Principal Investigator
Central Research Institute for Dryland Agriculture

The sub project under National Agricultural Innovation Project under its Component 3 "Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas" was implemented across eight backward districts of Andhra Pradesh between September, 2007 and March, 2012. The project aimed at improving the livelihoods of the rural poor through application of technologies with the support of innovative systems and processes. The project adopted a participatory action research model and implemented site-specific interventions through innovative processes and institutions. The project was unique in many ways. For the first time, a large consortium of different organizations came together to implement a complex project having ambitious targets. The project design provided good leverage and liberty to try new things boldly. A sound project implementation strategy involving people's institutions at the grassroots level and committed project partners was responsible for achieving desired outcome for the project. The learnings of the project have led to many insights, which have significant policy implications, especially in rainwater harvesting, groundwater sharing, repair and maintenance of rainwater harvesting structures, promotion of small farm mechanization, building and managing revolving funds by the community for sustaining project outcomes. It was also a project that raised the institutional capacity of all the implementing partners to deal with complex issues related to sustainable livelihoods. In all it has given new tools, new insights and confidence to everyone who was associated with the project.

I express my sincere gratitude to the Dr.Bangali Baboo, National Director, and Dr.A.P.Srivastava, National Coordinator, Component 3, NAIP for their constant support and encouragement throughout the period of implementation. I also thank Dr.Mruthyunjaya, Ex-National Director, NAIP who guided the entire project team in its formative stages. I am deeply indebted to Dr.B.Venkateswarlu, Director, CRIDA, who supported the project in all its stages of implementation and took keen interest in every aspect of the project. But for the confidence he reposed in the project team, the project would not have made significant strides. My thanks are also due to all the partners and project staff who worked tirelessly for achieving the desired outcome.

Hyderabad
March 25, 2012

(Sreenath Dixit)
Consortium Principal Investigator

कार्यकारी सारांश

वर्षा आधारित क्षेत्रों की कृषि प्रणाली उत्पादकता बढ़ाने हेतु दक्ष समर्थन प्रणाली अपनाने की आवश्यकता है। इसे ध्यान में रखते हुए, राष्ट्रीय कृषि नवोन्मेषी परियोजना के अवयव-३ द्वारा टिकाऊ ग्रामीण आजीविका उप-परियोजना का आरंभ सितंबर, २००७ में हुआ। इस परियोजना का कार्यान्वयन केंद्रीय बारानी कृषि अनुसंधान संस्थान, हैदराबाद ने अग्रणी केंद्र के रूप में दस अन्य संगठनों के संघ के सहयोग से आंध्र प्रदेश के आठ पिछड़े जिलों(अदिलाबाद, अनंतपुर, कड़पा, खम्मम,महबूबनगर, नलगोंड़ा, रंगारेड्डी एवं वरंगल) में किया गया। लक्षित जिलों में ३-४ गांवों के चयनित समूह केंद्रों पर टिकाऊ ग्रामीण आजीविका संबंधित समस्याओं के समाधान हेतु सहभागिता कार्रवाई अनुसंधान की रूपरेखा तैयार की गई। सहभागिता कार्रवाई अनुसंधान के सिद्धांत के अनुसार इस परियोजना का आरंभ पी.आर.ए., आर.आर.ए., हितधारक समुदायों के साथ विचार-विमर्श की एक श्रंखला के साथ हुआ। स्थान विशेष की आवश्यकताओं पर आधारित हस्तक्षेपों की योजना एवं कार्यान्वयन का मार्ग प्रशस्त करने हेतु चयनित समूह केंद्रों के बीच किए गए मूलभूत सर्वेक्षणों ने परियोजना लागू करने को दृढ़ता प्रदान की।

यद्यपि इस परियोजना को औपचारिक रूप से सितंबर, २००७ में शुरू किया गया था, लेकिन पूर्ण रूप से इसका कार्य खरीफ २००८ से शुरू हो पाया। इस प्रकार परियोजना कार्यकाल (२००७ से २०१२ तक) के दौरान पांच रबी एवं चार खरीफ फसलों तक सीमित रहा। चूंकि यह एक बृहत बहु संस्थानीय एवं बहु आयामी परियोजना थी जिसके तहत विविध जैव भौतिकी एवं सामाजिक-आर्थिक स्थिति वाले आठ जिलों में आजीविका से जुड़े जटिल मुद्दों का संबोधन सभी परियोजना भागीदारियों द्वारा प्रारंभ से ही अनेक परामर्शों एवं बैठकों के आयोजन द्वारा एक सर्वमान्य हल ढूंढ़कर किया गया।

इस परियोजना के महत्वपूर्ण अवयवों में प्राकृतिक संसाधन प्रबंधन गतिविधियों में एक प्रमुख हस्तक्षेप स्थान विशेष पर वर्षाजल संरक्षण कर गरीब किसानों को अपनी आजीविका हेतु वर्षाजल के इष्टतम प्रयोग को बढ़ावा देकर इसके इर्द-गिर्द अनेक लाभदायक हस्तक्षेपों की योजनाए बनाई गई एवं उन्हें कार्यान्वित किया गया। इनमें बेहतर फसलों एवं सस्ययन प्रणालियों को बढ़ावा देना, सस्ययन में पशुधन का एकीकरण, बागवानी, कटाई उपरांत मूल्य संवर्धन एवं बाज़ार संपर्क, छोटे कृषि यांत्रिकीकरण एवं क्षमता निर्माण प्रमुख रूप से शामिल थे।

प्राकृतिक संसाधन प्रबंधन

परियोजना का एक प्रमुख उदेश्य वर्षाजल के कुशल उपयोग के माध्यम से स्थान विशेष पर वर्षाजल संचयन रणनीति अपनाकर जल उपलब्धता को बढ़ावा देना था। चयनित समूह केंद्रों द्वारा वर्षाजल संचयन एवं उसके कुशल उपयोग के लिए अवसरों की जानकारी प्रदान की गई जो एक अनोखी कृषि पारिस्थितिकी का प्रतिनिधित्व करता था। परियोजना क्षेत्र में वर्षा ४०० मि.मी. (अनंतपुर के पंपानूर केंद्र) से ११०० मि.मी. (खम्मम के तुम्मलचेरूवु केंद्र) तक दर्ज की गई। इसी प्रकार, मृदा प्रकारों में सीतागोंड़ी, अदिलाबाद में

में गहरी वर्टीसोल्स तथा पंपानूर, अनंतपुर में मध्यम एवं उथली एल्फीसोल्स पाई गई। अतः अपवाह एवं अंतःस्यंदन में वृद्धि हुई जिससे जल सिंचाई क्षमता में भी वृद्धि हुई। अधिक वर्षा वाले वर्टीसोल्स क्षेत्र अदिलाबाद में अपवाह को खेतों के तालाबों में संचयन कर मौसम के बीच के सूखे से निबटने हेतु प्रयोग किया गया। कम वर्षा वाले उथली एल्फीसोल्स क्षेत्र अनंतपुर एवं महबूबनगर में अपवाह को भूमिजल के अंतस्यंदन एवं पुरर्भरण हेतु अंतःस्रवण तालाबों, खाई व गड़ढों एवं निरंतर समोच्च खाइयों का निर्माण किया गया। बेहतर उपयोग दक्षता सुनिश्चित करने हेतु कुशलता से पानी उठाने एवं उपयोग प्रणालियों के लिए प्रयास किए गए। इनमें कम जल उठाने वाले पंप एवं किराए पर सूक्ष्म सिंचाई प्रणाली शामिल हैं। इसके अलावा, काम न करने वाली एवं जीर्ण वर्षाजल संचयन बुनियादी संरचनाओं की पूर्ण क्षमता से कार्य करने हेतु मरम्मत कराई गई। समूह केंद्रों पर हस्तक्षेप का प्रभाव अतिरिक्त जल संचयन और उपयोग क्षमता में महत्वपूर्ण वृद्धि दर्ज की गई। इस क्षेत्र में किए गए प्रयासों के परिणामस्वरूप लगभग ४.३ लाख घन मीट र अतिरिक्त वर्षाजल सिंचाई क्षमता का निर्माण हुआ। जिससे ४०० हेक्टेयर को मध्य ऋतु सूखा के दौरान अतिरिक्त सिंचाई कर अधिक सस्य सघन क्षेत्र के अंतर्गत लाया गया। इससे भी महत्वपूर्ण बात यह है कि तालाब के आकार का अनुकूलन और भूमिगत जल बंटवारे के तकनीकी और संस्थागत हस्तक्षेपों से आकृष्ट होकर राज्य सरकार ने नियमित कार्यक्रमों की मुख्य धारा में शामिल किया है।

फसल उत्पादकता एवं लाभदायकता में सुधार

बेहतर फसल उत्पादकता एवं लाभदायकता के लिए तैयार की गई कार्यनीति में नई फसलों एवं किस्मों का प्रोत्साहन, विविधिकृत सस्ययन प्रणालियां, पोषकतत्वों एवं नाशीजीव प्रबंधन द्वारा बेहतर फसल प्रबंधन, किराए पर उपलब्ध बेहतर उपकरणों से बीजाई एवं कटाई की सुविधा, बेहतर सस्ययन पर सूचना प्रदान करने के लिए सहायता प्रणालियों की स्थापना, बीज उत्पादन के लिए किसानों की क्षमता का निर्माण, न्यूनतम प्रसंस्करण, जैसे सुखाने के लिए गोदाम पर आधारित संरचनाओं का निर्माण, मूल्य संवर्धन एवं विपणन प्रमुख रूप से महत्वपूर्ण हैं। वर्षा आधारित फसलों का उत्पादन बढ़ाने हेतु प्रमुख रणनीति में किसानों द्वारा समय पर बोवाई करने, पोषक तत्वों की कमियों को ठीक करने, खरपतवार प्रबंधन, कटाई एवं कट ाई के बाद का रख-रखाव एवं विपणन के लिए प्रणाली संबंधित बुनियादी सुविधाओं का निर्माण बहुत अहम रहा। इसके अलावा, आधारिक संरचनाओं में सुधार एवं मध्य ऋतु सूखा के दौरान जीवन रक्षा सिंचाई के लिए किसान द्वारा सिंचित वर्षाजल का उपयोग दक्षता से कर सूखा प्रबंधन की अति महत्वपूर्ण समस्या का समाधान किया गया। वैकल्पिक फसलों के बीजों को उपलब्ध कराकर आकस्मिक फसलों के प्रोत्साहन से मानसून में देरी जैसी आकस्मिक परिस्थितियों का समाधान करने के लिए भी फसल प्रणालियां तैयार की गईं। चयनित समूह से एकत्र मृदा नमूनों के विश्लेषणों ने बहु पोषक तत्वों, विशेषकर सूक्ष्म पोषक तत्वों जैसे कि जस्ता एवं बोरॉन की कमी को दर्शाया। कपास, मूंगफली, मक्का एवं सब्जियां जैसे फसलों ने सूक्ष्म पोषक तत्वों के प्रयोग के अनुकूल प्रतिक्रिया दर्शाई। समेकित पोषक तत्व प्रबंधन के भाग के रूप में, मेंढ़ों पर ग्लैरिसिडिया उगाना, वर्मीकंपोस्ट, कंपोस्ट, मृदा में फसल अवशेषों के समावेश को भी प्रोत्साहित किया गया। इन सभी प्रयासों के योगदान से मूंगफली की फसलोत्पादकता में १५-२० प्रतिशत जबकि कपास एवं सब्जियों में ३० प्रतिशत की महत्वपूर्ण वृद्धि दर्ज की गई।

ग्राम स्तर बीज उत्पादन का प्रोत्साहन एवं समूह केंद्रों में ही इसके विस्तार ने मूंगफली उगाने वाले क्षेत्रों(अनंतपुर, कड़पा एवं महबूबनगर) में अच्छे परिणाम दिए। चुनिंदा किसानों के भागीदारी गठबंधन द्वारा गांव स्तर पर उपयुक्त किस्मों का चयन एवं उत्पादन कर पूरे केंद्र में मूंगफली के पुराने एवं गैर प्रमाणित किस्मों का प्रतिस्थापन सफल अनुभव रहा। प्रशिक्षण एवं क्षमता निर्माण द्वारा संकर बीज उत्पादन के प्रोत्साहन ने छोटे किसानों की लाभदायकता में कई गुणा वृद्धि की। राष्ट्रीय खाद्य सुरक्षा मिशन से समाभिरूपता ने वरंगल एवं खम्मम में रबी दलहनों के विस्तार में सहायता दी। खम्मम में छोटे तालाबों के मरम्मत के परिणामस्वरूप सिंचाई के अंतर्गत रबी दलहनों एवं सब्जियों के क्षेत्र में वृद्धि हुई। कड़पा के बी.वाई. गुड़ी समूह केंद्र, पर करीब ६० एकड़ में बागवानी चारा की स्थापना से पशुधन के समावेश द्वारा उत्पादन प्रणाली में स्थिरता लाने में सहयोग दिया। वरंगल में शून्य कर्षण मक्का उत्पादन को बढ़ावा देना; खम्मम एवं वरंगल में बी.टी. कपास पौधों के अंतराल में बदलाव; नलगोंड़ा में टमाटर एवं मिर्च की बेहतर एवं नई किस्मों का समावेश; अनंतपुर में खरबूजें की कृषि के लिए प्लास्टिक पलवार का उपयोग; अदिलाबाद में कपास एवं अरहर के डंठलों का सब्जियों की खेती में पलवार के रूप में उपयोग; महबूबनगर एवं रंगारेड्डी में अरहर का रोपण; खम्मम एवं कड़पा में रसोई बगीचों के लिए अभियान; वरंगल में अरहर में सामुदायिक नाशीजीव प्रबंधन एवं आम में ड्रिप प्रणाली को बढ़ावा देने के लिए आंध्र प्रदेश सूक्ष्म सिंचाई परियोजना से समाभिरूपता; खम्मम में हल्दी की खेती एवं २००९ के सूखे के दौरान आकस्मिक फसल के रूप में कुलथी को बढ़ावा देना कुछ ऐसे फसल संबंधित हस्तक्षेप थे जिनका सफल कार्यान्वयन किया गया। यद्यपि यह छिटपुट हस्तक्षेप अनियमित प्रकृति के थे, परंतु इन्होंने स्थानीय आवश्यकताओं को पूरा किया एवं संसाधन संरक्षण तथा लाभदायक फसल उत्पादन के बारे में किसानों की जागरूकता में वृद्धि की।

जीविकोपार्जन सुधार के लिए पशुधन

पशुधन वर्षा आधारित कृषि के लिए अति आवश्यक लचीलापन प्रदान करता है। पशुधन, संकट के समय परिवारों के लिए संकट मोचन के रूप में भी कार्य करता है। पशु अवयव किसानों को पशु ऊर्जा शक्ति का कृषि कार्यों में उपयोग एवं खाद प्रदान करने के द्वारा फसल उत्पादकता बढ़ाने में पूरक का कार्य करता है। इस बात को ध्यान में रखते हुए, सभी चयनित केंद्रों में पशुधन हस्तक्षेपों को प्रोत्साहित कर कार्यन्वित किया गया।

निवार्य पशुधन रोगों के बारे में व्यापक जागरूकता लाई गई एवं प्रोफिलेक्सिस की आवश्यकता के बारे कृषक समुदाय को अवगत किया गया। पोषण एवं चारा संसाधनों के बेहतर प्रबंधन की आवश्यकता पर भी ज़ोर दिया गया। पोषण एवं चारा संसाधनों को बढ़ावा देने की आवश्यकता को समझाने के लिए समुदायों के लिए अनेक प्रशिक्षणों, कार्यशालाओं एवं प्रदर्शन दौरों का आयोजन किया गया। अज़ोल्ला को पशुओं के लिए एक पोषणपूरक के रूप में शामिल करने के प्रयासों तथा इसके उत्पादन हेतु नए दृष्टिकोण अपनाए गए। अतिरिक्त पशु स्वास्थ्य सेवा प्रदान करने के लिए, प्रत्येक केंद्र से युवाओं के एक दल को चुनकर बुनियादी पशु सेवाओं जैसेकि टीकाकरण, पेट के कीड़ों का नाश, खसीकरण एवं घावों पर मरहम पट्टी आदि कार्यों में प्रशिक्षित किया गया। छोटे एवं सीमांत किसानों की आय में वृद्धि के लिए छोटे जुगाली पशुओं के पेट के कीड़ों का नाश, टीकाकरण एवं पशुधन बीमा को प्रोत्साहित किया गया। सभी केंद्रों में भूमिहीन किसानों के

बीच भेड़ की इकाईयों का हस्तक्षेप सर्वाधिक लोकप्रिय रहा। खम्मम के तुम्मलचेरूवु केंद्र में रोग प्रतिरोधी एवं वृद्धिशील शारीरिक भार की दृष्टि से कुरोइलिअर पक्षी बेहतर पाए गए। केंद्रों के किसानों को उनके भूमि के कुछ हिस्से पर उनके पशुओं के लिए चारे की खेती को समर्पित करने को प्रोत्साहित किया गया। भूमिहीन महिलाओं एवं गरीब किसानों को भेड़ों एवं बछड़ों के पालन को एक उद्यम के रूप में अपनाने के लिए प्रोत्साहित किया गया।

संक्षेप में, पशुधन उत्पादकता में सुधार के लिए समग्र रणनीति हेतु प्रोफिलेक्सिस एवं पेट के कीड़ों का नाश के साथ-साथ पशुधन का बेहतर स्वास्थ्य एवं चारा प्रबंधन था। इसके अलावा, पशु की मृत्यु से होने वाले नुकसान से बचने के लिए पशुधन बीमा को प्रोत्साहित किया गया। किसानों द्वारा अपनाई जाने वाली पारंपरिक प्रबंधन प्रक्रियाओं की तुलना में उपरोक्त हस्तक्षेपों के परिणामस्वरूप पशुधन लगभग ३० प्रतिशत अधिक प्रतिफल प्राप्त हुआ। इस परियोजना ने कई भू-स्वामी किसानों को पशुधन खरीदने एवं अतिरिक्त पारिवारिक आय बढ़ाने के लिए प्रोत्साहित किया। राज्य सरकार के पशुपालन विभाग से समाभिरूपता प्रोत्साहन द्वारा इन्हें पशु स्वास्थ्य सेवाएं भी प्रदान की गई। अनंतपुर के सूखाग्रस्त पंपानूर केंद्र में पशुधन, छोटे एवं बड़े जुगाली पशुओं को व्यापक स्तर पर प्रोत्साहित किया गया जो पहले केवल फसल आय पर ही निर्भर रहते थे। परियोजना की शुरूआत से पूर्व, इस केंद्र पर दुग्ध का उत्पादन के आंकड़े कुछ विशेष नहीं थे परंतु परियोजना के अंत तक, शीर्ष मौसम के दौरान करीब ६०० लीटर, जबकि क्षीण मौसम के दौरान ४०० लीटर दैनिक दुग्ध उत्पादन दर्ज किया गया।

संस्थागत एवं समर्थन प्रणालियों में आधुनिकताएं

इस परियोजना का मुख्य उद्देश्य इस बात का पता लगाना था कि प्रौद्योगिकियों का गरीबों के विकास हेतु इन्हें किस प्रकार सहायक बनाया जाए। इस खोज के भाग के रूप में, जमीनी स्तर की संस्थाओं को स्थापित कर उनके प्रोत्साहन पर विशेष ज़ोर दिया गया और साथ ही उनकी भौतिक एवं संस्थागत सहायक प्रणाली निर्मित की गई जिसके द्वारा किसानों को बेहतर प्रौद्योगिकियों को अपनाने में सहायता मिली। शुरू में, जन संस्थानों का अध्ययन किया गया एवं उन्हें काम में लाया गया। उसके बाद, जन संस्थानों के रूप में सलाह समितियों को प्रोत्साहित किया गया जिनसे परियोजना एवं समुदाय की आवश्यकताओं में तालमेल बिठाकर समुदाय के सभी वर्गों तक परियोजना के लाभ पहुंचाना सुनिश्चित किया गया। इन सलाह समितियों ने जरूरती परिपाटी किराया सेवाओं को अपने हाथों में लिया जिसका मुख्य उद्देश्य संपूर्ण केंद्रों में छोटे कृषि यंत्रों का कृषि विस्तार हेतु प्रोत्साहित करना था। परिपाटी किराया केंद्रों ने किसानों को किराए पर यंत्र उपलब्ध कराए एवं नाम मात्र का किराया वसूल किया जिसका उद्देश्य उपकरणों का रख-रखाव एवं मरम्मत करना था। कई निष्क्रिय जन संस्थानों को केंद्र के विकास में सक्रिय भाग लेने के लिए शक्ति प्रदान की गई। खम्मम के तुम्मलचेरूवु, केंद्र में पुनर्जिवित किए गए किसान मित्र दल ने परियोजना कर्मचारियों के साथ काम करते हुए निष्क्रिय वर्षाजल सिंचाई निर्माणों की पहचान में महत्वपूर्ण भूमिका निभाई। अनंतपुर एवं महबूबनगर की सलाह समितियों, वरंगल की नवकल्पना सोसाइटी, नलगोंड़ा की बंजारा सोसाइटी, अदिलाबाद की युवा संघ, रंगा रेड्डी के जल उपयोगकर्ता संघ, कड़पा की समूह कार्रवाई टोलियों ने केंद्रों में हस्तक्षेपों पर आधारित आवश्यकताओं के कार्यान्वयन की प्रक्रिया में तेजी लाने में प्रमुख भूमिका निभाई। इनके अलावा,

कड़पा में वर्मीकंपोस्ट उत्पादन में व्यस्त महिला दल, बछड़ा पालन व वर्मीकंपोस्ट इकाई चलाते अनंतपुर के भूमिहीन श्रामिक दल, रंगा रेड्डी जिलें में दाल मिल चलाते किसान दल एवं मछली उत्पादन के लिए इब्राहिमपुर तालाब को पट्टे पर देने वाले युवा दल, नलगोंड़ा के आम एवं तरबूज़ उगाने वाले किसान दल जैसी कुछ उत्पादन अनुकूल ज़मीन से जुड़ी संस्थाओं को परियोजना द्वारा प्रोत्साहित किया गया जिसके परिणाम बहुत सुखद रहे। ग्राम संसाधन केंद्रों द्वारा इन दलों एवं संस्थानों को सहायता दी गई। ग्राम संसाधन केंद्रों के प्रत्येक केंद्र में विशेष रूप से तैयार किए गए सूचना एवं संचार प्रौद्योगिकी उपकरणों को रखा गया जिसने कृषि एवं पशुधन के विभिन्न पहलुओं पर अत्याधुनिक जानकारी उपलब्ध कराई गई । इन केंद्रों में इंट रनेट के माध्यम से मौसम एवं बाज़ार की सूचनाएं प्राप्त कर दैनिक आधार पर किसानों को उपलब्ध कराई गई। मोबाइल फोन रखने वाले किसानों को दैनिक आधार पर बाजार एवं मौसम की जानकारी दी गई। ट `लिफोन द्वारा किसी को भी फसल, मौसम एवं बाजारों पर सूचना प्रदान करने के लिए ग्राम संसाधन केंद्रों में परस्पर क्रियाशील आवाज़ प्रतिक्रिया प्रणाली स्थापित की गई।

पूरे परियोजना दल को सशक्त सहायता प्रदान करने के लिए अत्याधुनिक परियोजना प्रबंधन ढांचा अपनाया गया। इसके तहत प्रत्येक जिले के लिए एक समूह केंद्र समन्वयन एवं निगरानी दल शामिल था, जिसने अपने संबंधित जिलों में परियोजना स्थलों का नियमित रूप से दौरा किया। इन दलों ने समय-समय पर बारीकी से बातचीत कर, समूह एनकरिंग पाटर्नर, जिसने जमीनी स्तर पर परियोजना का कार्यान्वयन किया, से संबंध स्थापित कर ज़रूरी तकनीकी सहायता उपलब्ध कराई। इसके अलावा, तकनीकी सहायक दल जिसमें वरिष्ठ विशेषज्ञ ने समय-समय पर प्रगति की समीक्षा एवं सलाह प्रदान करने के लिए पूरे परियोजना दल के साथ नियमित रूप से बैठको का आयोजन किया गया। परियोजना भागीदारों द्वारा समय-समय पर तकनीकी एवं वित्तीय समीक्षाओं (खरीफ एवं रबी फसलों के अंत में एक-एक) का आयोजन कर, दोनों मोर्चों पर अच्छी प्रगति दर्ज की।

Executive Summary

National Agricultural Innovation Project Component-3 sub project on "Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas" was launched in September, 2007. This project was implemented in 49 villages belonging to eight backward districts (Adilabad, Anantapur, Kadapa, Khammam, Mahabubnagar, Nalgonda, Rangareddy and Warangal) of Andhra Pradesh by a consortium of ten organizations with CRIDA as the Lead Center. The overall objective of this project was to improve rural livelihoods by promoting sustainable natural resource management through an innovative process of enabling and empowering rural communities. It followed a participatory action research (PAR) framework to address the issues of Sustainable Rural Livelihoods in selected clusters of 3-4 villages in the target districts. In accordance with the PAR philosophy, the project began with a series of consultations with the stakeholder communities by employing PRA, RRA, focused group discussions and brainstorming workshops and such other tools. The output of these exercises was fortified by a baseline survey conducted across the clusters that paved way to planning and implementing site specific need based interventions.

Though the the project was formally launched in September, 2007, the beginning of kharif 2008 marked the flagging off of project in full stream. Thus, the project period encompassed five rabi seasons and four kharif seasons between 2007 and 2012. Since this was a large multi-institute, multi-disciplinary project addressing complex issues of livelihoods across eight districts having diverse biophysical and socio economic conditions, it was necessary to develop a common vision of the project by all project partners. This was achieved through workshops, meetings and consultations during the initial phase of the project.

Natural resource management activities such as rainwater harvesting through site specific measures formed the flagship intervention of the project, as it was believed that efficient management of natural resources like rainwater and its access to the poor is the key to secure livelihoods. Similarly, soil fertility enhancement was also addressed through a systematic intervention consisting of sampling, analysis and amendment with deficient nutrients. The other interventions included supporting crop and livestock productivity and institutional innovations. Under these promotion of better crops and cropping systems; integration of livestock into cropping; horticulture, post harvest value addition and market linkages; small farm mechanization and capacity building were taken up.

Natural Resource Management

One of the major emphases of the project was on augmenting rainwater availability through its efficient use by adopting site-specific rainwater harvesting strategies. Each cluster representing a unique agro-ecology presented different kinds of opportunities for rainwater harvesting and its efficient use. The rainfall ranged from around 400 mm (Pampanur cluster Anantapur) to over 1100 mm (Thummalacheruvu cluster Khammam) across the project area.

Similarly, soil types varied too from deep Vertisols (Seethagondi, Adilabad) to medium and shallow Alfisols (Pampanur, Anantapur). Hence, the runoff and infiltration capacity; therefore the water harvesting potential also varied. In high rainfall Vertisol areas (Adilabad) runoff was harvested in farm ponds for tiding over mid season droughts. In low rainfall shallow Alfisols (Anantapur and Mahbubnagar), the runoff was harvested in percolation ponds, trench cum bunds and CCTs for facilitating infiltration and re-charging of groundwater. Major interventions under this theme included digging of farm ponds, repair and renovation of existing rainwater harvesting infrastructure such as de-siltation of tanks, repairing of sluice gates etc; networking of bore wells to promote sustainable use of groundwater; participatory soil health management through identification and correction of major and micronutrients. Efforts were also made to put in place efficient water lifting and application systems to ensure better use efficiency. This included introduction of low lift pumps and micro irrigation systems on custom hiring basis. Besides, defunct and dilapidated rainwater harvesting infrastructure was revived to function to their full capacity. The impact of interventions aimed at enhancing rainwater harvesting and utilization capacity was very significant across the clusters. The efforts in this area resulted in the creation of an additional rainwater harvesting capacity of over 4.3 lakh cu m leading to increased cropping intensity by bringing over 420 ha of area under protective irrigation regime (details in Annexure I). More importantly some of the technical and institutional interventions on optimizing pond size and groundwater sharing have drawn the attention of the State Government for mainstreaming in regular programmes. These initiatives paved way to better crop productivity and higher profits due to augmented rainwater availability and its improved management. Thus, NRM interventions rightly played the role of flagship interventions.

Improving crop productivity and profitability

The strategy for improving crop productivity and profitability included promotion of new crops and varieties; diversified cropping systems; better crop management through nutrient and pest management; facilitation of seeding and harvesting through improved implements made available on custom hiring basis; establishing support systems for accessing information on better cropping; capacity building of farmers for seed production; creating infrastructure for minimum processing (like drying yards), value addition and marketing. The major strategy for securing rainfed crop production was to create systems for enabling farmers to take up timely sowing, correcting nutrient deficiencies, weed management, harvesting and post harvest handling and marketing. Besides, the most important aspect of drought management was addressed through improving the infrastructure and farmer capacity to use harvested rainwater for life saving irrigation during mid season droughts. Systems were also developed to address contingent situations such as delayed monsoon by promoting contingency crops through making available seeds of alternate crops. Analysis of soil samples collected for across the cluster showed multiple nutrient deficiency, particularly of micro nutrients such as zinc and boron. Crops like cotton, groundnut, maize and vegetables responded favourably to application of micronutrients. As part of integrated nutrient management, raising of glyricidia on the bunds, vermicomposting, composting, incorporation of crop residue in soil were also promoted. These efforts put together contributed significantly to enhancing crop productivity

ranging from 15-20% in groundnut to over 30% in cotton and vegetables. Interventions like zero till maize improved yields by 13% over conventional method besides savings on water and labour. Altered spacing in cotton contributed to 30% yield increase. Plastic mulching in watermelon increased yields by 22% while mulching with shredded cotton stalks in brinjal increased yield by 25%. A detailed analysis of practice-wise impact on yield and income through such improved interventions is provided in Annexure II.

Promotion of village level seed production and their spread within the cluster gave good results in groundnut growing areas (Anantapur, Kadapa and Mahbubnagar). A participatory framework of selection of suitable varieties and their production at the village level by select farmers resulted in replacement of old and non descript varieties of groundnut across the clusters. Promotion of hybrid seed production through training and capacity building improved profitability of small farmers by several folds. Convergence with National Food Security Mission helped spread of pulses in rabi in Warangal and Khammam. Repair of minor irrigation tanks in Khammam resulted in increase of area under rabi pulses and vegetables under irrigation. Establishment of hortipasture in over 60 acres in BY Gudi cluster, Kadapa helped bring stability to the production system through introduction of livestock. Promotion of zero till maize in Warangal; altering of spacing in Bt.cotton in Khammam and Warangal; introduction of improved varieties of tomatoes and chilies in Nalgonda; use of plastic mulch for cultivation of melons in Anantapur; mulching of vegetable fields with shredded cotton and pigeonpea stalks in Adilabad; transplanting of pigeonpea in Mahbubnagar and Rangareddy; campaign for kitchen gardening in Khammam and Kadapa; community pest management in pigeonpea and convergence with AP micro irrigation project for promoting drip systems in mango in Warangal; turmeric cultivation in Khammam and promotion of horsegram as a contingency crop during the drought of 2009 were some other crop related interventions that were implemented. Though these interventions were sporadic in nature, they responded to the local needs and heightened the awareness of farmers about resource conservation and profitable crop production.

Livestock for livelihood improvement

Livestock provides much needed resilience to rainfed farming. Livestock also acts as the shock absorber for the families at times of distress. Animal component also complements crop productivity by providing draft and manure to the farmer. With this in mind, livestock interventions were promoted across the clusters.

Wide spread awareness was created about preventable livestock diseases and the community was sensitized about the need for prophylaxis. Emphasis was also given to better management of feed and fodder resources. The communities were engaged on several trainings, workshops and exposure visits for understanding the need to augment feed and fodder resources. Cultivation of azolla as a feed supplement to cattle was intensified with renewed focus on cultivation practices. In order to supplement the veterinary health services, a group of youth selected from each cluster was trained in basic veterinary services like vaccination, deworming, castration, wound dressing etc. promotion of small ruminants was taken up in a big way to augment

income of the small and marginal farmers with emphasis on deworming, vaccination and insurance. Sheep units were the most favorite intervention among the landless across the clusters. Kuroiler birds were found to perform better both in terms of disease resistance and incremental body weight at Thummalacheruvu cluster, Khammam. Farmers across the clusters were encouraged to cultivate fodder for their cattle by allocating a portion of their land. Landless women and poor farmers were encouraged to take up ram lamb rearing and calf rearing as an enterprise.

To sum up, the overall strategy for livestock productivity improvement was better health and feed management of the existing livestock along with prophylaxis and deworming. Besides, livestock insurance was promoted to avoid loss due to the death of animal. These interventions resulted in over 30% increase in returns by livestock as compared to the traditional management practices followed by the farmers. The project encouraged many land owning farmers to buy livestock and supplement their family income. They were also facilitated with veterinary health services by promoting convergence with the state department of animal husbandry. Livestock, both small and large ruminants, were promoted aggressively in the drought prone Pampanur cluster of Anantapur which earlier depended only on crop enterprise. Prior to the beginning of the project, this cluster was not producing any milk quantity worth a mention. By the end of the project, the daily milk production during peak season reached over 600 l while it was 400 l during lean season. The range of livestock interventions promoted by the project and it's impact is detailed in Annexure III.

Institutional innovations and support systems

The major aim of the project was to research on how to make technologies work for the poor. As part of this quest, the project laid enormous emphasis on building and promoting grassroots institutions and create both physical and institutional support systems that helped in enabling the farmers to adopt improved technologies. To begin with, a stock of the existing institutions was taken and began engaging with them for understanding the role they could play in securing the participation of the community in the project. Later, Salaha Samithis were promoted as people's institution which articulated the community needs with the project and ensured that the project benefits flowed to all sections of the community. These Salaha Samithis handled custom hiring service which was aimed at promoting small farm mechanization across the clusters. Custom hiring centers rented out machinery such as planters, weeders, power sprayers, threshers, decorticators, strippers, shredders etc to the farmers and collected nominal user fee which would serve the purpose of the maintenance and repair of the equipment. Many of the inactive/defunct institutions were rejuvenated to take up active part in the development of the cluster. The Rythu Mithra group which was revived in Thummalacheruvu cluster, Khammam played a pivotal role in identifying defunct rainwater harvesting structures by working closely with the project staff. The Salaha Samithis in Anantapur and Mahbubnagar, Navakalpana society in Warangal, the Banjara society in Nalgonda, the Youth association in Adilabad, the Water users association in Rangareddy, the Cluster Action Teams in Kadapa played major role in speeding up the process of implementation of need based interventions in the clusters. These apart, several small groups like the Women's group in Kadapa engaged

in vermi compost production, the Land less labourers group in Anantapur running the calf rearing cum vermi compost unit, the Farmer's group managing the dal mill and the group of youth that has leased in Ibrahimpur tank for fish production in Rangareddy, the Manago and Watermelon farmers groups in Nalgonda were some of the production oriented grassroots institutions that were promoted by the project and functioned successfully. These groups and institutions were supported by the Village Resource Centers (VRC) specially built at each cluster to house the ICT equipment in which latest content on different aspects of agriculture and livestock was made available. These centers accessed weather and market information through the Internet and made available to the farmers on daily basis. Farmers having cell phones were sent message alerts on market and weather on daily basis. An interactive voice response system was installed in the VRCs to provide information on crop, weather and markets to anyone who contacted via telephone. A list of community based institutions revived and promoted during the project period is provided in Annexure IV.

An innovative project management framework (Annexure V) was adopted to provide a strong a support to the entire project team. It consisted of one cluster coordination and monitoring team for each district which regularly visited project sites in their respective districts. These teams closely interacted and provided technical backstopping with the Cluster Anchoring partner who implemented the project at the ground level. Besides, a team of senior experts called technical support group held regular meetings with the entire project team to review the progress and offer advice from time to time. Periodical technical (one each at the end of kharif and rabi seasons) and financial reviews helped the project partners to register good progress on both the fronts.

Part-I: General Information of Sub-project

Title of the sub-project	Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas
Sub-project code	Sponsored project
Component	3 (Research on Sustainability Rural Livelihood Security)
Date of sanction of sub-project	24.07.2007
Date of completion	31.03.2012
Extension if granted	Not Applicable
Total sanctioned amount for the sub-project	1734.8919 lakhs
Total expenditure of the sub-project	1343.64874
Consortium leader	Central Research Institute for Dryland Agriculture
Name of CL, Designation, Organization Address, Phone & Fax, E-mail, Website	Dr B Venkateswarlu, Director, CRIDA, Santoshnagar, Saidabad, Hyderabad 040-24530177, vbandi_1953@yahoo.com, www.crida.in

List of consortium partners:

	Name of CPI/ CCPI with designation	Name of organization and address, phone & fax, email	Duration (From-To)	Budget (Rs. Lakhs)
CPI	Dr.Sreenath Dixit	Central Research Institute for Dryland Agriculture, Santoshnagar, Saidabad PO, Hyderabad – 500 059 Telefax: 040-24535336 Email: sreenathd@yahoo.com; sdixit@crida.in	01.09.2007 to 31.03.2012	440.87680
CCPI 1	Sri B. Shiva-rudrappa	BAIF Institute of Rural Development(BIRD), C/o.B.Damodar Reddy Door No.9-6-173, Road No.2, Durga Bhavani Nagar Colony, Santoshnagar Hyderabad – 500 079 Mobile: 9440353991 Email:baif_ap@rediffmail.com	01.09.2007 to 31.03.2012	194.78210
CCPI 2	Sri R. Murali	Modern Architects for Rural India (MARI), 1-8-499, Behind Ekashila Park, Balasamudram, Hanamkonda – 506001, Warangal District Tel: 0870-2571208/2552928, Fax: 0870-2541762 Mobile: 9849649051 Email:marimail@rediffmail.com, mariwgl@gmail.com	01.09.2007 to 31.03.2012	105.48730
CCPI 3	Dr.G.Suren-dranath	Watershed Support Services Action Network (WASSAN), 12-13-445, Street No.1 Tarnaka, Secunderabad–500017 Tel: 27015295, 27018581 Email: wassan@eth.net	01.09.2007 to 31.03.2012	128.32430
CCPI 4	Sri R.Verraiah	Sri Aurobindo Institute for Rural Development(SAIRD), P.O.Gaddipalli, Garidepalli Mandal, Nalgonda district, A.P. Tel: 08683-237443, Email: saird_gaddipalli@yahoo.com	01.09.2007 to 31.03.2012	97.03980

	Name of CPI/ CCPI with designation	Name of organization and address, phone & fax, email	Duration (From-To)	Budget (Rs. Lakhs)
CCPI 5	Sri R Kishore	Aakruthi Agricultural Associates 6-3-903/ A13, II Floor, Suryanagar, Rajbhavan Road, Somajiguda, Hyderabad – 500 082 40038381, 66737672 Mobile: 9849910972, Email:aai_aakruthi@yahoo.com	01.09.2007 to 31.03.2012	99.58930
CCPI 6	Sri R.V.Rama Mohan	Center for World Solidarity 12-13-438, Street No.1 Tarnaka, Secunderabad–500017 Tel: 040 27018257, 27014300 Fax: 040-27005243, 9440194866 e-mail: nrm@cwsy.org, nrmcws@gmail.com, rvrm2@yahoo.com	01.09.2007 to 31.03.2012	115.29430
CCPI 7	Dr.R.Sudhakar Rao	ANGRAU, Rajendranagar Hyderabad – 500 030 Tel: 040-24015078 dr_angrau@yahoo.co.in	01.09.2007 to 31.03.2012	223.75390
CCPI 8	Dr.S P Wani	ICRISAT P.O.ICRISAT, Patancheru, Hyderabad Tel: 040-30713466, Mobile: 9849005546 Email: s.wani@cgiar.org	01.09.2007 to 31.03.2012	117.72680
CCPI 9	Sri Vijay Jesudassan	IKisan Limited 1, NagarjunaHills, Panjagutta Hyderabad – 500082 Phone: 040-23350671 Fax: 040 23350232 Email: vijay@ikisan.com	01.09.2007 to 31.03.2012	212.01730

CPI-Consortia Principal Investigator; CCPI-Consortia Co-Principal Investigator

Statement of budget released and utilization partner-wise (Rs. in Lakhs):

	CPI/ CCPI Name, designation & address)	Total budget sanctioned	Fund released (up to closing date)	Fund utilized (up to closing date)
CRIDA	Dr.Sreenath Dixit Consortium Principal Investigator, CRIDA, Santoshnagar, Saidabad, Hyderabad-500 059	440.87680	346.08871	328.77599
ANGRAU	Dr. R.Sudhakar Rao Director of Research ANGRAU, Rajendranagar Hyderabad – 500 030	223.75390	162.12309	150.52992
ICRISAT	Dr S P Wani ICRISAT, P.O.ICRISAT, Patancheru, Hyderabad	117.72680	95.96778	95.50058
BIRD	Mr.B.Shiva Rudrappa Chief Programme Coordinator BIRD Door No.9-6-173, Road No.2 Durga Bhavani Nagar Colony Santoshnagar, Hyderabad–500079	194.78210	157.56647	155.91930
WASSAN	Dr.G.Surendranath Programme Officer, WASSAN, 12-13-450, Street No.1 Tarnaka, Secunderabad–500017	128.32430	107.99510	108.35042
SAIRD	Dr.R.Veeraiah SAIRD, P.O.Gaddipalli, Garidepalli Mandal, Nalgonda district, A.P.	97.03980	84.13972	83.39572

	CPI/ CCPI Name, designation & address)	Total budget sanctioned	Fund released (up to closing date)	Fund utilized (up to closing date)
MARI	Sri R.Murali, Secretary 1-8-499, Behind Ekashila Park, Balasamudram, Hanamkonda – 506001 Warangal District	105.48730	89.85066	88.67678
CWS	Sri R.V.Rama Mohan, Director (NRM), 12-13-438, Street No.1 Tarnaka, Secunderabad–500017	115.29430	97.50336	96.67132
IKISAN	Sri Vijay Jesudasan, National Manager (Operations and Development) I Kisan Limited No.1 Nagarjuna Hills Panjagutta Hyderabad – 500 082	212.01730	147.33710	146.63252
AAKRUTHI	Sri R.Kishore, Programme Coordinator 6-3-903/A/3, II Floor, Suryanagar colony, Rajbhavan Road, Somajiguda, Hyderabad – 500 082	99.58930	89.19619	89.19619
Total		**1734.8919**	**1377.76818**	**1343.64874**

Part II: Technical Details

1. Introduction

Poverty eradication has been the overriding objective since the beginning of economic planning in India. Despite spectacular growth in the industry and the services sector in the past decade, rural poverty continues to bother the government and development professionals. The issue of rural poverty is complex and intimately linked with the performance of agriculture and allied sectors. The near-stagnant agricultural growth during the last decade and declining work opportunities in rural areas are forcing the poor to migrate to towns and cities in distress. Poor capital formation in agriculture; inadequate credit and institutional arrangements and poor market, storage and processing infrastructure besides the risks associated with weather are pushing farmers into chronic indebtedness. The poor performance of agriculture has seriously affected the landless laborers and rural artisans. Therefore, there is an urgent need to reverse this process and give a new lease of life to agriculture and rural livelihoods through appropriate **research based development strategies** and suitable **policy interventions.**

In this backdrop, National Agricultural Innovation Project Component-3 sub project on "Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas" was launched in September, 2007. This project was implemented in 8 backward districts (Adilabad, Anantapur, Kadapa, Khammam, Mahabubnagar, Nalgonda, Rangareddy and Warangal) of Andhra Pradesh by a consortium of 10 institutions with CRIDA as the Lead Center. These districts were categorized as the disadvantaged districts of Andhra Pradesh as identified by the Planning Commission, Govt. of India based on 'work for employment' programme. A brief profile of the selected districts is provided in Box-1.

Adilabad: It is spread over an area of 16,20,000 ha. with nearly 45% under forest cover. The gross cropped area is about 5,40,000 ha. with net sown area of around 35% of the geographical area. The cropping intensity of the district is 101% least among the project districts despite receiving highest rainfall (1104 mm) among the eight districts. This district has a significant tribal population (17%) with an average literacy rate of 46%. There is no major irrigation project in the district and cropping is predominantly rainfed. Major crops are cotton, soybean, maize and sorghum with some area under black gram. Poor infrastructure facilities and long distance from the major markets coupled with frequent droughts due to erratic monsoon are some of the disadvantages facing this district.

Anantapur: It is the largest among the project districts in terms of geographical area (19,13,000 ha.) with very little (13%) forest cover. Gross cropped area is 11,36,00 ha. while the net sown area accounts for 70% of the total geographical area. About 14% of the population belongs to scheduled castes while about 3.5% belongs to scheduled tribes. Literacy in rural areas is 62% with nearly 70% of the work force engaged in agriculture. It is the only arid district of the state with about 536 mm annual rainfall. It lies in the rain shadow area of the state and suffers from frequent droughts. The district has only 10% of area under irrigation. Groundnut

is the major crop accounting for over 75% of the cropped area. Other important crops are sunflower, pigeonpea, chickpea, rice and sorghum. The district suffers from very poor and erratic rainfall leading to frequent crop failures thus being the major disadvantage.

Kadapa: This district is s spread over 1538000 ha with about one-third of the area under forests. Gross cropped area accounts for 4,74,000 ha and net won area is 27% of the total geographical area. About 16% of the population belongs to scheduled castes and 2.5% to scheduled tribes with about

60% literacy among rural population. The annual average rainfall of the district is 719 mm with about 30% of the area under irrigation. This district also experiences moderate to severe drought frequency. Groundnut, sunflower, rice and chickpea are the major crops. The soils are generally very degraded with very poor water holding capacity, thus exacerbating the drought conditions. With over 60% of the population depending on agriculture and allied sectors for livelihoods, this district also is classified as one of the backward districts of the state.

Khammam: This district is spread over 15,81,000 ha with almost half of it under forests. The gross cropped area is 4,79,000 ha with a net sown area of about 28% of the geographical area. The district consists of large populations of scheduled castes (17%) and scheduled tribes (27%). About 39% of the cultivated area is irrigated with rice as the major crop. Cotton has been a popular crop since mid 1990s while crops like green gram and sorghum declined. The literacy among rural population is 51% with over 70% of the work force engaged in agriculture and allied activities. The average rainfall of the district is 1096 mm with relatively low drought frequency. However, due to poor communication and transport infrastructure this district has remained backward. Besides, the district also has suffered from long periods of insurgency affecting the normal course of development.

Mahbubnagar: It occupies 18,47,000 ha with nearly 17% of it under forest cover. Gross cropped area is 7,37,000 ha with around 44% of the total geographical area being net sown area. However, current fallows account for 34% being one of the highest in the state. Castor, sorghum, pigeonpea and green gram are the major crops of the district. The district has very high livestock population (18.3 adult cattle units). With the highest number of small ruminants (7.73 lakhs) this district suffers from very high grazing pressure which has led to degradation of common pastures and lands. The annual average rainfall of the district 749 mm with a very high frequency of droughts. With only 19% of irrigated area the effect of frequent droughts results in large scale distress migration by the rural population.

Nalgonda: The district covers an area of 14,22,000 ha with very little forests (5.6%). Net sown area is 34% of the geographical area. The district has over 17% of scheduled castes population and over 10% of scheduled tribe population. The literacy among rural population is 67.6%. The average annual rainfall districts is 744 mm with a very high frequency of droughts during the past two decades. The district has 36% of its cultivated area under irrigation. Besides, rice, castor, cotton are the major crops. Though the district has witnessed

significant increase in horticulture production (17,000 ha in 2002 to 71,000 ha in 2006), the infrastructure for marketing has not developed commensurately.

Rangareddy: This is the most urbanized and the smallest of districts (7,53,000 ha) except the state capital. Gross cropped area is 2,66,000 ha. It has 14.5% and 4% of its population as scheduled castes and scheduled tribes. Due to its vicinity to the state capital nearly 60% of its work force is engaged in non agricultural activities. Despite this, large sections of the rural population depends on agriculture and livestock rearing. It receives 835 mm annual rainfall and experiences high frequency of droughts. It has no major irrigation source and cultivates pigeonpea, green gram, black gram and sorghum. Migration and frequent droughts are a major reasons for the backwardness of the district.

Warangal: Spread over 12,82,000 ha, it has ¼th of it under forest. Gross cropped area is 5,50,000 ha while the net sown area is 29% of the total geographical area. Nearly 17% of the population belong to scheduled castes while 14% belong to scheduled tribes. The district receives an average rainfall of 991 mm. It has 64% of its total cultivated area under irrigation with rice as the major crop. Cotton has gained significant area post mid- 1990s. With a large population of livestock heads the district is suffering under high grazing pressure (8.5 ACU/ha). Despite favourable conditions, rainfed areas suffer from frequent droughts. Besides, this district also has had a long history of insurgency as a result of which it is counted as one of the backward districts of the state.

It followed a Participatory Action Research (PAR) framework to address the issues of Sustainable Rural Livelihoods in selected clusters of 3-4 villages in the target districts. In

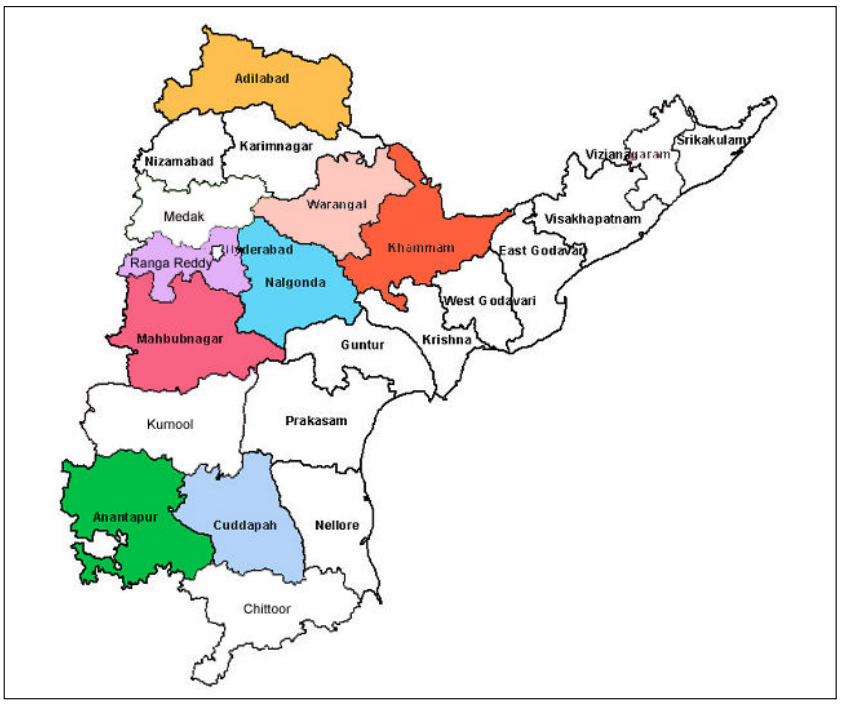


Fig.1: Eight selected districts of A.P. in which the project sites are located

accordance with the PAR philosophy the project began with a series of consultations with the stakeholder communities by employing PRA, focused group discussions and brainstorming sessions etc. The output of these exercises helped in understanding the livelihood issues across the clusters and design appropriate interventions.

2. Overall Sub-project Objectives

The project was conceived with the overall objective of addressing rural livelihoods holistically by piloting innovations to optimize the use of **natural** and **human capitals** and by building institutional capability to sustain the gains through convergence of expertise at cluster level. The specific objectives however, were:

- To improve the livelihoods of the rural poor through efficient management of natural resources and increased productivity, profitability and diversity of the farming system.
- To facilitate agro processing, value addition and market linkages for enhanced on farm and off-farm income and employment generation.
- Capacity building and skill development of primary and secondary stakeholders through knowledge sharing, collective action and use of modern ICTs.
- To build a policy framework, institutional mechanisms and support systems for scaling up of the successful approaches.

3. Sub Project Technical Profile

Methodology

The detailed account of the methodology followed for the project including the selection of target area, implementation approach and stakeholder participation etc. is described in this chapter.

Target Area Selection

The target area for the project includes eight predominantly rainfed clusters of villages in 8 districts of Andhra Pradesh identified as backward by the Planning Commission of India. Each cluster covers 3-4 villages/hamlets falling under one Gram Panchayat (GP) and is contiguous with a homogenous production system. It was ensured that adequate population of scheduled castes and scheduled tribes, the landless and poor households are represented in the selected villages so that the interventions and their outcomes will be useful for replication in other parts of the district/state. A profile of project clusters is given in Table 1.

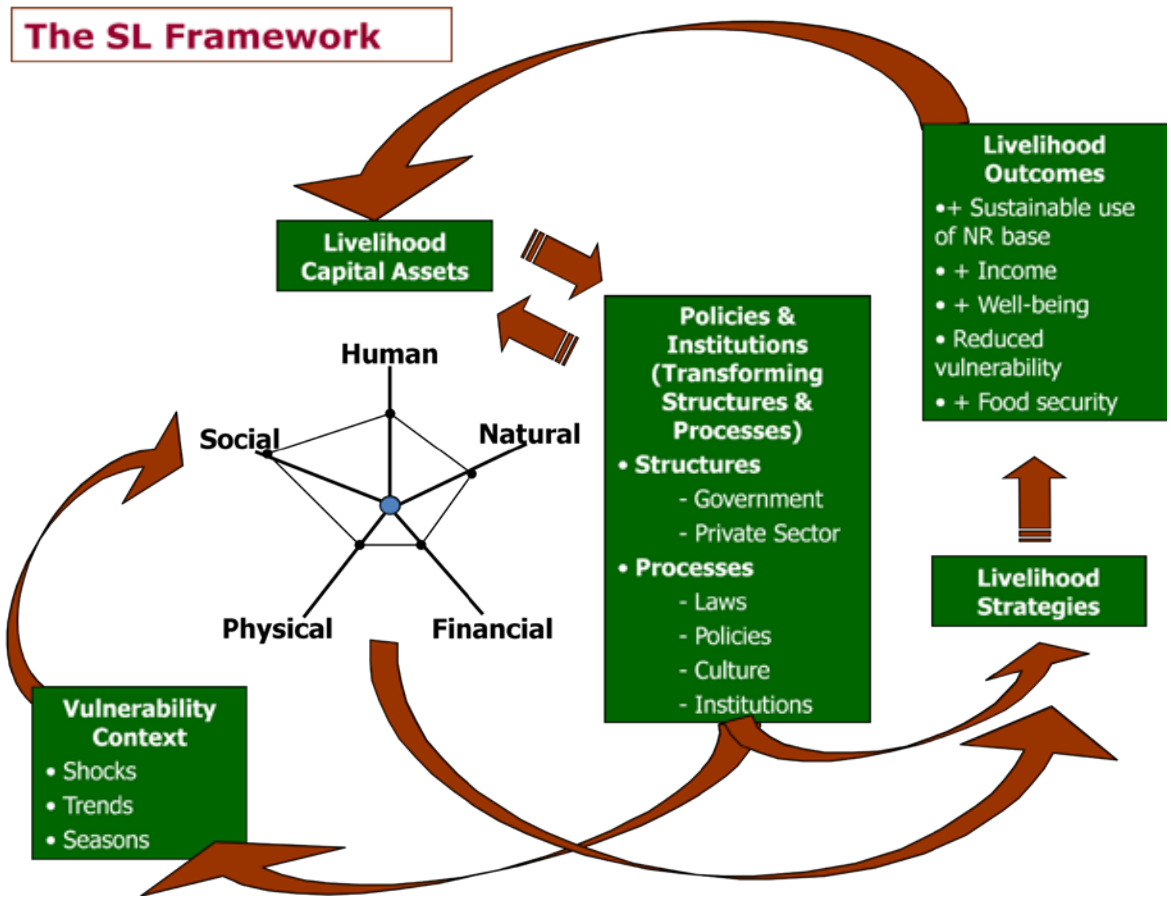
Table 1: Profile of project clusters in the target area

District	Mandal	Cluster	Villages/Hamlets	Area (ha)	Households (no.)
Adilabad	Gudihath-noor	Seetha-gondhi	Old Somwarpet, New Somwarpet, Garkampet, Arkapalli, Chinna Malkapur, Pedda Malkapur, Kotwalguda, Seethagondi	1913	575
Pampanur, Anantapur	Atmakur	Pampanur	Pampanur, Pampanur Thanda, Y. Kothapalli	2111	576
Kadapa	Lakki Reddy Palli	B. Yerragudi	Brahmana Yerragudi Kaspa, V.N. Palli, Mudindla Palli, Kapu Palli, Konampeta, P.V. Palli, Puttakarlavary colony, Madhigapalli	1354	516
Khammam	Ashwa-puram	Tummala-cheruvu	Tummala Cheruvu, Bandla Pullaiah Gumpu, Kurvapalli Kotturu, Koremvari Gumpu, Ramavaram, Mamillavai, Venkatapuram, Bheemavaram	6934	629
Mahabub-nagar	Mahabub-nagar	Jamistapur	Jamistapur, Telugugudem, Kodur Thanda	1217	739
Nalgonda	Penpahad	Dupahad	Jalamalkunta, Seetamma Thanda, Yellappa Kunta Thanda, China Gorekunta, Peda Gorekunta, China Seetaram Thanda, Peda Seetaram Thanda, Lalsing Thanda	800	621
Ranga Reddy	Parigi	Ibrahimpur	Ibrahimpur, Ibrahimpur Thanda, Roopsing Thanda, Dhadi Thanda, Malkaipet Thanda	898	409
Warangal	Raghuna-thapally	Jaffer-gudem	Jaffergudem, Satyanarayanapuram, Ramannagudem, Kusumabai Thanda, Chakal Zal Thanda, Lokya Thanda, Vepula Gadda Thanda, Cherla Thanda	2070	689

Project Approach

The project followed the sustainable livelihoods framework adopted by DFID (Carney, 1998) which is based on the five capitals viz. human, natural, financial, social and physical capitals. The interventions were designed to address each of the capitals to bring about improvement in the livelihoods of the people in the selected disadvantaged clusters. The interventions undertaken to address the enhancement of these capitals are comprehensively captured with some examples in a table annexed to this report (Annexure VI).

A participatory approach was followed in the project implementation. A detailed assessment of the existing situation with respect to farm and non-farm activities; constraints and opportunities for enhancing household income and livelihood security was carried out before designing the project interventions. A critical analysis of livelihood related problems was made, specific constraints identified and a problem-intervention matrix was prepared. **A flagship intervention approach** was followed where the major focus in a given cluster was laid on one or two interventions, which address the key livelihood issue of the cluster having maximum impact at the household level.



Adapted from (Carney, 1998)

4. Baseline Analysis

A total of 2385 families were covered for the baseline survey conducted across eight districts. Proportionate sampling of all the categories (large, medium, small and marginal farmers and the landless) was done (see Table 2) and information was collected in structured, pre-tested interview schedule. A sample of 60 households per district was surveyed in non-cluster villages as a control. Several studies showed that poverty is acute in households managed by aged, female headed, especially widowed female, physically challenged and those belonging to the scheduled castes and tribes. Therefore, special attention was given through appropriate columns in the questionnaire to capture such factors. The pre-designed questionnaire that consisted of data requirement both from primary and secondary sources was administered simultaneously across the 8 clusters. Cross verification was carried out with available secondary data wherever required. Data were statistically analyzed and a report generated in excel format. The benchmark survey was carried out during 2007-08, just before the project interventions began. The summary findings of the benchmark survey on key indicators are presented in Tables 2 & 3.

Table 2: Cluster-wise distribution of households based on land holding

Cluster	Landless	Marginal Farmers	Small Farmers	Medium Farmers	Large Farmers	Total
Seethagondhi, Adilabad	41	10	110	84	45	290
B.Y.Gudi, Kadapa	25	32	71	59	22	209
Thummalacheruvu, Khammam	40	114	152	35	11	352
Jamistapur, Mahabubnagar	54	182	125	10	2	373
Jaffergudem, Warangal	76	167	76	26	5	350
Ibrahimpur, Rangareddy	57	96	50	5	3	211
Dupahad, Nalgonda	75	76	80	78	0	309
Pampanur, Anantapur	3	46	97	89	56	291
Total	**371**	**723**	**761**	**386**	**144**	**2385**

Table 3: Annual income (Rs.'000) of farm households across the clusters (2007-08)

Cluster	Landless	Marginal Farmers	Small Farmers	Medium Farmers	Large Farmers	Overall
Seethagondhi, Adilabad	29176	33004	44489	68296	128224	61817
B.Y.Gudi, Kadapa	31651	26758	29088	34400	75718	35446
Thummalacheruvu, Khammam	50547	28497	32671	44996	73893	35864
Jamistapur, Mahabubnagar	57628	59572	83480	133210	122708	69615
Jaffergudem, Warangal	46239	71016	104704	132909	172718	79002
Ibrahimpur, Rangareddy	46778	41677	57701	34570	91740	47396
Dupahad, Nalgonda	22345	18425	21567	44984	-	26894
Pampanur, Anantapur	26333	35429	33505	50241	77508	47322
Overall	40584	47258	50168	57726	97038	51848

A brief analysis of cluster-wise baseline information is as follows.

Seethagondi cluster, Adilabad

The project was implemented in Seethagondi cluster, consisting of 8 hamlets. The total geographical area of the cluster is 1913 ha, of which 1296 ha (68%) is under cultivation. The average annual rainfall of the district was 984 mm. The cluster has a total population of 1983 (as per 2001 census) with number of women marginally outnumbering men.

The benchmark survey conducted revealed the following details about the cluster. The cluster has in all 575 households out of which 38.4% belong to medium farmers, 22.4% to marginal farmers, 18.4% belong to small

farmers, 11.1% belong to landless labourers and 9.6% to large farmers. The Scheduled Tribe families account for 23%. About 9% of the households in the cluster were reported to be below poverty line.

There were about 22 village level community based organizations like Self-Help Groups and Rythu Mitra Groups in the cluster. Thus, the average number of such village level institutions worked out to one per every 100 persons. There was one commercial bank branch in the cluster. There was no primary health centre and animal health center in the cluster. The nearest agricultural market yard was around 10 km.

Of the total geographical area (1913 ha), 601 ha (31%) was under forests while 1296 ha (68%) is under cultivation. About 23.3% of the land was classified as degraded land. Approximately 9% of the geographical area was treated with soil and water conservation measures. Majority of the soils of the cluster represented *Vertisols* with reasonable depth. The estimated soil loss of the cluster was 19 t/ha/year. The major crop group of the cluster was commercial crops such as cotton (62%) followed by cereals (20%) and vegetables (9%). The major source of irrigation was open wells followed by bore wells. There was one agro-processing unit in the cluster.

Based on the details obtained by the benchmark, the outcomes of PRA and a series of discussion held with the community and other stakeholders, a broad framework was prepared for implementing the intervention. Keeping in view the potential and its livelihood implications, rainwater harvesting through farm ponds and recycling for protective irrigation was identified on the flagship interventions. Other interventions were planned and implemented around this theme to improve the livelihoods of the farming community.

Pampanur cluster, Anantapur district

Three villages in Pampanur cluster of Anantapur district were selected for project implementation. The total geographical area of the cluster is 2110.9 ha out of which the cultivable area was 1431.5 ha. The cultivable area comprised of 138.5 ha of wet land (irrigated) and 1293 ha of dry land (rainfed). The average annual rainfall of the district is 338 mm. The cluster had in all 576 households out of which 31.8% belong to medium farmers, 23.8% to landless labourers, 17% to large farmers, 16% to marginal farmers and 12.3% to small farmers. The share of Scheduled Tribe households in the cluster was 18%.

The cluster had a total population of 2905 (as per 2001 census) with almost equal number of men and women. The literacy rate was 59%. There were 36 DWACRA and 11 RMG in the cluster. One commercial bank, and one primary health centre were present in the cluster. The cluster had no market yard in the vicinity of 10 km radius. Out of the 2110.9 ha of geographical area, the net sown area was 1430.5 ha land under forest was 427.4 ha, barren land 100 ha,

uncultivable waste 90 ha, permanent fallow 42 ha, and 10 ha each under trees/groves and other cultivable lands.

Majority (93%) of the soils in the cluster were red chalka soils (*Alfisols*). Extent of soil loss (due to runoff) per year was estimated at 6 tons /ha while extent of land degraded was 1.7% of the total geographical area. About 30% of the total geographical area was treated with soil and moisture conservation measures when the project began. Groundnut was the major oilseed crop in the cluster which occupies over 80% of the cropped area. Area under cereals was around 6% while that under pulses was 4% with very little under vegetables (0.4%).

The major source of irrigation was through wells and over 90% of the wells were functional. There were 2 tanks, which catered to the irrigation needs of paddy growers in the cluster. There were 3 agro processing units in the cluster.

Keeping in view the limitations of the agro-ecology of the cluster, project interventions were designed to augment the natural resource base to encourage profitable farming. The major focus was on developing and implementing site specific rainwater harvesting and water productivity enhancement initiatives. Besides, productivity enhancement of groundnut, the major crop of the cluster, was addressed through a systematic plan involving seed replacement, nutrient management and mechanization of post harvest operations.

B.Yerragudi cluster, Kadapa district

The cluster comprised of six villages with total geographical area of 1670 ha. The cultivable area was 578 ha out of which 96 ha was irrigated and 482 ha is rainfed. The average annual rainfall of the district was 394 mm. No other village institutions except 13 DWACRA and 5 SHGs were present in the cluster.

The cluster had 516 households out of which 49.4% belonged to small farmers, 24.6% to medium farmers, 16.1% to landless labourers, 5.6% to large farmers and 5% to marginal farmers. Men out numbered (620) women (568). The total population of the cluster was 1286 including 98 children. About 38% of the population was illiterate. Less than 50%t of the geographical area of the cluster (578 ha) was used for cultivation of crops. A major portion of the land (350 ha) was barren and put to non-agricultural use. Both permanent (71 ha) and current (42 ha) fallows accounted to 113 ha (10% of the geographical area). Only 20 ha was under forest strip and 18.5 ha under miscellaneous trees and groves. About 18 percent of the cultivable land was red chalka soil, 14 percent were black soils and other types constituted 68 percent. Major crops grown in the cluster were oil seeds (362 ha), pulses (112 ha), cereals (32 ha) and vegetables (7 ha) where as other crops accounted for 65 ha. Wells (both open and bore wells) were the major sources of irrigation followed by tanks for irrigated cultivation.

Thummalacheruvu cluster, Khammam

In the Tummalacheruvu cluster of Khammam district the project was implemented in 8 hamlets across total geographical area of 6936 ha. The total cultivable area was 978.4 ha out of which 73.8 ha was irrigated and 904.6 was rainfed. The average annual rainfall of the district is 890 mm.

The cluster has 629 households out of which 29.9% belonged to medium farmers, 26.6% to small farmers, 20.2% to marginal farmers, 16.7% to landless labourers and 6.7% to large farmers. The total population of the cluster was 2637. Except a primary health centre, no other institution like financial institutions and market yards were present in the cluster. The cluster being a remote locality situated in the fringe forests, the share of tribal population was as high as 42%.

Literacy among the population of the cluster was 44%. In respect of institutions in the cluster, there were 48 SHGs / DWACRA groups and 4 RMGs. The land use pattern of the district indicated that the maximum area was under forests (5549.6 ha) followed by area under crops (978.4 ha), non-agricultural use/barren land (419.5 ha), uncultivable waste (278.3 ha) and area under trees/grooves (27.5 ha).

The soils of the cluster are predominantly red chalka soils (68%) followed by black soils (18%) and other types (14%). Study of different crops grown in the cluster showed that as much as 63% of the area cultivated was under commercial crops followed by 15% under cereals, 10% under pulses 7.5% under vegetables and about 4% of the area under other crops.

Wells (both open and bore wells) were the main source of irrigation. There were two tanks under which irrigated crops like paddy were predominantly grown.

Jamisthapur cluster (Mahabubnagar district)

Jamisthapur, Telugugudem and Kodur thanda were the three villages where the project was implemented in this cluster. The project addressed a total geographical area of 1216.80 ha, of which 850.40 ha was cultivable. Agriculture is predominantly rainfed in this cluster with only 59.30 ha under irrigation. The average annual rainfall of the district is 447 mm.

The cluster had 739 households out of which 50.9% belonged to small farmers, 25.6% to the landless labourers, 18.8% to medium farmers and 0.8% to large farmers. The share of the tribal households was

only 3% in the cluster. The strength of women was 1402 out of 2863 total population in the cluster.

The literacy level in the cluster was about 36%. There were 42 village institutions in the cluster which included 36 DWACRA / SHG groups and 6 *RMGs*. There was a market yard within the vicinity of 10 km of the cluster.

Net sown area in the cluster was about 850 ha while that under forests was 305.40 ha. Permanent fallows accounted for 43 ha and area under miscellaneous trees and groves for 18.40 ha. The cluster had predominantly (93%) red chalka soils (*Alfisols*). About 53% of the total cultivated area was under oilseeds followed by 36% and 10% under cereals and pulse respectively. The sources of irrigation for agriculture were 23 open wells, 127 bore wells and 8 tanks.

Dupahad cluster, Nalgonda district

The total geographical area of the cluster is 800 ha, spread over in 9 hamlets. Out of this area, 600 ha was cultivable with over 80% of it under rainfed condition. The rest was irrigated by groundwater. The average annual rainfall of the district is 562 mm.

The cluster had 621 households out of which 47.5% belonged to marginal farmers, 34.8% to small farmers, 10.8% to medium farmers, 5.6% to landless labourers and 1.3% to large farmers. The total population of the cluster was 2326 of which women population was slightly higher (1141) than men (1130). The scheduled tribes accounted for nearly half (46%) of the households in the cluster.

There were 6 SHGs and 3 *RMG*. There was one branch of the commercial bank and one primary health centre. However, there was no animal health care facility in the cluster. No market yard was present within the vicinity of 10 km radius of the cluster.

The land use pattern indicated that 600 ha was net sown area, 74 ha was permanent fallows and 13.5 ha was under miscellaneous trees and groves. About 97% of the cluster soils are red chalka soils and only 3% are black soils and 16% of the geographical area was reported as degraded.

Pulses were the major crops grown in this cluster representing 63% cultivated area followed by 18% under cereals, 11% under oilseeds and 8% under vegetables. The major source of irrigation was wells. There were a total of 232 wells with over 50 open wells. Of these 45 open wells were defunct while over 80% of bore wells were functional. There was one processing unit in the cluster.

Ibrahimpur cluster, Rangareddy district

Four villages viz., Ibrahimpur, Malkaipet, Roopsing Thanda, Dadi Thanda representing a total geographical area of 898 ha were considered for project implementation. Of this, 439 ha was the cultivable comprising 284 ha of un-irrigated and 155 ha of irrigated area. The average annual rainfall of the district is 587 mm.

The cluster had in all 409 households out of which 52.6% belonged to marginal farmers, 24.2% to small farmers, 14.7% to landless labourers and 8.6% to large farmers. The cluster had a population of 2365 members of which men were 1170, women 1088 and children 107. The literacy rate in the cluster was around 35 recent.

In respect of presence of village institutions, DWACRA / SHGs out numbered (23), *RMG* (6). There were no credit organizations institutions, primary health centers (for humans and animals) and market yards (within 10 km radius) in the cluster. The cluster had a cultivable area of 439 ha followed by forest (427 ha). About 50% of the net sown area was red chalka, while 30% was black soils and the rest were other type of soils.

Cropping pattern of the cluster indicated that cereals occupied prominent position in terms of area covered (181ha) followed by pulses (118 ha), vegetables (24 ha), oil seeds (22 ha), fruits and commercial crops (8 ha each) and other crops (78 ha). Tube wells (138) were the major source of irrigation followed by open wells (18) in addition to two tanks which mainly catered to the irrigation needs of paddy growing farmers of the cluster.

Jaffergudem cluster, Warangal district

The Jaffergudem cluster of Warangal district had eight villages with a total geographical area of 2070 ha. The total cultivable area in the cluster was 1551 ha, of which 312 ha is irrigated while the remaining 1239 ha is rainfed. The average annual rainfall of the district is 799 mm. The rainfall in the cluster during 2010 was 844 mm.

The cluster had in all 689 households out of which 42.2% belonged to marginal farmers, 27% to small farmers, 11.5% to medium farmers, 5.8% to landless labourers and 0.3% to large farmers. The households belonging to scheduled tribe accounted for 35% of the households in the cluster.

Out of the total population of 3286 there were as many as 1150 illiterates. About 46 village institutions existed in the cluster and of these 31 were self help groups formed under DWACRA and 15 *RMG*. There are no credit institutions in the cluster. There was no primary

health centre or veterinary hospital in the cluster. However, there were 3 market yards within the vicinity of 10 km radius.

A perusal of the land use pattern indicated that 1551 ha was net sown, 310 ha was under forests, 159 ha was under permanent fallows with a meager area under barren land (16 ha). Further, area under miscellaneous trees and groves was 18.6 ha and uncultivable wasteland was about 15 ha. Red chalka (*Alfisols*) represented nearly 75% of the soils followed by black soils (15%) and others (10%).

Soil loss in the cluster was estimated at around 16 tons/ha/ during the year 2007. Among different crops grown in the cluster, cereals occupied highest area of 715 ha (46%) followed by 689 ha of commercial crops (45%). Also grown were oilseeds (84 ha), pulses, (49 ha) and vegetables (14 ha).

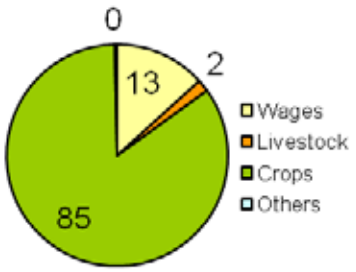
The major source of irrigation was groundwater (155 open wells and 207 tube wells). Tanks (5) also formed the secondary source of irrigation for growing paddy.

Need Assessment at Cluster Level

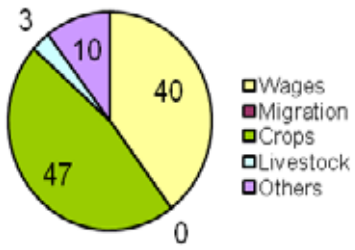
Area	Problem / issue identified	Proposed intervention
NRM	• Indiscriminate digging of tube wells and falling success rate of tube wells. • Incurring huge expenditure, indebtedness • Soil Fertility – Nutrient deficiency	• Rainwater harvesting through a network of farm ponds • Renovation of existing percolation ponds and check dams for groundwater recharge • Soil test-based nutrient application
Crops	• Poor seed replacement ratio, still using TMV series of groundnuts that have lost varietal vigor • Lack of private sector interest in groundnut seed industry, as margins are less • Declining profit margins in groundnut farming due to high labour cost and stagnant yield levels	• Replacing groundnut seeds from local sources with improved Kadiri series developed ANGRAU • Value addition to groundnut • Reducing cost of cultivation, Farm level value addition to groundnut, mechanization of small farms
Horticulture	• Poor nutrient and water management in the existing orchards • Poor market information about papaya and cucurbit fruits	• Balanced nutrient and judicious water management • Buyback arrangements to be facilitated
Livestock	• Milk production not profitable due to poor price offered by vendors. • Lack of fodder during dry periods. • Low retention of backyard poultry birds and small ruminants by poor families	• Establishment of milk collection center • Augment supply of fodder during summer • Incentives for higher retentions
Gender issues	• Drudgery in stripping and decorticating groundnuts	• Introduction of machinery for groundnut stripping and decortication and retain groundnut shell for manure
Off farm employment/ youth empowerment	• Lack of off-season and alternative employment due to lack of marketable skills	• Finding new opportunities like groundnut chikki making, sheep rearing, diary farming, nursery raising, motor winding trainings, BPO jobs from District training institutes.

Household livelihood analysis in eight project clusters

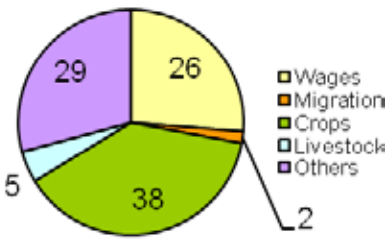
Seethagondhi, Adilabad



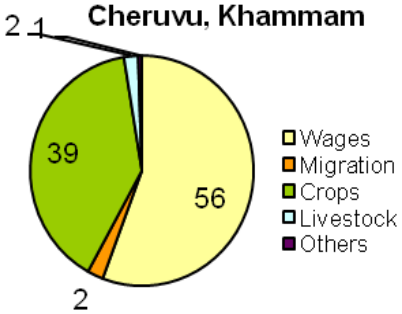
Pampanur, Anantapur



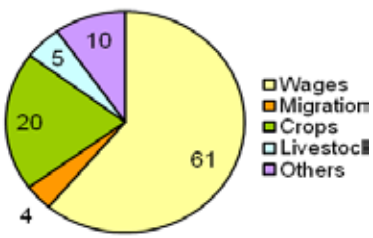
Brahmana Yerragudi, Kadapa



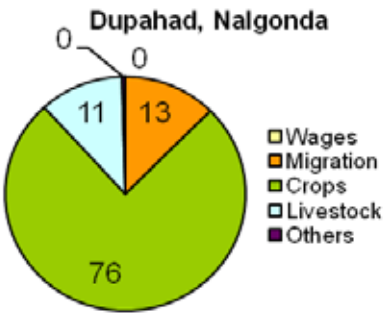
Tummala Cheruvu, Khammam



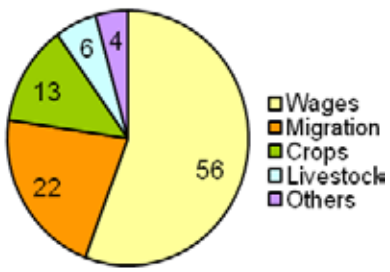
Zamistapur, Mahabubnagar



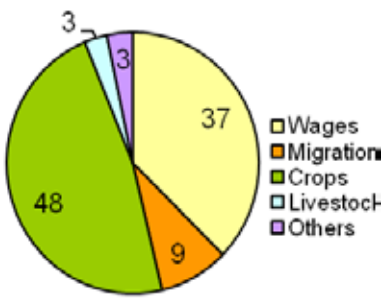
Dupahad, Nalgonda



Ibrahimpur, Rangareddy



Jaffergudem, Warangal



The sub project adopted on-farm action research framework for achieving its objectives. The research framework was kept flexible to accommodate site specific interventions and needs of the community. This provided much needed freedom to address issues related to rural livelihoods. However, the interventions undertaken as part of the research project were broadly classified into: a) crop based interventions, b) NRM based interventions, c) livestock based interventions and d) capacity building and market related interventions. A detailed account of research achievements registered under these themes in each cluster is presented in the following pages.

5.1) Seethagondi cluster, Adilabad District

NRM Interventions

a) Farm ponds

The physical features of the cluster and the reasonably good rainfall offered very good scope for natural resource management interventions, particularly rainwater harvesting. Despite receiving about 984 mm annually, farmers experienced midterm droughts and suffer crop loss. In order to address midterm droughts, protective irrigation through farm ponds and several innovations and support systems were promoted in the cluster. Firstly, based on the potential runoff, soil type and rainfall, the size of the ponds was altered and the first pond was dug in August, 2008 amidst a lot of resistance from farmers. Due to good rainfall during kharif 2008 the pond filled several times over and it became a center of learning for the farmers, the officials of the District Water Management Agency (DWMA) and the line departments. The success of Mr.Namdev who cultivated vegetables during rabi season using the harvested rainwater attracted many farmers and they started approaching the project staff. The project encouraged farmers to approach the district administration for availing the benefit of MNREGS for digging farm ponds on their fields to foster convergence with the on-going programmes. The project staff visited the sites

proposed by farmers and identified 30 suitable locations for taking up farm ponds. Further, farmers were facilitated to file their combined request with the district authorities by showcasing the initial success met by Mr.Namdev (see Box-2). The district administration sanctioned Rs.20.00 lakhs for taking up 30 farm ponds in the selected sites under MNREGS.

But the size of the farm ponds dug under MNREGS was of 10 m x 10 x 2.5 m where as the desirable size was 20 m x 20 m x 4 m keeping in view the rainfall and runoff potential of the area. This matter was taken up with the district authorities and permission was obtained to expand the size of the farm ponds dug under MNREGS by using machine in selected spots. Thus, a network of 30 farm ponds was dug in the cluster leading to increase in cropping intensity by 50%. Once the farm ponds were dug, the issue of lifting the harvested rainwater and applying the same at times of drought or for taking up second crop during rabi was addressed by promoting, low cost, low lift pumps on cost sharing basis. Modifications were also done in the available low lift pumps to further reduce their weight by replacing some of the parts with lighter material (such as plastic) so that pumps could be carried by head load or on bicycle from one place to another place without having to use bullock cart or tractor.

By promoting farm ponds as source of water for protective irrigation, 40 ha was brought under protective irrigation regime besides creating a possibility of its taking second crop during rabi season. Thus, farm ponds served the purpose of drought proofing as well as increasing cropping intensity. The following table gives detailed account of the impact of farm ponds in the cluster.

Table 4 :Impact of farm ponds

RWH Structures	No's	Storage Capacity (cu m)	No. of farmers benefited	Protective Irrigation potential created* (ha.)	Increase in Cropping intensity %
Farm ponds	16	16608	30	40	100
Remodeled farm ponds in convergence with MNREGS	14	15554			

Box-2

Farm pond helps Namdev improve his livelihood

Keeping this in mind the rainfall, potential runoff and scope for harvesting rainwater a farm pond of 17m x 17m x 4.5m size was dug on Mr.Namdev's field in Garkhampet village. Initially there was very strong opposition from Mr. Namdev and his brothers for allocating a part of his land for the pond. They were convinced after several rounds of visits and discussions that the harvested rainwater would help in avoiding mid season drought besides allowing them to take an additional crop.

Soon after the farm pond was dug (July, 2008), there were good rains and the farm pond filled to the brim. This enthused the brothers and they hired diesel engine to irrigate half acre area where they grew tomatoes. Looking at the water level, the staff of KVK, Adilabad facilitated the release of 1000 fingerlings in the ponds. By the time tomatoes came to harvest, the prices in the market had touched close to Rs.25/kg. Mr.Namdev hired local vehicle and went to the market himself to sell tomatoes. He made a good profit of over Rs.20,000/- through four good harvests. By mid November, the depth of water in the pond was up to two meters. This encouraged the brothers to sow chickpea on one acre land. By then the fishlings had grown well and each one was weighing up to 300 g. He sold fish in the local market and made an additional profit of Rs.4,000/-. This raised enthusiasm of the farmers in the cluster and as many as 50 farmers came forward and approached the project staff for digging farm ponds in their fields. The project staff undertook a survey of all the 50 spots and found 30 of them suitable for digging farm ponds. In order to meet the huge demand, the project staff approached MNREGS to avail convergence for this activity. The district administration accorded its approval to this proposal and sanctioned an amount of Rs.20 lakhs for up scaling this intervention. Utilizing this facility, 30 farm ponds were dug in the cluster by the end of the project period.

b) Use of crop residue as mulch and livestock feed

Cotton is the major crop of this cluster. Farmers either burn the cotton stalks in the field before preparing the field for the next crop or use them as fuel in their houses. As cotton had replaced grain crops over the years, there was acute shortage of fodder for the livestock in the cluster. To address the twin problem, chipper-shredder, a unique machine was introduced and farmers were encouraged to shred the stalks and

use it as mulch or as cattle feed. This machine was introduced on custom hiring basis. The shredded residue was applied as mulch to vegetables and used as livestock feed by farmers after fortifying it with mineral mixture.

Demonstrations were conducted with the machine to raise the awareness of farmers about the advantages of mulching. Vegetable (Brinjal) farmers were encouraged to apply mulch in the inter row spaces and it was observed that the mulched plants showed better growth characteristics. Further, it was also observed that the weed competition in the mulched plot was much less. The advantages of mulching was evident from the difference in growth parameters and yield levels between the mulched plots and the other plots where mulching was not taken up. The plots mulched with shredded cotton stalks had higher number of flowers and fruits (24 & 10 resp.) compared to the controlled plot (18 & 8 resp.). Besides, mulched plot required irrigation once in 6 days as compared to controlled plot (4 days).

Effect of mulching on plant growth

Parameter	Mulched plot	Control plot
Height (cm)	90	75
Length of moisture retention (days)	6	4
No. of irrigations	3	6
Branches/plant	6	5
No. of flowers/plant	24	18
No. of fruits/plant	10	8
Yield (t/ac)	10	8

Demonstration was also conducted to prepare palatable feed by using shredded cotton stalks. Animals were supplemented with the balls of shredded cotton stalks during dry seasons. Livestock farmers who suffered from shortage of feed were very happy about finding a new feed which could be prepared by the waste generated on their farm.

Though the chipper shredder is very efficient in shredding various types of biomass, it lacks portability due to its weight (about 375 kg) and hence farmers found it difficult to transport the machine from one field to another. They requested the project staff to find some solution to this problem. The FMP engineers of CRIDA developed a mechanism for mounting it on a tractor with a three-point hitch frame made of 70 mm width and 10 mm thick mild steel flats. Thus, over 50 cotton farmers made use of this machine over a period of one month after cotton was harvested during 2010-11.

Crop based interventions

c) Low Cost Nursery for Gap Filling in Cotton

Generally, about 3-5% gaps are observed in cotton fields due to mortality of plants as a result of water logging or trampling damages. However, these are not filled generally as there will be a difference in the age of the plant. To address this, a technique was developed to grow nursery of cotton plants in a limited number. The date of sowing in the field and that in the nursery being the same, the nursery grown plants will be very useful for gap filling purpose. Five thousand seedlings were raised in the nursery by using palas *(Butea monosperma)* leaf sleeves which are available in abundant quantity in the villages. Members of an SHG took up this activity and sold the nursery raised cotton plants @ of Rs.0.50/plant. Farmers in general appreciated this effort as it made their job of gap failing easy. Since the seeds of Bt Cotton are expensive, farmers (24 nos.) are now practicing this technique on their own in an area of 8 ha.

Cotton seedling nursery raised in the sleeves of Palas leaves (left); seedling ready to fill gaps

d) Intercropping

The major crop grown in the cluster is cotton which is intercropped with redgram or Jowar. However, over time cotton is increasingly mono-cropped without any intercrop due to high profitability and labour shortage. This is leading to nutrient exhaustion and poor yields of cotton. In order to discourage mono-cropping of cotton, intercropping of cotton with pulses was promoted in the cluster in a big way. This encouraged diversity as well as ensured food and fodder security to the households.

Table 5: Promotion of intercrops in cotton

Crop/variety	Area (Ac)	Mean yield (Q/ha)	Farmers (No.)
Red gram (MRG-66)	466	62.5	105
Red gram (PRG-100)	66	50	12
Soybean (JS 93-05)	18	150	16
Green gram (WGG-37)	10	75	47

Besides, the following crops were introduced to promote household food security and diversity where farmers were practicing cotton mono-cropping for a long time.

Table 6: Alternate crops promoted in the cluster

Crop/variety	Area (Ac)	Mean yield (Q/ ha)	Farmers (No.)
Maize (Trishulatha)	12	125	58
Horsegram (CRIDA-18R)	3.5	138	7
Bengalgram (ICCC-37)	38	87	38
Bengalgram (JG-11)	14	75	14
Wheat (Lok-1)	14	63	14

Suggested alternative livelihood model

This area is blessed with fairly high rainfall, good soils and dedicated farming community. However, due to the ill distributed and erratic rainfall, livelihoods associated with farming suffer from frequent droughts and the resulting crop failures. In the absence of major irrigation facility, rainfall is the only source of water for agriculture. Since the tribals who predominantly inhabit this cluster do not consume milk and milk products, livestock is not a thriving enterprise here. The project made efforts for introducing improved livestock management interventions with limited success. Keeping these in view, the alternate livelihood model can focus on rainwater harvesting through farm ponds and recycling the same for reducing vulnerability to droughts and in good years the same water can be used to take up an additional crop during rabi season.

Wheat (Lok-1)

Bengalgram (JG-11)

5.2. Pampanur cluster, Anantapur district

Natural Resource Management

The project facilitated digging of farm ponds, mini percolation tanks and continuous contour trenches along with block plantation on wastelands. The following table summarizes NRM activities taken up during the project period and the additional amount of rainwater storage capacity created:

Table 7: Rainwater harvesting strategy

Intervention	Quantity	RWH storage capacity (m^3)	Farmers benefitted (No.)	Man days generated
Farm pond (No.)	8	1200	16	800
Mini percolation tanks (No.)	8	2770	28	1370
Continuous contour trenches (m)	1840	550	28	269
Block plantation (No.)	17000	NA	28	213

The Pampanur cluster of Anantapur being very arid prefered to harvest rainwater through percolation ponds and recharge groundwater. The groundwater was then judiciously used through sprinklers and drip irrigation systems which were deployed across the cluster by converging with development programmes such as Andhra Pradesh Micro Irrigation Project (APMIP) and National Horticulture Mission (NHM). Besides, the custom hiring centers at Pampanur and Y.Kothapalli have been equipped with good number of sprinkler sets and pipelines which are in great demand among farmers.

Groundnut Seed Replacement & Productivity Enhancement

Groundnut is the major crop of the district and is predominantly cultivated in the cluster. However, farmers were cultivating old/non-descript or TMV series of varieties without replacing the seeds for several years. As a result, the productivity was very low (<1000 kg/ha). Since the livelihood of the farm and non-farm families mostly depended on groundnut related economy, it was decided to address low productivity of groundnut by encouraging farmers to change their seeds in favour of the high yielding ones. A participatory varietal selection initiative was undertaken as the first step during rabi 2007 and kharif 2008. High yielding varieties such as cvs. Narayani, K-6, ICGV-91114 were tried by farmers. Due to consistent high yield, K-6 was largely accepted by farmers.

Table 8: Performance of improved varieties against farmers' preferred variety (TMV-2)

Per plant	TMV-2	Narayani	K-6 (Rainfed)	ICGV-91114
Filled pods	9.4	9.4	11	9.83
Unfilled pods	1.2	1	1.25	1.83

The agricultural research stations of ANGRAU were contacted and a joint programme was developed to promote seed production of K-6 by selected farmers. An arrangement of seed buyback was initiated according to which the ARS, Anantapur and Kadiri (the latter is exclusively working on improving groundnut productivity in the region) bought back groundnut

seeds from the farmers at a mutually agreed price. A set of farmers having irrigation facility were identified and trained as seed producers by the project staff in collaboration with ANGRAU scientists. Supporting arrangements such as storage space, seed treatment etc. were made so that the seeds produced during rabi season could be used during kharif on a large scale.

Over 30 farmers were trained as seed producers and 177 tonnes of seed were produced during the project period. The following table gives an overview of the total quantity of the seed produced and the area in which the non descript seed was replaced. Over these years, the farmers have developed capacity to negotiate with the research stations of ANGRAU and are able to produce and sell the seeds to the research stations. This has helped to augment the supply of high yielding varieties of groundnut in the cluster.

Table 9: Groundnut seed production (season wise)

Season	Area coved (ha)	No. of farmers	Quantity produced (tonnes)	Seed made available to (ha)
Rabi 2007	13	38	15	60
Kharif 2008	26	13	65	260
Kharif 2009	13	18	16	64
Rabi 2009	11	26	18	72
Kharif 2010	12	21	21	84
Rabi 2010	6	20	12	48
Rabi 2011	11	26	30	120

Due to seed replacement and a host of other good cultivation practices such as timely sowing with improved implements, maintaining plant population, *in stiu* harvesting of rainwater, protective irrigation through harvested rainwater, pest and disease management and integrated nutrient management the average yield of groundnut increased from around 100 to 150 q/ha.

The Pampanur cluster did extremely well in maintaining and running the custom hiring center, which was equipped with the need-based agricultural machineries. The following equipment were in continuous demand by the farming community.

Table 10: Performance of custom hiring center

Equipment	Area covered (ha)*	Farmers benefitted (No.)	Revenue generated (Rs.)
Plant protection equipment	253	536	11720
Sprinklers (5 sets)	60	102	17988
Oil engine	43	65	3400
Groundnut thresher	256	261	71200
Groundnut planter	6	17	600
Total	618	981	104908

* multiple use possible

The overall transactions of the custom hiring center amounted to Rs.1,04,908/- serving 981 farmers. Mechanization of labour intensive operations like planting and threshing resulted in savings of labour 25-30% and Rs.4000/ha

Livelihoods for the Landless

Among the non-farm enterprises, the performance of the calf rearing center along with the vermi composting unit attached to it was successful with scope for horizontal spread. These enterprises were run by two separate self help groups. A group of landless women was facilitated with training, access to building to house the vermi composting unit and seed money to set up a community vermi composting unit. Meanwhile, another group of landless women expressed interest to take up income generating activities. The cluster anchoring partner (BIRD-AP) with its experience of successfully running calf rearing centers elsewhere suggested the group to take up calf rearing as an enterprise. Nine women came forward to form a group and they purchased 17 calves (13 Holstein Friesian and 4 Jersey) ranging between 6 months to 12 months of age during the year 2008 in two phases. The cost of the calves ranged between Rs.5,800/- to Rs.7,200/-.The total investment was Rs.1,50,000/-. The group engaged in calf rearing was trained by BIRD-AP in feeding and management practices. The drought of the year 2009 was particularly challenging to this group, as there was acute fodder shortage during the following summer. They were encouraged to cultivate fodder during the drought by accessing private property on lease. The group cultivated fodder sorghum, guinea grass and horsegram to supplement feed resources. BIRD-AP facilitated artificial insemination of these calves upon maturity and each pregnant cow was worth Rs.18,000/- to Rs.20,000/-. Of the nine, 5 women chose to retain the cow throughout pregnancy and retain the calf after calving to engage in selling of the milk. While the remaining four, sold the pregnant cows and realized lump sum profits. The group of women engaged in vermi composting produced 5 t and sold the lot @ Rs 3 per kg to earn a total income of Rs 15,000/-. The following table summarizes the economics of calf rearing.

Table 11: Economics of community calf rearing centre*

(n=9)

Average calf purchase cost (Rs)	Average sale cost (Rs)	Mean Earnings	
		Milk sale	Dung sale cost
8500	18,650	-	1000
6600	-	11,100	2000

*The data presented is for one cycle of production which is of 18 months for calf rearing enterprises and 30 months for milk yielding cows.

Ram Lamb Rearing: Promoted as Enterprise through Revolving Fund

Small ruminants viz., sheep and goat play an important role as supplementary source of income for the landless and resource poor farmers. Considering this, the project promoted interventions involving small ruminants, especially fattening of ram lambs for sale during peak demand period. This intervention was very popular across the clusters and particularly so in the dry districts. The households were selected from the landless, marginal farmers and the poor women headed families in Pampanur cluster. The capital required for procuring the ram lambs was provided through a revolving fund vested with the *Salaha Samithi* which was promoted on a grassroots community institutions. The loan amount availed by participants ranged from Rs.2,000/- to Rs.5,000/-. These households contributed 10% of the cost as margin money for buying the lambs. A total of 91 households have availed benefit through this intervention in three phases (40+21+30). The interest rate on borrowings was decided by the *Salaha Samithi* as 3% per annum. Ram lambs were reared till the age of 6-7 months and were sold at an average of Rs.4,500/-. The average net returns was Rs.2,500/- per animal. The end use of profit from the enterprise was not only for continuity, but also for substitution, such as switching over to large ruminants or buying agricultural assets or investing in petty trade, etc. Considering the availability of fodder, some of the participants also invested the returns temporarily in agriculture to continue rearing ram lambs to coincide sale during the peak demand period.

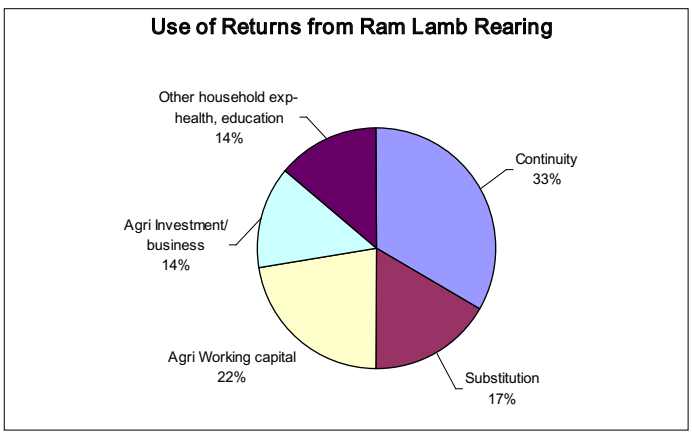
During the II Phase, the households were encouraged to avail insurance for their animals in convergence with the Department of Animal Husbandry through its *Pasu Kranti Scheme*. The project promoted Common Interest Groups for collective procurement and marketing to make this intervention more profitable. The unit size of 4-5 animals is considered more ideal as per the feedback of the participants.

A study was carried out to trace the flow of earning out of small ruminant rearing among select families at Anantapur. It was found that 1/3 of the households continued with ram lamb

rearing, while a fifth of them ploughed back the profits as working capital for their agriculture needs (see Table 12). Other households spent it on household expenses such as health and education, petty business and buying large ruminants (see fig.). The rate of returns was over 90% in Pampanur and Kothapally while, it was only 16% in Pampanur Thanda. The low rate of returns in thanda was due to the initial mortality of the animals. Due to this, half of the beneficiaries discontinued ram lamb rearing while the other half switched over to other enterprises.

Table 12: Utilization of returns from ram lamb rearing

Village	Continuity	Substitution	Agri Working capital	Agri Investment/ business	Other purpose - health, education
P Thanda	0	2	1	0	1
Pampanur	1	3	4	2	1
Y Kothapalli	11	1	3	3	3
Total	12	6	8	5	5



Plastic mulching for promoting higher melon production

Plastic mulching was promoted in melon cultivation in the cluster for ensuring higher yield and better quality melon production. During the year 2009, a trial was taken up in Mr.China Venkatesh's field to demonstrate the benefits of plastic mulch in production of better quality melons. Initial trial was laid out in water melon (1.5 ac) and musk melon fields (1.2 ac). The results were very encouraging. Plastic mulched water melon production was to the tune of 22 t / ac as compared to 18 t in the plots without plastic mulch. In the case of musk melon, the yield in mulched plot was 14 t/ ac while it was 8 t in the check plot. Melon farmers of the cluster were taken to Mr Venkatesh's melon plots during the field day. The farmers were impressed with the advantages of plastic mulch in melon cultivation. The following are the advantages of plastic mulch as listed by the farmers:

- Weed free plot; relatively low pest incidence
- Healthy growth and early maturity due to favourable micro climate
- Larger and uniform fruit size with attractive colour

Based on the experience generated by Mr. Venkatesh during 2009, 16 farmers took up melon cultivation with plastic mulch during later season.

Table 13: Melon cultivation with plastic mulch: Yield and net returns

Parameter	Mulched		Not Mulched	
	Water melon	Musk melon*	Water melon	Musk melon
Yield t/acre	22	14	18	8
Net Returns (Rs/acre)	37150	36750	22000	12500

*Directly procured at the farm gate by retail chain operators of Bangalore.

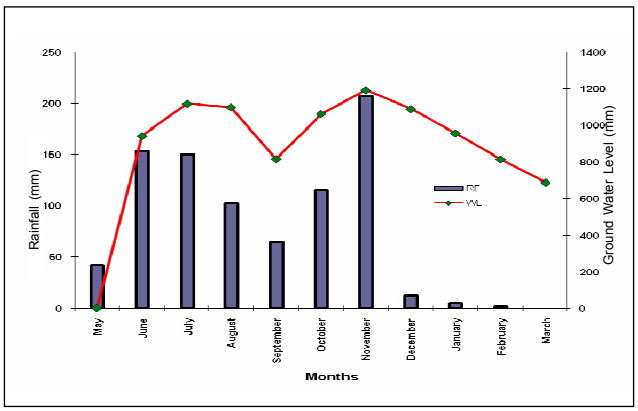
Suggested alternate livelihood model

Keeping in view the frequency of droughts and lack of diversity in cropping, emphasis needs to be given on conserving rainwater through multiple approaches like rainwater harvesting both by *in situ* and *ex situ* means. The prevailing weather conditions which are generally dry are suitable for many horticulture crops particularly melons. Micro irrigation and mulching have been shown to improve both productivity and quality. Livestock enterprises consisting of both small and large ruminants can be an ideal alternative to minimize the effects of drought. Thus, the alternate livelihood model for this area must essentially be a combination of crop, horticulture and livestock enterprises with the core theme of rainwater harvesting and conservation.

5.3. B.Yerragudi cluster, Kadapa district

Natural Resource Management

This cluster had the poorest soils when compared to those in other clusters. As a result, the water holding capacity of the soils was also very poor. In order to promote *in situ* rainwater harvesting and improving the water table, large scale contour bunding was taken up in convergence with MNREGS. Over 850 m long contour bunding was taken up creating an additional rainwater harvesting capacity of 400 m^3. This was accomplished by availing 380 man days through convergence with MNREGS. Later, de-silting of five water bodies namely



Gajulakunta, Y.Pedda Cheruvu, Kadirappa Kunta, Narsimhulu Kunta, Nayudi Cheruvu was taken up. Over 1100 tractor loads of silt was excavated and applied to over 60 acres of land in the cluster.

De-silting could create an additional 2250 m^3 rainwater storage capacity. Besides, over 640 m long bunds were laid covering 27 acres by utilizing 117 man days where the land slope was of higher gradient. These interventions reflected favorably in terms of raised water table in bore wells and open wells (graph).

Community vermi composting was promoted as a group enterprise by a group of women belonging to the landless. The demand for vermi compost increased in the locality and many vegetable growers brought vermi compost. Over 3000 man days were generated during the

project period. Nearly 102 MT of vermi compost was been produced and sold with an income of over Rs.6 lakhs.

Establishment of horti-pasture system on marginal lands

The analysis of soils in the B.Y.Gudi cluster had clearly shown that the soils were more suitable for tree based farming or hortipasture systems. Keeping this in view, farmers were mobilized to bring their land under horticulture with inter spaces planted with perennial fodders. Over 24 ha of land was brought under hortipasture system by planting mango varieties of farmers' choice. Farmers were encouraged to dig the pits and the grafted plants of farmers' choice were mobilized from reputed nurseries in the locality. The plantation came up well with a mortality of around 10%. Farmers took up gap filling and also cultivated groundnut in the interspaces helping the mango saplings with better moisture conservation.

Agriculture and allied interventions

Introduction of new varieties

In groundnut crop, high yielding varieties like K6 and Narayani procured from the research stations were promoted among farmers, Nearly 14 ha of area was brought under the cultivation of these varieties. Another variety from ICRISAT- ICGV 91114 was also promoted across 4 ha.

In redgram, LRG-41 and LRG-36 were promoted over 27 ha. In castor, Haritha and PCH 222 were introduced in 2010 in 4 ha.

Interventions were taken up to encourage diversity by introducing fodder crops, horticultural crops, vegetables and small ruminants in the cropping system. One of the major objectives of these interventions was to increase household food security. This was attempted by taking up nutrition gardening in the backyards of the households in a campaign mode. Nearly half of the families (205) took part in this campaign with about 10 m^2 area under vegetables in their backyard. All these households were supplied with seeds of tomatoes, brinjal, okra, snake gourd, bitter gourd, ridge gourd and leafy vegetables like amaranthus, fenugreek etc. Together over 2.6 t of vegetables worth Rs.44,000/- were produced. The average vegetable production per household was 13 kg worth Rs.215/-. Besides, 1000 plants of papaya and 800 drumstick plants were planted on the farm bunds or in the backyards. This apart, some farmers took up vegetable cultivation on a relatively large scale account for above 12 ha of tomatoes and 2 ha of chilies. About 0.8 ha of fodder green grass was also taken up in the cluster.

Community shade net

The potential of the cluster for vegetable production during rabi and summer seasons was well understood in the beginning of the project. However, lack of availability of good quality

seedlings was an issue. Though there were some nurseries in the area, they were far away from the cluster and involved large transportation cost leading to higher cost of cultivation. A shade net was established during the second year of the project and a commodity interest group was promoted to take up production and sale of good quality vegetable seedlings. During the year, the nursery produced over two lakh vegetable seedlings (tomato-1,55,000; chilies-40,000; brinjal-18,000). Over 500 man days of labour and sale value of Rs.50,000/- were generated by this enterprise.

Alternate livelihood model

The cluster has five large and a few (2-3) community rainwater harvesting bodies. These are largely silted up and harvest much less rainwater compared to their actual capacity. Efforts were made during the project to demonstrate the effect of de-silting of tanks both on improving land fertility through silt application and improving water table by increasing rainwater harvesting capacity. This was well received by the community. Owing to very poor soil fertility status, the lands are by and large prone to drought and crop loss. The alternate livelihood model can consist of a silvi horticulture component where small ruminants can be introduced under controlled grazing for additional income. A large programme to address the de-silting of tanks of existing water bodies will help in improving water security for these areas.

5.4. Thummalacheruvu cluster, Khammam

Natural Resource Management

Securing rainfed agriculture was one of the important activities conceived by the project. In order to achieve this objective, the project identified two important activities 1. Efficient water management through renovation of identified water bodies like tanks and ponds, and 2. Formation of water sharing groups. While renovation of water bodies like tanks and ponds was taken into consideration as the project identified significant loss of irrigation potential of some existing water bodies due to lack of maintenance of the structures, formation of water sharing groups was conceived so as to increase the utilization of groundwater potential in the GP.

At the time of project's entry into these villages, groundwater potential was not fully utilized, although there were 76 open wells and 17 bore wells. Of these 76 open wells, only 12 are occasionally used and no bore well was being used as there was no availability of 3 phase electricity for agriculture and farmers were also not in a position to afford buying diesel engines. Of the total 978.4 hectares of cultivable land in the GP, a very small extent, i.e., 74 ha (7.5%) was irrigated under tanks and open wells in 2007.

With an objective to efficiently manage water resources, the project undertook to restore the lost irrigation potential of existing water bodies. Three tanks were identified for critical repairs to be taken up, **1**. Ippalakunta Tank, **2.** Bandlavagu Tank and **3.** Pulikunta Tank. These tanks were identified for renovation in participation with local communities during Participatory Rural Appraisal (PRA) in 2007. All the tanks identified were later surveyed technically to understand the problem and arrive at estimates. All these tanks were constructed under various programmes and had pending repairs resulting in significant decrease in their irrigation potential.

Of the three tanks, the sluice of Ipplakunta tank's was damaged and needed immediate repairs with estimated potential to irrigate additional 40 to 50 acres. In the case of Bandlavagu tank, the pipeline conveying water from Bandlavagu tank was left incomplete. It was estimated that this work could provide additional irrigation to 30 to 40 acres land.. Pulikunta Tank's sluice was also completely damaged and needed reconstruction.

In addition to the above tanks there were two other tanks in the cluster in relatively good condition. Of the three tanks identified, Ippalakunta and Bandlavagu tanks were repaired during Rabi 2008-09, Pulikunta tank was repaired during Rabi 2010-11. Unlike the other project activities, no financial contribution was raised from farmers, but farmers were asked to voluntarily participate in physical activities. While with the support of local Sarpanch, significant proportion of unskilled physical activities were carried out under MNREGS, expenditure on skilled works, cost of construction material and other expenditure was met by the project.

Renovation of Ippalakunta tank: Ippalakunta tank is a small irrigation tank with 18 ha of command area. Before renovation, due to water leakage from the tank, it could irrigate only 5 acres against the 18 ha of potential command area. It was understood during the PRA in

2007 that sluice pipes of the tank damaged, causing perennial leakage. As a result, the tank's potential started slowly deteriorating and by 2004-05 it could irrigate just 2 ha of land as 90% of harvested water was lost by leakage, leaving the standing crops in the command area to wilt and fail. In addition to this, the main channel was silted up and needed urgent de-siltation. Experiencing severe water shortage at critical time of crop harvesting, the command area farmers slowly gave up cultivation of lands under the tank.

A technical survey done by the project revealed that a small investment of Rs.1.5 Lakh on renovating and plugging the leaks would irrigate the designed 45 acres, benefitting around 24 farmers. Based on the survey findings, sluice pipes were replaced and height of the bund was also increased by 5 feet. In addition to this, 200 meters of main channel was also de-silted. While replacement of sluice pipes and increasing the bund height was carried out by the project, main channel de-silting was carried out under MNREGS, creating 100 employment days.

Renovation was taken up involving the local farmers' group namely Abhinandana Rythu Mithra Group. During kharif 2010, the tank harvested rainwater to its full capacity and provided irrigation to the entire 18 ha of land as expected, helping all the command area farmers to grow paddy during that season. Gaining confidence by looking at the tank's status, the same farmers cultivated green gram during the Rabi 2010. Thus, renovation of this tank not only secured paddy crop, but also helped in crop diversification and nutrition security of the people.

Table 14: Crop Production, pre and post renovation of Ippalakunta

Crop	Productivity in 2008-09 Pre renovation (q/ha)	Productivity in 2010-11 Post renovation (q/ha)
Paddy	43.2	50
Green gram	20	28

Construction of aqueduct across Bandlavagu: Bandlavagu tank is a traditional water harvesting structure in Bheemavaram village. It is an important source of irrigation for the village with an irrigation capacity of around 36 ha. The tank is spread over an area of around 5 acres with a main channel of 2.5 km long. The tank has a maximum water storage depth of 2.5 m above the sluice with a water spread area of 1.2 ha. The excess water that over-flows from the tank surplus weir flows down and joins another natural stream about one km downstream. A small check dam built at this confluence again diverts water for irrigation to about 16 ha located further downstream. Thus, excess water from the Bandlavagu tank is also utilized for irrigation downstream. Over-flow and excess water release from the tank happen only for

few months during a good monsoon year. Therefore, post-monsoon and summer months do not have any flows from the tank feeding the check dam.

A portion of the main channel work, which was part of a renovation work carried out in 2001, was not completed due to disputes with the contractor. During the PRA and interactions with the people it was found that if this portion of channel (about 430 m) is completed, additional 20-24 ha land could be brought under irrigation while also enhancing the water availability at the check dam mentioned above. This work also involved a major component of construction of a pipe aqueduct across the stream that carried the water from surplus weir of the tank.

Through a technical survey, it was estimated that the identified work would cost anywhere around Rs.5.50 Lakh. This work was taken up involving the local farmers' group namely Sai Baba Rythu Mithra Group. Technical estimate and designs were provided by GEST Consulting Engineers from Hyderabad. Beneficiary farmers voluntarily participated in removing weeds in the channels, site preparation and shifting of pipes for constructing the aqueduct. After the completion of construction of the aqueduct, a main channel of length 446 meters was dug following the land slope to enable flow of water by gravity.

The entire construction and renovation work, including laying of pipeline, were completed by November 2010. For this pipeline support pillars were provided using GI pipes of 7.5 cm. This pipeline, constructed with a total expenditure of Rs.5,37,000/-, helped to extend the existing command area of tank by additional 22 ha bringing benefits to about additional 40 farmers in the Bheemavaram village. Since land shaping and land leveling was required to some extent in remaining lands under the channel, the farmers were motivated to repair their respective lands.

Renovation of Pulikunta tank: This tank is another small irrigation tank in the project area with 60 acres of command area. During the PRA in 2007, it was understood that the tank was constructed during the year 1995, but functioned for just 2 to 3 years. After that the sluice gate was damaged leading to loss of control over the water storage and release. Gradually, the condition of the irrigation channel also deteriorated due to silting and weed growth and almost became defunct by the year 2000, limiting the tank's role to a ground water recharge structure. Before renovation of the tank, it was not in a position to irrigate even a single acre. All the farmers under the tank also lost hope on the same as all their efforts to persuade different departments went in vain. Experiencing severe water shortage at critical times of crop harvesting, these farmers slowly gave up cultivating their lands under the tank during the Rabi season.

A technical survey done by the project revealed that a small investment of Rs. 2.8 Lakh on reconstructing the sluice gate and de-silting the main channel would restore the tank's potential to irrigate it's designed command area of 60 acres, benefitting around 30 farmers. Based on the survey findings, the sluice was completely restructured including the replacement of old and damaged gate with the new one. Renovation of this tank was completed in July 2011.

Formation of water sharing groups: Groups were formed with an objective to increase the utilization of ground water potential in the GP. As there was no 3-phase power supply for agriculture purpose in the GP, groundwater potential is significantly under-utilized by the farmers. Considering this, the project distributed water lifting implements like diesel engines and pressure pumps. As these implements can serve more than one farmer, water sharing groups were formed with neighboring 2 to 4 farmers and the engines/pumps were given on group ownership basis.

While oil engines were shared by 3 to 4 farmers, pressure pumps were shared between groups of 2 farmers. Thus, nine groups comprising 25 farmers were formed. Since oil engines could serve more number of farmers, the respective groups were allowed to give them to other farmers on rent also. Apart from providing life-saving irrigation to paddy and red gram, these water sharing groups were to grow vegetables in about 20-24 ha during each summer by lifting water from the streams and open wells.

Impact of the activity: This intervention not only helped to secure rainfed agriculture but also provided an opportunity to these rainfed farmers to grow diversified crops, as there was assured water supply under the tanks during the Rabi. Otherwise farmers would leave lands fallow during rabi season. This was achieved with the help of efficient water management through restoration of irrigation potential of identified tanks and formation of water sharing groups. While renovation of tanks ensured water supply during critical

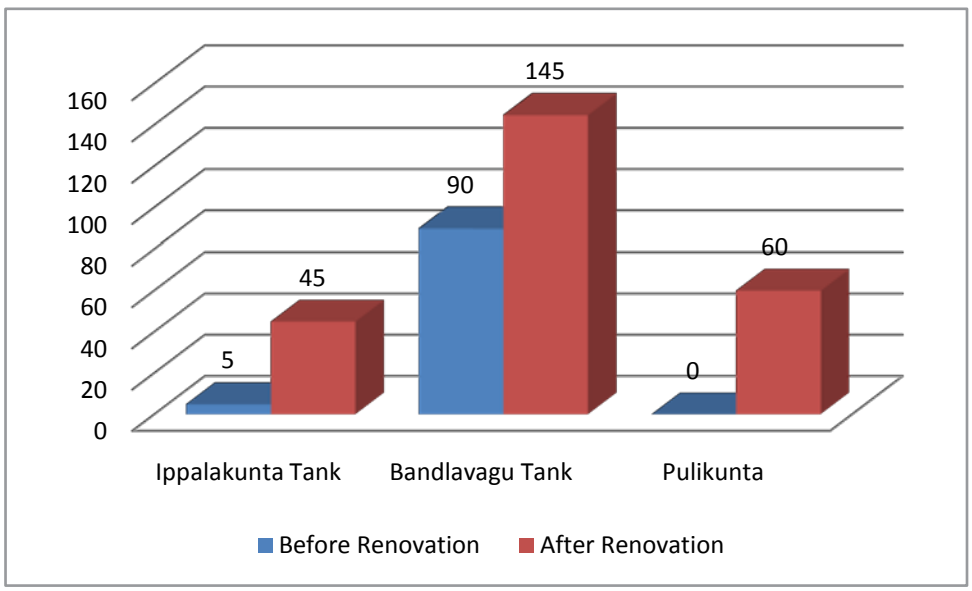


Figure : Irrigation capacity of tanks before and after renovation

times in dryland agriculture and brought additional 62 ha under tank irrigation, formation of water sharing groups helped dryland farmers to provide life-saving irrigation to paddy and red gram and provided them an opportunity to grow vegetables too during summer. This is not only bringing cheers in the lives of 80 to 90 farm families, it also has been instrumental in increasing crop production and productivity by 30 to 40%. This not only enhanced the food security and income levels of small farmers, but also augmented the availability of pulses and fodder.

Sustainability: With an objective to achieve long term sustainability of the works undertaken for renovating tanks, farmers were advised to take up operations and maintenance (O&M) activities of the respected tanks on their own. For this, all the farmer beneficiaries under each tank were formed into groups and for each group an executive committee was formed. It was discussed and decided by each group that every farmer beneficiary of the tanks would contribute Rs. 100/- per year towards O&M works. For each group, a separate bank account was also opened to deposit these contributions. Executive committee members were also provided training on book keeping. Now that the farmers are aware of the benefits of addressing the issues associated with mal functioning irrigation/water bodies by taking up required repairs/renovation, they have identified such water bodies where repairs and renovations can enhance water harvesting potential. They are also contacting other government agencies to get them repaired/renovated. In a way, this is paving way for the communities to become pro active and take up such issues with the concerned departments.

Promotion of household biogas units

It is a general practice with the households in the cluster to fetch firewood from the nearby forests once every year in several cartloads. Each household on an average used 6 - 8 cartloads of firewood to meet their cooking needs. Cutting firewood from the forests not being environmentally sustainable was also a major cause of respiratory ailments among women and children especially during monsoon. The Non-conventional Energy Development Corporation of Andhra Pradesh (NEDCAP), keeping these in mind has been promoting small sized (1 m^3) biogas plants for every household in the cluster. However, the program was not able to make much headway as the households; to avail benefits of this programme were expected to arrange for sand and bitumen for the construction of the biogas dome. Due to the remoteness of the area and the cost of transport many households were not keen to avail the NEDCAP project benefits. The NAIP subproject staff working in the cluster facilitated the community by pooling the requirement of sand and bitumen of the households and arranging for transporting them helped construction of 47 plants April-

Sept 2010. This encouraged NEDCAP to further expand the program in the cluster. After the installation of first phase of the biogas units, there were several minor issues such as gas leakage insufficient gas production etc., and, as a result, some households discontinued use of biogas initially. The project staff identified these gaps and conducted on-the-spot training programmes for troubleshooting. Followed by this, the project staff arranged for periodical meeting with beneficiaries involving the NEDCAP officials on operation and maintenance of the systems. Staff visited each beneficiary household to observe the use and operational aspects and advised them on the proper way of mixing the dung and feeding the plants for efficient gas production. The total number of functional bio gas plants in the cluster was 97.

- Fuel requirement: 6-8 cartloads firewood/year/hh
- Mini biogas unit caters to cooking twice daily
- Capacity: 1 m^3
- Requirement: Dung of two cattle

Agriculture and Allied Activities

Farmers in the cluster were cultivating only one crop during kharif and leaving their land fallow later even though there was scope for utilizing residual moisture for growing a short duration crops and vegetables during rabi. As part of the projects efforts to increase cropping intensity and promoting diversity, farmers were engaged over the years through awareness building. Farmers were encouraged to cultivating green gram and vegetables during rabi season through a systematic programme. A significant increase in area of pulses and vegetables has been achieved due to a sustained campaign. A survey was conducted to assess the extent of increase in area and production of rabi crops in the cluster. Initial results from the 4 villages where survey was completed, show that the area under second crops (pulses and vegetables) increased by nearly 43 % on average in the cluster.

Crop Diversification

Introducing seeds of various food crops was conceived as one of the most important activities to be carried out in the cluster so as to achieve crop diversification and ensure food and nutritional security. At the start of the project in 2007, paddy and cotton were the only two predominant crops in the cluster. One and half decade before, farmers in this area used to grow only food crops. Considering the prevailing agriculture situation in the cluster, it was attempted to diversify cropping pattern by increasing area under food crops through the introduction of improved crop varieties.

In addition to introduction of HYVs of food crops, vegetable cultivation was also promoted in the cluster. To address this, farmers were motivated and provided necessary trainings on dryland crop and vegetable production. Farmers' interest in growing vegetables increased gradually over the project period. The number of farmers whom cultivated pulses and vegetables even without project support also increased considerably (Table 15).

Table 15: Increase of area (ha) under pulses and vegetables in rabi

Crop	2007-08		2008-09*		2009-10	
	With project support	Without project support	With project support	Without project support	With project support	Without project support
Green gram	11	26	23	4.4	22	32
Black gram	6	0.4	21	3.5	6	7.5
Vegetables	0	1	4	0.1	3.5	1.5
Total	17	28	49	8	31.5	41

* drought year

Turmeric cultivation: In addition to promoting pulses and vegetables, turmeric was also introduced as a new crop during kharif 2010. In the first year only two farmers were supported with seed material, sufficient to sow in 1.5 acres. Witnessing the significant profits (i.e. Rs. 80,000 to 1,00,00/- per acre) made by these farmers, during kharif 2011, nearly 25 farmers purchased turmeric seed on their own and sowed in 20 acres. Of the two farmers who cultivated turmeric during kharif 2010, one farmer could supply seed to 5 fellow farmers.

Altogether, in addition to establishing a diversified crop environment in the cluster, the seed intervention also helped a few women to regain their traditional role of seed management. A few farmers could take up seed production in pulses and turmeric ensuring restoration and sustainability of crop biodiversity. Altogether 10 types of crop varieties were introduced under this intervention and motivated more than 200 farmers to cultivate various crops.

5.5. Jamisthapur cluster (Mahabubnagar district)

Natural Resource Management

Jaffergudem cluster is one of the most dry areas of the drought-prone Mahabubnagar district. The rainfall in the cluster was erratic throughout the project period and hence mid season droughts were frequently experienced. In order to improve the capacity of the community to cope with mid season droughts, many site specific soil and water conservation measures were implemented. These were aimed at in-situ moisture conservation as well as harvesting of rainwater ex-situ. As part of the NRM interventions, five farm ponds were dug at suitable locations, three check dams were repaired and three mini percolation tanks were dug to improve groundwater resources. Twenty nine gully control structures were built at various places and trenches were dug and field bunds were put across slope in the hill slopes abetting the villages. In all, it was estimated that nearly 17000 cu m rainwater harvesting capacity was created across the cluster and this benefited 180 cultivators. With this, the protective irrigation potential was created for 128 acres. This also helped increase cropping intensity, as farmers could cultivate additional crop during rabi with the augmented water availability.

Castor productivity enhancement by introduction of hybrids

Due to poor soils and frequent droughts, the yield of castor generally remains very poor and hence low income in Jamisthapur cluster, Mahbubnagar. One of the important inputs of improved castor production technology is timely availability of good quality seed. High yielding varieties of castor are popular as seed material among castor growers. However, farmers were not used to growing hybrid castor in this area. Castor hybrids evolved by different research institutes have shown good yield potential even under rainfed conditions. However, timely availability of hybrid castor seed to farmers at village level is lacking. Though it is easier for a farmer to produce true to type seeds of good quality high yielding varieties of castor, producing hybrid castor seeds by farmers was a challenge. Keeping this in mind, an attempt was made to build the capacity of farmers for taking up hybrid seed production. A few farmers showed interest and came forward to undergo training in hybrid seed production at Directorate of Oilseeds Research (DOR), Hyderabad during *rabi*, 2008-09. Finally, one farmer

started hybrid seed production (DCH-519 supplied from DOR). Due to initial delay and certain issues, irrigation supply was impaired. As a result, the crop did not give expected levels of yield. However, still the economics of growing hybrid castor was an attractive proposition for the farmer. This farmer and a couple of other farmers were supported by the project to produce hybrid castor during later part of the project as well.

Table 16: Comparative analysis of cost and returns of castor hybrid seed production

Cost incurred (in Rs)	Seed Production Plot		Bulk Seed Plot	
	Recommended	Followed	Recommended	Followed
Land preparation and marking	1260	1260	1260	1260
Seed	540	540	375	375
Sowing	300	300	300	300
Weeding	2360	2360	2360	2360
Rouging	400	400	0	0
Basal application	1500	0	1500	0
Top dressing	1270	1060	1100	1060
Plant protection	740	740	Need based	Need based
Harvesting	900	900	900	900
Cleaning and grading	400	400	0	0
Irrigation	150	150	150	150
Total cost incurred	**9820**	**8110**	**7945**	**6405**
Yield (Kg)	300	100	700	350
Gross income	54000	18000	16100	8050
Net income	**44180**	**9890**	**8155**	**1645**

*Rs.180/kg; ** Rs.23/kg

Castor hybrid seed production was carried out for the second year with another farmer Mr. K. Venkatesh, Jamisthapur. The hybrid seeds produced (80 kg) during *rabi*, 2009-10 were sold to 45 farmers in the cluster and a total of 50 acres came under hybrid castor DCH-519. Due to better rainfall during 2010, the average productivity of hybrid castor was 985 kg/ha as compared to castor varieties (450 kg/ha) generally cultivated by the farmers of this area. During *rabi*, 2010-11, Mr. Venkatesh produced 200 kg hybrid castor seeds in his 1.6 acre plot and realized a profit of Rs. 11,000/-. This seed will be used to spread hybrids in the cluster during *kharif*, 2011. Though farmers are interested to produce hybrid castor seeds, some local constraints like availability of power and water are the major limitations. However, widespread awareness and interest was generated among the educated farmers about hybrid castor seed production. The higher profitability of seed production enterprise which is 4-5 times the bulk

crop production attracted farmers towards this enterprise. Besides, local production of hybrid seeds improved availability of hybrid seeds to a large number of farmers at their door steps at an affordable price.

Table 17: Castor hybrid seed production during three years

Year of production	No of farmers	Acreage (Ac)	Yield (q/ha)	Spread of the hybrid (ha)	Year of distribution	Average yield (q/ha)
2008	1	2	2.0	16	2009	9.5
2009	1	2	4.2	21	2010	10
2010	1	1	1.7	13	2011	10.5

Red Gram Seed Multiplication:

Station for multiplication by farmers. The crop was sown in kharif 2010 both as main crop and intercrop with castor and jowar. The crop sown as main crop yielded 2.5 q. However, the intercrop failed to yield because of pest attack. The crop was sown as sole crop in 10 acres by 25 farmers and as intercrop in 15 acres by 15 farmers. The variety is resistant to drought.

Small ruminant enterprise for the landless women

The landless women were encouraged to invest in small ruminant rearing enterprise by supporting them through initial project support. Each woman was assisted by 5 ram lambs and encouraged to fatten them through better feed management and controlled grazing for a period of 6 months. They were de-wormed regularly and fed with locally available concentrate feed. One of the land less labourer, Anasuya bought 5 ram lambs and sold them for Rs.22,500/- after 6 months. With this money she purchased 15 more ram lambs and continued the cycle for a complete year. Over 3 cycles, she earned Rs.75,000/-. In Jamistapur 78 farmers were involved in sheep and goat rearing unit successfully. Osmanabadi goat and Sindhnoor sheep were found in each rearing unit. Fodder plots of berseem were taken up by 17 farmers while African tall is introduced as cereal fodder on 26 farmer's field. Seven farmers started Azolla unit on their backyard in the cluster. With this the livestock farmers could meet the fodder requirement for their animals.

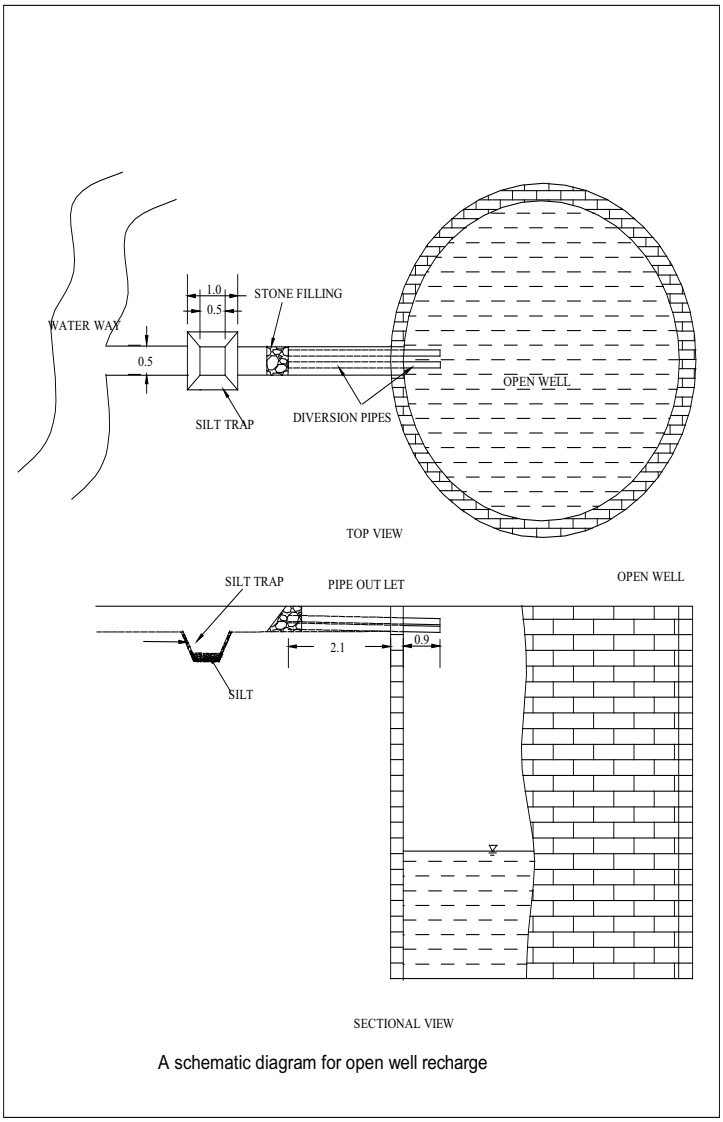
Drying yard in community land

The farmers of Jamisthapur cluster had a long standing demand for a drying yard in the village as the traditional system of having a farm yard has long been discontinued owing to pressure on land. This issue was discussed with the village elders and the panchayat. The panchayat came forward to provide about 1000 m^2 land for this purpose and transferred the same to *Salaha Samithi*. As part of the project's initiative in promoting simple post harvest practices like proper drying and storing of agricultural produce, it was decided to support this activity by ensuring farmers' contribution. The community contributed inputs like labour, transport and the soil required for filling while the project has provided cement, sand and stones for the construction. There is a broad agreement among the farmers that a nominal user fee be levied for using the drying yard facility. The details however will be worked out in consultation with the community.

5.6. Dupahad cluster, Nalgonda district

Natural Resource Management

Keeping in view the large number of defunct open wells a massive campaign was undertaken to recharge the open wells. Of the 45 defunct wells, over 30 wells were recharged by diverting the runoff after trapping the silt to the open wells. The technique involved diverting the runoff from a nearby water way into a silt trap and then leading the clear water into the open well through a PVC duct (see diagram). With the help of additional water the area under protective irrigation increased from 4 ha to 26 ha. Besides this, 4 farm ponds were dug leading to recharging of 4 bore wells in the farmers field. With this, an additional 13 ha was brought under protective irrigation. The de-silting of Jalamalakunta which was taken up during summer 2009 in convergence with MNREGA. This resulted in an additional water storage capacity of over 3000 m^3 which in turn brought in over 40 ha under protective irrigation due to recharging of the open and bore wells around the tank.



A schematic diagram for open well recharge

One of the major interventions taken up in this cluster was community biogas cum vermi compost unit through convergence with the Non Conventional Energy Development Corporation of Andhra Pradesh (NEDCAP). This intervention was implemented as a model for offering solution to the rural energy problems besides generating employment through production of good quality vermi compost. Under this, a large bio gas unit of 85 cu m capacity was constructed by availing technical and financial assistance of NEDCAP. The plant requires about

950 kg of dung every day with which it can produce about 50 cu m of gas. A family of 4-5 members requires approximately 1.4 cu m gas per day for meeting its domestic cooking needs. With this, 50 households were connected with biogas for which about 45 cu m gas is used. The remaining is used for running a 15 kva generator for two hours a day. The power thus generated is used to energize pumps for storing and supplying drinking water to the community. This arrangement is helpful to draw water from bore wells when electrical power is unavailable. The slurry coming out of the biogas unit is used as input to a large scale vermi composting unit in which weed biomass and crop residue is turned into useful manure. Every week, around 5 tons of slurry comes out of the biogas unit which is fed to the vermi compost unit. After 40-45 days, this slurry turns into about 3 t of excellent vermi compost. This is sold to vegetable cultivators of this area forming another source of revenue for the unit.

A system has been put in place to collect about 35 kg of dung/family every day and feed it to the biogas unit. Besides, each household is being encouraged to pay a minimum monthly contribution towards maintenance and repair of the unit and pipe line connections. A user group has been formed to take care of the operation and maintenance of the entire unit. Two persons are engaged on wage basis for assisting the user group in collecting the dung from households, feeding the biogas unit with dung and vermi compost unit with slurry. They are being paid from the revenue generated from the unit.

Market linkage interventions

Mango farmers

Mango farmers of the cluster disposed off their produce by awarding usufruct rights of their orchards to local contractors at throwaway prices. In the process the farmers were not realizing desired profit margins. Keeping this in view, a sustained effort was made right from the beginning of the project. In the year 2008, only one mango farmer came forward to sell his produce directly to retail marketing company which offers to buy mangoes directly from the farm gate. He sold eight tons of his produce to the retail marketing company and realized higher price by nearly 17%. The year 2009 saw two farmers coming together and selling 20 tons with a total transaction of Rs.3.77 lakhs where the price realization was 24% higher than the local prices. In the years 2010 and 2011, the number of farmers joining this intervention rose to 6 and 9 respectively with the total tonnage marketed through retail chain to 41 (2010) and 164. The total transaction in the year 2010 touched nearly Rs.6.50 lakhs and that in 2011 rose to Rs.24.00 lakhs. The overall transaction through this intervention over the project period was over Rs.35.00 lakhs and the average profit was higher by 24%. Now that the farmers have come to know the benefits of marketing mangoes directly with the retail chain operators, they have picked up the good harvesting and transport practices promoted by the project and are now capable of independently dealing with the marketing issue.

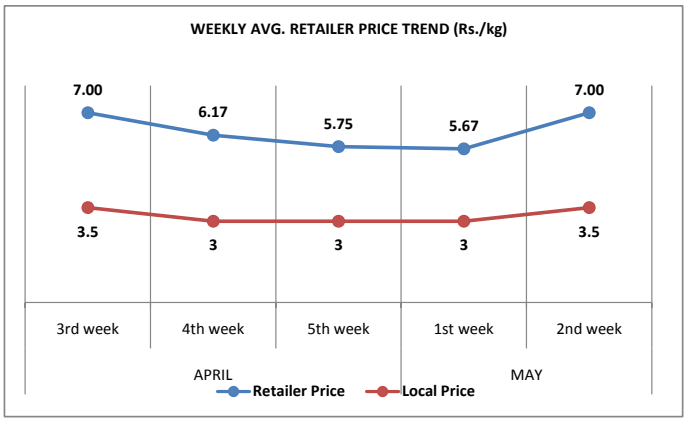
Watermelon farmers

Farmers in this cluster cultivate watermelon extensively and this practice is encouraged by the fact that vendors would pick up the produce at the farm gate. They prominently cultivate large oblong shaped watermelons (cv. Namdhari 295). The prevailing watermelon marketing practice involved local vendors buying the produce from farmers at their farm after physically examining the field at the time of fruiting and fixing a price without any regard to the actual quantity of produce (tonnage). Generally, the whole plot is negotiated for certain amount (lease system). Over time, a few farmers had ventured into direct selling of watermelons in the local market due to higher price realization. However, this involved several hassles for the farmer.

Through a quick market survey of the fruit and vegetable category, I-Kisan the market intervention partner, collected information on consumer preference, local market price, offer price of the retail marketing companies, transport cost etc. China Gorekunta, one of the villages of the cluster which was a prominent watermelon producing village was selected for the intervention. Hence it was decided by the consortium partners CRIDA, Ikisan and KVK-SAIRD to pilot the introduction of varieties that are comparatively in higher demand. Subsequently based on the results, the activity could be scaled up to other villages. Mango linkage which is almost established in the cluster could be used as a back up to work on water melon linkages.

This particular intervention of market linkages works on backward integration strategy. Apart from providing a platform to link up/ market the produce, suitable variety that has a greater demand and good price was recommended. This was done keeping in view the demand of particular varieties with the buyers/retailers. Icebox type varieties have better

demand and were proposed for introduction in the cluster area. It was decided to take the activity on pilot and later scale it up based on the results.



Costs incurred and the risk involved in local market are almost negligible. But due to lack of negotiation power farmers would have no option but to oblige to the price fixed up by the vendors. This created a major difference in the profitability for the farmer. Intervention by the project in this case not only emphasized on educating farmers about profitability through market linkages but also on customization of the cultivation/ cropping patterns based on market demand. Customization in this case was replacement of the crop variety with a much sought after and demanded type, Sugar Queen Variety. Average price obtained per kg was Rs. 6.35 with five major retailers of Hyderabad city through linkages.

The minimum profit through the intervention was around **95%** more than that obtained in the local market and around **100%** more than that comes from leasing the crop to vendors**.** Seed costs were considered in the economics as there is a significant difference between the two variety's costs. Oval to round large varieties cost around Rs. 5000 to 10000 and Sugar Queen costs Rs. 26000 per kilo of seed.

Table 18: Costs and profitability: Watermelon market linkage

	Traditional System		Market Linkages
	Farm Gate	Local Market	
Costs (Rs.)			
1. Seed (per kg of harvest)	0.05	0.05	0.15
2. Transport	-	0.50	1.20
3. Commission (10%)	-	0.40	-
4. All other costs	1.00	1.00	1.00
Total	**1.05**	**1.95**	**2.35**
Price (Rs.)			
1. Gross	3.00	4.00	6.35
2. Net	1.95	2.05	4.01

5.7. Ibrahimpur cluster (Rangareddy district)

Natural Resource Management

The major activity in the cluster was to enhance the drought coping ability of the small and marginal tribal farmers by providing life saving irrigation during kharif and provide limited irrigation facility for a rabi crop. This was achieved by linking the bore wells through underground network of pipelines at Malkaipet thanda. The details of the intervention and its impact are detailed below.

The Innovation

Seven bore wells owned by 7 different farmers located over a vast patch of land have been linked through a network of underground pipelines and the groundwater extracted through these bore wells is prudently shared through sprinkler irrigation by 18 farmers who collectively own 45 acres of land.

Background

Southwest monsoon is the major source of soil moisture for agricultural activities in rainfed areas. Due to the erratic distribution of the monsoon, rainfed agriculture often suffers intermittent droughts causing severe crop losses. The losses can be prevented if the crop can be protected by providing irrigation to tide over the moisture stress due to break in monsoon. Paradoxically, we also see a few farmers using groundwater from bore wells for irrigating high water demanding crops with poor water use efficiency.

Besides, in most rainfed areas the length of crop growing season is just enough for cultivating only one crop a year. Once the monsoon recedes the land is left fallow. It has been shown by many studies that providing irrigation support to mitigate moisture stress during critical stages of crop growth will enhance crop yields by 2-4 times (depending on crop and the stage at which moisture stress is experienced). Though, a lot of experimental evidence is available to demonstrate the importance of critical irrigation, it has been seldom possible to demonstrate this on a large scale under field conditions. Thus, the concept of protective irrigation has so far remained largely an exploited potential.

Through this innovation which involves irrigation and social engineering approaches, we have been able to operationalize the concept of protective irrigation under field conditions. The Impact of groundwater sharing on the pipe line network user group was assessed by comparing their cropping and income during the year 2008-09 (when the pipe line network was

not operational) with those in 2009-10. The summary of the impact is presented in following table. It can be seen from the data presented in the table that there is quantum jump in the annual income of both the groundwater donors and recipients offering a win-win situation for both.

Once the underground pipeline network was laid out to link the bore wells, the area under second crop increased by two folds. The 11 farmers who had never cultivated crop during post monsoon season (rabi) could dramatically increase their family income. Further, they were able to provide protective irrigation and save crop during mid season droughts besides diversifying their cropping pattern during kharif. Generally, the farmers who did not have any water source would migrate during post monsoon to nearby cities. The pipeline network encouraged them to stay back and engage in cropping during post monsoon season preventing them from out migration and its hazards, as this new system generated an additional 90 to 100 days of employment/family in the post rainy season. The pipeline networking also prevented the unhealthy competition for digging bore wells in the already precarious groundwater situation. Thus, the pipeline network helped to manage the water demand within the threshold of seasonal hydrological recharge potential. This is a very significant ecological benefit to the community, as this arrested over exploitation of the precious groundwater.

Table 19: Impact of groundwater sharing on the pipe line network user group (2008-09 and 2009-10)

Before Groundwater Sharing Arrangement									After Groundwater Sharing Arrangement									
	Area Cultivated in Kharif (Acres)			Area Cultivated in Rabi (acres)			Annual Total	Annual Income per family (Rs. '000)	Area Cultivated in Kharif (Acres)						Area Cultivated in Rabi (acres)			Annual Total	Annual Income per family (Rs. '000)
	Paddy	Red gram + Maize	Total	Paddy	Groundnut	Total			Paddy	Redgram	Maize	Greengram	Cow pea	Total	Paddy, Groundnut	Groundnut	Total		
Bore well owning farmers (7 nos.)	7	0	7	2	10	12	19	-	4.5	2	0	7.2	2	15.7	4, 7	7	18	26.7	-
Income of bore well owning farmers (Rs.'000)	49	0	49	14	60	74	123	17.57	31.5	6	0	25.2	6	68.7	70	42	112	180.7	25.81
Farmers without bore wells (11 nos.)	0	25	25	0	0	0	25	-	0	11	4	11	3	29	0	10	10	39	-
Income of farmers without bore wells (Rs.'000)	0	75	75	0	0	0	75	6.81	0	33	18	33	9	93	93	60	153	246	22.36

Agriculture and Allied Activities

Promotion of Compost Production

Farmers were encouraged to dig a compost pit of size 4x3x.5 m right on their farm. They also planted 50 glyricidia cuttings on the border of each pit. The weed biomass and other agricultural waste was dumped in the pit to produce about 1-1.5 t compost twice a year. This was particularly useful to the groundnut farmers who cultivated during rabi under pipeline network. Each farmer under the pipeline networking system agreed to dig one compost pit each on their farm after they discussed about the options for reducing frequency of irrigation during rabi in a brainstorming session facilitated by the project staff.

Drought mitigation strategy

Due to late outset of monsoon, farmers in the cluster many times failed to sow pigeonpea in time. Since pigeonpea is one of the predominant crops of the cluster, it was planned to promote transplanted pigeonpea in Ibrahimpur (Rangareddy) clusters and considerable quantity of pigeonpea plants were raised in the nurseries. These came in handy when drought eased by the end of August, 2009. The performance of transplanted pigeonpea trials is summarized in the Table 20. Though the drought was challenging, it was nevertheless an opportunity to try and organize the community to take measures for coping with it.

Table 20: Performance of transplanted pigeonpea under different planting patterns

Spacing (cm)	Pods/plant	Seeds/pod	100-seed weight (g)	Seed yield (q/ha)
150x90	596	4.1	11.89	11
120x90	425	4.1	11.76	9
90x60	208	3.9	11.73	9.2
90x20 (direct sown)	94	3.2	11.02	8.3

Revival of Local Seed Systems

Earlier a system of barter existed where certain families in the village specialized in cultivating, storing and distributing good quality seeds. Over time, this system de-generated. An attempt was made to revive the system where a group of women engaged in ensuring collecting seeds in lieu of certain quantity of seeds supplied. Improved varieties of red gram (PRG-158), sorghum (PSV-1) and green gram (WGG-37) were made available to farmers by the project and the women managing the seed systems were made responsible to collect 1.5 to 2 times the seed that was earlier distributed to them as seed material. This arrangement covered an area of 225 acres during kharif 2010. Further, the group has also collected enough seed material for 350 acres of these crops for kharif 2011.

5.8. Jaffergudem cluster (Warangal district)

Natural Resource Management

Tapping potential for harvesting water resourced

The participatory assessment was carried out to understand the extent to which water harvesting potentials were realized in the area because of watershed interventions. The assessment found that besides constructing a large number of stone gully plugs, earthen gully plugs and gabion structures, watershed project has implemented a few sunken ponds, mini percolation tanks (MPTs) and a check dam. And it clearly brought out the need for repairing the defunct water harvesting structures that were constructed under different programs previously, using the dried up open-wells as recharge structures, converting soil mining pits into farm ponds and constructing MPTs or dug out ponds (DOPs) in locations where potential for water harvesting existed, which were hitherto not addressed by watershed interventions.

These interventions were implemented with the above objective between 2009 and 2012. As part of this initiative digging of 11 farm ponds, repair of one check dam and recharging of 23 dried up wells were implemented. In addition, 12 Check Dams were constructed by mobilising resources from MNREGS. Ensuing this, farmers in the area have got protective irrigation and could withstand variability in rainfall. The benefits accrued by farmers from this intervention include (Table 21).

Table 21: Impact of water harvesting

Indicator	Unit	Figures	Narration
Increase in double crop area	Hectares	113.2	Increased from 58.8 ha to 172 ha; and the area may further increase in coming years
Protective irrigation	Hectares	4	There was only a few cases need for supplementary irrigation was felt due to good rainfall and even distribution in 2010
Estimated reduction in production loss	Amount/ cluster (Rs.)	90000	Improved water availability has reduced production loss
Additional water storage capacity created	Cubic meters	24074	From water harvesting structures constructed under NAIP
Recharging open wells	Number	23	Out of 45 dried up wells

Indicator	Unit	Figures	Narration
Improvement in ground water table	Meters	1.5 to 2.0	In influence zone of check dam
Defunct bore well made functional	Number	21	Likely to increase further
Additional Production	Tonnes	58.6	Due to increase in double crop area

- Additional storage capacity of water was created to the tune of 23174 cubic meters. As a result, farmers could give protective irrigation covering cotton, maize and caster crops during Khariff 2010 and 2011.
- Improved availability of water to livestock, recharge of bore wells and revival of defunct open wells.
- Convergence between NAIP and watershed interventions increased the efficacy of both the projects and also provided optimum benefits to the people in the cluster.

Recharge of defunct irrigation wells (open wells)

Following the success of open well recharging at Dupahad cluster, Nalgonda, a survey was conducted in Jaffergudem cluster to identify defunct open wells. It was found that 45 open irrigation wells had gone dry due to depletion of ground water. Of these, 23 were selected in the first phase for recharging. These wells were recharged by tapping into a nearby runoff channel and diverting the runoff using an HDPE pipe into the open well through a silt trap. During the kharif 2010 about 5650 m^3 runoff water was diverted in to these wells.

Agriculture and Allied Activities

Integrated nutrient management trials were conducted in 50 farmers fields in one acre each. Micro nutrient like boron (1 kg), zinc (20 kg) and gypsum (100 kg) were applied in every plot. An average yield increase of 110 kg/acre worth Rs.5500/- was noticed. Over all yield gain at the cluster level was 5500 kg and the total additional income accrued to the farmers was Rs.2,75,000/-. Azospirillum was introduced as a bio-fertilizer in kharif rice in 50 acres. The yield increment was to the tune of 150 kg/acre worth Rs.1600/-. Pigeonpea was introduced as an intercrop in maize with a marginal decrease of 200 kg/acre in the yields of maize with an additional yield of 380 kg pigeonpea yield. Due to good market price the additional income through intercropping was Rs.12,000/acre.

Integrated nutrient management in cotton

During the year 2007, ICRISAT collected 100 representative soil samples covering all the habitations, analysed the samples and prepared the soil health cards for all the farmers in the village. According to the soil test data nutrients like zinc, boron and calcium are deficient in the soil. Trials were conducted in the 2008-2011 to study the effect of integrated nutrient

management practices along with the deficient nutrient application at each farmers' field. The trials were started in 8 farmers' fields during the year 2008 and scaled up to 15 farmers in 2009-10 and subsequently to 50 farmers during 2010-11. Table below gives year-wise trials and yield per ha.

Table 22: Effect of INM on crop yield

Season	No. of trials		Quantity applied (kg/ha)			Yield Kg/ha	
	No. of farmers	Acreage (ha)	Zn	Bo	Gypsum	Farmers' practice	Innovative practice
2008-09	8	3.2	20	1	100	4	5.5
2009-10	15	3.0	20	1	100	3.2	4.1
2010-11	50	20	20	1	100	3.4	4.2

Altered Spacing for Higher Profitability in Cotton

Generally cotton is sown at a spacing of 90 x 90 cm. After farmers switched over to Bt cotton, they continued the same spacing even in poor soils despite its small canopy size. While discussing ways and means of increasing productivity of cotton in Jaffergudem cluster during kharif 2008 planning workshop, an idea of reducing intra row spacing in cotton came up. This was later discussed with farmers and 18 farmers came forward to take up trials with modified spacing (90cm x 60cm) in cotton in one acre each. The results were encouraging. Farmers could use their inter-cultivation devices between the rows while the plant population was intensified within the row. This resulted in an increase of plant population from 12346 to 18519 per ha. The increased spacing cost the farmers half a kg of more seed per ha while the other inputs remained more or less the same. As a result of increased plant density, the average yield of cotton recorded was 1450 kg as against 1875 kg/ha in the plots with conventional spacing. The details of particulars in the modified spacing are provided in the table below.

Table 23: Effect of altered spacing in cotton

Particulars (per ha)	Spacing	
	90cm x 90cm	90cm x 60cm
Plant density	12346	18519
Seed rate	1.1 kg	1.6 kg
Seed cost (Rs.)	1833	2708
Yield (kg)	1450	1875
Income (Rs.)*	43500	56250
Cultivation cost (Rs.)	24010	24885
Profit (Rs.)	19490	31365

* @ Rs.30/kg

The economics of increasing plant density was very attractive. As a result, over 150 farmers adopted modified spacing over an area of 104 ha during kharif 2008.

Impact: The average increase in yield per ha due to higher plant density was 4000 kg. This translates to a total higher income of over Rs.12,000/ha. This practice can be followed in mediocre soils with medium to low fertility levels. However, cautioned needs to be exercised during over cast conditions, as the chances of multiplication of pests/diseases will be higher under high density cropping. This simple practice change brought an additional Rs.12,48,000/- for the cluster.

Upscalling of Zero Till Maize

The zero till maize introduced during rabi 2007 was upscaled within the cluster and outscaled beyond the Jaffergudem cluster during the year. This was systematically attempted through well designed training and exposure visits for the farmers of the cluster and other clusters. Rabi 2008 saw the zero till maize spreading to 20 farmers in Jaffergudem cluster.

Cotton-red gram intercropping:

Intercropping is a traditional practice in rain-fed areas, which is a risk mitigation practice. Over the years, farmers have neglected this practice with the emergence of cotton cultivation in the area. And cotton is grown as sole crop in the cluster under rain-fed conditions. During the deficient rainfall years, farmers used to harvest low yields and incur financial loss. Average yield of sole crop was 4.5 quintals, which used to be much lower during drought years.

Keeping this in view, MARI has promoted this practice in order reduce risk of crop failure in drought years and optimize use of nutrients and moisture from different layers of soil and to encourage population build up of beneficial insects in the field.

Pest control at community level

Majority of the farmers are small, marginal and scheduled tribe farmers. Redgram is being cultivated as an intercrop in cotton. The yields of the redgram are badly affected if the pests in redgram are not controlled in time. Farmers are unable to take up control measures in time because of small holdings, non availability of sprayers, etc. Farmers were motivated to take up control measures in time by pooling up of resources, hiring of sprayers which proved to be effective in controlling pod borers in redgram. In the year 2009-10 about 50 farmers were involved in the activity. During the year 2010-11 about 70 farmers were involved in community spraying. Redgram was introduced as inter crop in cotton during 2008-09 under NAIP farmers used to neglect the crop Redgram without PP measures and were satisfied whatever yield they got. As a result both yield and income has increased.

Introduction of summer vegetables

The lands were kept fallow during the summer season due to water scarcity, and the farmers used to move out of the village in search of work. Taking advantage of the water availability because of the natural resource management works taken up under the NAIP and NABARD watersheds, motivated farmers for vegetable cultivation during summer for higher returns. During the year 2008-09 four farmers cultivated vegetables profitably. Considering the profitability six farmers have taken up the cultivation during 2009-10 summer. To encourage more farmers to take-up vegetable cultivation, the Navakalapana society has started supplying the suitable quality seed/ planting material. The returns obtained from the summer vegetable cultivation vis-a-vis the traditional practice is as follows.

Table 24: Spread of vegetable cultivation

Year	No. of farmers	Area cultivated (ha)	Gross income (Rs/ acre)
2008-09	4	1.2	38,750
2009-10	6	1.7	40,000
2010-11	9	2.6	1,06,990

Promotion of fodder Jowar

During Kharif 2009-10 farmers were anticipating sever fodder shortage as majority of rice fields were kept fallow because of deficit rainfall. To combat fodder shortage encouraged fodder Jowar cultivation. In response to our motivation 20 farmers have taken up fodder Jowar

cultivation over an area of 2.5 acres. Seed was procured from the dept of A.H. on subsidy and technical support was extended by the project staff. Arranged inter action session with the other farmers. Farmers have accepted it as a good strategy to combat fodder scarcity in drought situation. Farmers having milch animals are taking the fodder jowar cultivation round the year.

Introduction of Maghi Jowar crop in Rice fallows as a drought resilient measure

Deficit rain fall was received during kharif 2009-10. Most of the rice fields were kept fallow and farmers were anticipating fodder shortage. To avoid the fodder shortage to cattle and also to support food security to the farmers, introduced Maghi Jowar which can grow with the residual soil moisture. Trials were conducted in 4 acres by procuring seed from Madhira Research Station Khammam dist. variety M.35 has fared well. Swings were taken up in the last week of September 2009. Average grain yields of 2.5 Qtls and 4 cart loads of dry fodder per acre was obtained. Field day was organized on 28.12.2009. (60) farmers have attended the programme and they have accepted the activity as good option to with stand drought conditions.

Livestock Interventions

Sheep units were promoted among small and marginal farmers as a means to earn additional income. Small and marginal farmers (24 Nos.) were encouraged to purchase sheep units by availing soft loan from the Nava Kalpana society. With the profits earned the group has added 165 more sheep to make the total number to 225 sheep within a span of 6 months. The general practice is to sell the rams and retain the eves. The groups are supported with seasonal de-worming and vaccination camps involving the local staff of the Department of Animal Husbandry.

6. Process/ Product/Technology Developed

S. No.	Process/Product/Technology Developed	Adoption/ Validation/ Commercialization, etc.	Responsible Partner
1	Altered Spacing	Total cluster adopted	MARI
2	Pipeline Networking	40 acres covered	WASSAN
3	Zero Till Maize	Total cluster covered	MARI
4	Deepening of farm ponds	14 ponds	ANGRAU
5	Plastic mulching in commercial crops	15 farmers	BAIF
6	Hybrid seed production	7 acres covered	BAIF
7	Market linkages in mango and watermelon	Total cluster adopted	SAIRD/IKISAN
8	Soil sampling for soil test based nutrient application	Around 1050 samples collected and analyzed	All Partners

7. Linkages and Collaborations

Department/Organization	Nature of work	Unit/Quantity	Amount (Rs.)
Seethagondi, Adilabad			
DWMA	Farm ponds	5	80000
ZP	Sanction of additional funds to CLRC Building	1	175000
ITC	Supply of Eucalyptus saplings	7000	49000
Department of Forestry	Supply of saplings (Pongamia, Seethaphal)	2000	6000
JK Trust	Artificial Insemination	5	250
NREGS	Digging of community farm pond and mini percolation tanks	30	2000000
	Total		2310250
Pampanur, Anantapur			
Department of Animal Husbandry	Fodder production (endowment land)	1.6 ha	20000
	Animal Health Camps	2	20000
NREGS	NRM activities		
	CCT	2000 m	25000
	TCB	1300 m	100000
	Farm pond	1	12000
RDT	Calf rearing	30 cows	450000
ANGRAU	Kisan Mela		10000
NHM	Nursery establishment	34000	68000
NEDCAP	Biogas	20	300000
	Total		1005000

Department/Organization	Nature of work	Unit/Quantity	Amount (Rs.)
B Yerragudi, Kadapa			
DWMA	Laying field bunds	10.8 ha	87000
	Jungle Clearance	2 ha	6000
ADAH	Fodder seed distribution	150 kg	4500
	Poultry Units	74 units (each 10 chicks)	9250
	Vaccination	3520 animals	13000
	Poultry Vaccination	2500 birds	2300
ADH	Tomato Seed	30 farmers	1500
Dept. of Agri.	Vermi Hatchery	1	500
	Pheromone traps	100	3000
	Pheromone Lure	100	950
	Knap Sack Sprayer (Project Support)	1	800
	Knap Sack Sprayer	6	4800
	Foot Sprayer	4	18000
	Pheromone traps	200	4500
	Pheromone Lure	200	2450
	Knap Sack Sprayer	6	4800
Dept. of APMIP	Sprinklers (Project support)	3 Sets	45000
	Sprinklers	20 Sets	92000
Dept. of Sericulture	Mulberry	0.4 ha	100000
Dept of ATMA	NPM (Vermicompost, Neem oil, Rhizobium, Trichoderma,) subsidy Rs 1000/Acer	22 ha	55000
		Total	455350
Thummalacheruvu, Khammam			
Primary Health Centre	Health Camp	100 members	15000
Chaitanya Seva Samithi	Dryland Paddy training	25 members	2000
Kovel Foundation	Non Timber Forest Management (NTFM): Data collection about gum production& trainings	5 batched (60 members)	40000
Northern Power Distribution Co. Ltd. (NPDCL) & ITDA	Power Connection 3-Phase		4456800
NEDCAP	Biogas plants	87	652500
Department of Animal Husbandry	Vaccination 2 times & health camp	500 animals	5500
Mandal Development office	Hand pumps repair	10	33000
		Total	5204800

Department/Organization	Nature of work	Unit/Quantity	Amount (Rs.)
Jamisthapur, Mahabubnagar			
APMIP	Micro Irrigation for vegetable & Horticulture (Drip)	2	28000
Department of Animal Husbandry	Animal Health Camp	830 animals	20000
	Vaccination	200 animals	1400
	Deworming	200 animals	1400
	Fodder (PC-23) Production	80 kg	320
Sri Venkateswara University	Animal Health Camp	288 animals	10000
Livestock Research Station	Training on Sheep & Goat rearing	35	3500
NRC on Meat	Feed supplement for small ruminants	200	10000
J P Morgan/Planet water foundation	Drinking water facility	3 units	1200000
		Total	1274620
Duphad, Nalgonda			
Department of Horticulture	Vegetable seed production(Tomato, Vegetables, Bhendi, Palak)	3 kg	22000
MNREGS	Deepening and desilting of Jalamalakunta percolation tank	3695 m^3	214000
Department of Agriculture	Vegetable seeds	400 farmers	140000
Department of Agriculture	Three tier cultivars	222	321900
Department of Horticulture	Taiwan hand sprayers and hand sprayers	139	296800
Department of Horticulture	Supply of micronutrients	215	8625
		Total	1003325
Ibrahimpur, Ranga Reddy			
Department of Horticulture	Mini kits for kitchen garden	50	500
CLDP	Pipeline networking	1	200000
NEDCAP	Individual biogas plants	27	192000
		Total	392500
Jaffergudem, Warangal			
ATMA & NFSM	Groundnut seed production		20000
	Red gram seed production		35300
	Green gram seed production		9800

Department/Organization	Nature of work	Unit/Quantity	Amount (Rs.)
	Cow pea seed production		900
	Watermelon demonstration		12000
	Hybrid castor demonstration		4000
Board of SPICES	Silpaulin Sheets (for clean threshing)	15	33352
Department of Animal Husbandry	Fodder Jowar Seed Distribution	200kg	4000
	Chaff cutters		4100
	Animal Health Camps	5	25000
NEDCAP	Biogas plants	6	72000
NABARD & IGWDP Department	Field bund strengthening	934.59 m^3	96484.00
	Water absorption trenches (WAT)	23512 m^3	161559.00
	Continues contour trench (CCT)	3392 m^3	2476.00
	Stone gully plug (SGP)	10	51128.00
	Mini percolation tank (MPT)	3	69773.00
	Repaire to MPT	1	97109.00
	Sunkenpits (SP)	27	34553.00
	Dug out ponds (DOP)	1	7791.00
	Check dam	1	587769.00
MNREGS	Check dam	12	2287000
Department of Agriculture	Gypsum		54328
	No. of implements	125	200000
	Maize seed on 50% subsidy	40 bags (2008-09)	93750
		80 bags (2009-10)	
		30 bags (2010-11)	
	Zinc Sulphate	10 quintals (2010-11)	17000
		2 Quintals (2011-12)	5600
	Neem oil	36 l	5000
Department of Horticulture	Vegetable seed		49860
ANGRAU	Maghi Jowar		625
APMIP	Sprinkler sets (6 nos)	6	54000
	a. SC / STs (36 units) (100% subsidy)	36 Units	1800000

Department/Organization	Nature of work	Unit/Quantity	Amount (Rs.)
Nagarjuna fertilizers	Customized fertilizer trials		
	a. Paddy demo plots	2	3000
	b. Maize demo plots	2	3000
	c. Chilly demo plots	1	4000
		Total	5906257
		Grand Total	**20756902**

8. Status on Environmental and Social Safeguard Aspects

As committed in the project document, efforts were made to address environmental and social safeguards through various initiatives. Soil and groundwater parameters were periodically measured by the project staff. Runoff and soil loss were measured by instruments fixed in farmers fields in five clusters. Further, groundwater level was measured in all the clusters periodically. Sustainable groundwater management practices were promoted in places like Rangareddy district where groundwater has depleted to "dangerous levels". Planting of trees in wastelands and composting of farm waste by discouraging burning of crop residue, judicious water application methods by promoting micro irrigation equipment were promoted as part of environmental safeguards measures. As part of social safeguard measures, the project adopted a bottom up approach right from the beginning. Poorest of the poor were identified by the grama sabha and endorsed by people's institutions like Salaha samithis. The land less poor were addressed by the project through promotion of small ruminants, facilitating access to productive resources both from private and public property regime, building stake in important production resource like groundwater (sharing of groundwater in Rangareddy district) and including small and marginal farmers through specially focused capacity building programmes (hybrid castor seed production by small farmers in Mahbubnagar). Groundwater sharing between bore well owners and their neighbours was a classic example of bridging the income gap between resource rich (bore well owners) and resource poor farmers. The pipeline network facilitated by the project to share groundwater helped the resource poor farmers to raise their income by three times (from Rs.6800/- to Rs.21,000/-). Thus, bringing down the income disparity within the village.

9. Publications

Research papers in peer reviewed journals

S. No.	Authors, Title of the paper, Name of Journal, Year, Vol. & Page No.	NAAS Ratings	Responsible Partner
1	Ramana, D.B.V., Vijay Kumar, A., Sreenath Dixit and Venkateswarlu, B. (2011). Livestock production practices for sustainable rural livelihoods: A participatory action research in rainfed areas of AP. Indian J. of Rural Development, Vol.30, No.(1) pp.71-79.	3.4	CRIDA
2	Srinivasarao, Ch., Venkateswrlu, B., Sreenath Dixit, Veeraiah, R., Rammohan, S., Sanjeev Reddy, B., Sumanta Kundu and Gayatri Devi, K. (2010). Implementation of contingency crop planning for drought in tribal villages in Andhra Pradesh: Impacts on food and fodder security and livelihoods. Indian J.Dryland Agric. Res. & Dev.2010. 25(1): 23-30.	4.1	CRIDA
3	Srinivasarao, Ch., Venkateswarlu, B., Wani, S.P., Sahrawat, K.L., Sreenath Dixit, Sumanta Kundu, Gayatri Devi, K., Rajesh, C. and Pardasaradhi, G. (2010). Productivity enhancement and improved livelihoods through participatory soil fertility management in tribal districts of Andhra Pradesh. Indian J.Dryland Agric. Res. & Dev.2010. 25(2): 23-32	4.1	CRIDA
4	Ramana, D.B.V and Vijaya Kumar, A. (2010). Raillietina infestation in Vanaraja chicks. *Intas polivet*, 11(1): 126-127	4.1	CRIDA
5	Ramana, D.B.V., Vijay Kumar, A., Sreenath Dixit, B. Venkateswarulu and G. Surendranath (2010). Success of ram lamb rearing: a livelihood option for landless tribal women. *Intensive Agriculture*, 49: 18-20		CRIDA
6	Ramana, D.B.V., Vijaya Kumar, A., Sreenath Dixit and Venkateswarlu, B. (2011). Livestock Production Practices for Sustainable Rural Livelihoods: A Participatory Action Research in Rainfed Areas of Andhra Pradesh, India. *Journal of Rural Development*. Vol.30 (1). pp. 71-79	3.4	CRIDA
7	Sreenath Dixit and Venkateswarlu, B. 2010. Local solutions to climate change. Infochange Agenda. Quarterly Published by Centre for Communication and Development Studies, Pune. Issue.19 (21-24). Available online at http://infochangeindia.org/Agenda/Agricultural-revival/Local-solutions-to-climate-change.html		CRIDA

8	Sreenath Dixit, Prasad, J.V.N.S., Raju, B.M.K and Venkateswarlu, B. Towards a Carbon – Neutral Rural India: Challenges and opportunities in agriculture. 2010. India Infrastructure Report – 2010. Infrastructure development in a low carbon economy. pp.393-407.		CRIDA
9	Suseelendra Desai, B. Anuradha, B. Sahadeva Reddy, Sreenath Dixit and B.Venkateswarlu. (2009). Seed Self Sufficiency in Groundnut: A Participatory Approach, J. Oilseeds Res., Vol.26 (Special issue); 728-729.	3.3	CRIDA
10	Sreenath Dixit, Venkateswarlu, B. and Srivastava, A.P. (2011). Promoting Sustainable Rural Livelihoods: A Framework for Managing Multi Institute Consortia. Journal of Agricultural Extension Management. Vol.XII No.(1). pp. 55-65.	1.8	CRIDA

Books/ Book chapters/ Abstracts/ Popular articles, Brochures, etc.

S. No.	Authors, Title of the papers Name of Book/ Seminar/ Proceedings/ Journal, Publisher, Year, Page No.	Responsible Partner
1	Vijay Kumar, A, Ramana, D.B.V., and Ravishankar, K. 2008. Streamlining animal health services as community activity in containment of animal diseases: a participatory approach. *In* Abstracts. Symposium on "New Horizons in Food Security with Special Reference to Veterinary Public Health and Hygiene-Evolving Strategies with Global Perspective", Global Meet on Veterinary Public Health, Lucknow, 19-21st November, 2008.	CRIDA
2	Ramana, D.B.V., Rama Rao, CA., Vijay Kumar, and Nagasree, K. (2009). Input use pattern and cost of milk production from milch animals in different zones of Andhra Pradesh. *In* Summaries of Papers for Discussion of the 23rd National Conference on Agricultural Marketing at CRIDA, Hyderabad from November 12-14, 2009: 53	CRIDA
3	Vijaya Kumar, S., Sreenath Dixit, Rao, K.V., Bhaskara Rao, I., Vijaya Kumar, A. and Majid Ali (2010). Roof top rainwater harvesting for domestic needs – An approach. Paper presented at the National Seminar on Engineering Agriculture for Evergreen Revolution, 24-25 September, 2010, ISAE AP Chapter, Hyderabad	CRIDA
4	Ramana, D.B.V., Vijay Kumar, A, Sudheer, D and Raju BMK. 2010. Spatial distribution of enteric methane emissions from ruminanat livestock in Andhra Pradesh. *In* Extended Summaries of Papers of National Symposium on Climate Change and Rainfed Agriculture at CRIDA, Hyderabad from February 18-20, 2010: 413-415.	CRIDA

S. No.	Authors, Title of the papers Name of Book/ Seminar/ Proceedings/ Journal, Publisher, Year, Page No.	Responsible Partner
5	Rao, K.V., Venkateswarlu, B., Sahrawath, K.L., Wani, S.P., Mishra, P.K., Sreenath Dixit, Srinivasa Reddy, K., Manoranjan Kumar and Saikia, U.S. (Eds) 2010. Proceedings of National Workshop-cum-Brain Storming on Rainwater Harvesting and Reuse through Farm Pond: Experiences, Issues and Strategies. Pages: 242.	CRIDA
6	Sreenath Dixit, Venkateswarlu, B (2011). Local solutions to cope with climate change effects on rainfed agriculture: Innovative NRM interventions. Agricultural Drought: Climate Change and Rainfed Agriculture, Lecture notes of the 5th SERC School, Central Research Institute for Dryland Agriculture, Hyderabad, India. 289-294.	CRIDA
7	Dixit, S., Venkateswarlu, B. and Desai, S. 2008. Towards sustainable rural livelihoods: Innovative options and institutions. Poster presented in the technical session on Sustainable Rural Life at the Symposium on Education and Research in Sustainability during 8-9 September 2008, IIT, Chennai.	CRIDA
8	Suseelendra Desai, 2008. Towards sustainable rural livelihoods: Innovative options and institutions. Invited lead paper presented in the technical session on Sustainable Rural Life at the Symposium on Education and Research in Sustainability during 8-9 September, 2008, IIT, Chennai	CRIDA
9	A.Vijaya Kumar, D.B.V.Ramana and K.Ravi Shankar. Streamlining Animal Health Services As Community Activity In Containment Of Animal Diseases: A Participatory Approach, presented in the global meet on veterinary public health and Symposium on "New Horizons in food security with special reference to veterinary public health and hygiene-evolving strategies with global perspective" held at Hotel Taj Residency, Lucknow (V.P), India on 19th to 21st November, 2008.	CRIDA
10	Saroja, D.G.M, Prasad, Y.G. and Sreenath Dixit. Incidence of Mealybug, *Phenococcus solenopsis* Tinsely and its Natural Parasitoids on Cotton in Andhra Pradesh. National Symposium on IPM Strategies to Combat Emerging Pests in Current Scenario of Climate Change. January 28-30, 2009 at College of Horticulture and Forestry, Central Agricultural University, Pasighat.	CRIDA
11	Srinivasa Rao, Ch., Venkateswarlu, B., Sreenath Dixit, Sumanta Kundu and Gayatri Devi, K. (2010). Impacts of Soil Fertility Management in Improving Cotton Production in Andhra Pradesh: On-Farm Experiences. Poster Presented in National Workshop on Innovations and better management practices for climate resilient sustainable cotton production at CRIDA, Hyderabad during 15-16 Dec., 2010.	CRIDA

S. No.	Authors, Title of the papers Name of Book/ Seminar/ Proceedings/ Journal, Publisher, Year, Page No.	Responsible Partner
12	Kareemulla, K., Rama Rao, C.A., Sreenath Dixit, Ramana, D.B.V., Venkateswarlu B. and Ramakrishna, Y.S. 2008. A Profile of Target Districts in Andhra Pradesh : Demography, Land Use and Agriculture. NAIP-SRL Series-1. Central Research Institute for Dryland Agriculture, Hyderabad. 32p.	CRIDA
13	Ramana, D.B.V., Kareemulla, K., Rama Rao, C.A., Sreenath Dixit,., Venkateswarlu B. and Vijay Kumar, A. 2009. Status, Dynamics and Livelihood Contribution of Livestock in the Rainfed Areas of Andhra Pradesh. NAIP-SRL Series-2. Central Research Institute for Dryland Agriculture, Hyderabad. 24p	CRIDA
14	Ramana, D.B.V., Vijaya Kumar, A., Sreenath Dixit and Venkateswarlu B. 2009. Pasuvulaloo adhikotpattiki samagra poshana mariyu adhunika yaajamanya paddatulu (Telugu). Bulletin-3/2009, NAIP (Comp-3), CRIDA, Hyderabad, 64p	CRIDA
15	Ramana, D.B.V., Shalander Kumar, Kareemulla, K., Rama Rao, C.A., Sreenath Dixit, Rao, KV and Venkateswarlu B. 2009. Livestock in Rainfed Agriculture: Status and Perspective. Policy Paper: SEPR Series-2, Central Research Institute for Dryland Agriculture, Hyderabad. 46p	CRIDA
16	Srinivasa Rao, Ch., Venkateswarlu, B., Sreenath Dixit, and Anil Kumar Singh. 2010. Potassium deficiency in soils and crops emerging soil fertility constraint in dryland agriculture, NAIP-SRL Series-4, Central Research Institute for Dryland Agriculture, Hyderabad. pp.34	CRIDA
17	Srinivasa Rao, Ch., Venkateswarlu, B., Sreenath Dixit and Venkataraoamma, K. (2010). Pantalalo mareu nealalo potassium lopam metta vayavasaya utpathilo peruguthuna poshaka samashya, NAIP-SRL Series-5, Central Research Institute for Dryland Agriculture, Hyderabad. pp.34	CRIDA
18	Ramana, D.B.V., Vijaya Kumar, A., Venkateswarlu, B., Sreenath Dixit, (2009). Improved livestock feeding and management practices for higher productivity (Telugu). NAIP-SRL Series-3, Central Research Institute for Dryland Agriculture, Hyderabad. 64 p	CRIDA
19	Nagasree, K., Sreenath Dixit, Ravishankar, K., Venkateswarlu, B. (2010). Garamina vyavasaya vignyana samachara kendramulu-Karadeepika. NAIP-SRL Series-4, Central Research Institute for Dryland Agriculture, Hyderabad. pp.24	CRIDA

S. No.	Authors, Title of the papers Name of Book/ Seminar/ Proceedings/ Journal, Publisher, Year, Page No.	Responsible Partner
20	Srinivasa Rao, Ch., Venkateswarlu, B., Suhas P. Wani, Sreenath Dixit, Sharawat, K.L., Sumanta Kundu. (2011). Benefits from micro and secondary nutrients : Impacts on farm income and livelihoods in rainfed tribal and backward regions of Andhra Pradesh. NAIP-SRL Series-1, Central Research Institute for Dryland Agriculture, Hyderabad. pp.20	CRIDA
21	Srinivasa Rao, Ch., Venkateswarlu, B., Dinesh Babu, M., Suhas P. Wani, Sreenath Dixit, Sharawat, K.L., Sumanta Kundu. (2011). Soil health improvement with Glyricidia: Greenleaf manuring in rainfed agriculture – on-farm experience. NAIP-SRL Series-2, Central Research Institute for Dryland Agriculture, Hyderabad. pp.16	CRIDA
22	Srinivasarao, Ch., Venkateswarlu, B., Sreenath Dixit and Sumanta Kundu (2011). Participatory Soil Health Management and Carbon Buildup in Rainfed Region of Andhra Pradesh: Field Experiences. *In* Soil Carbon Sequestration for Climate Change Mitigation and Food Security (Ed. Ch.Srinivasa Rao, B.Venkateswarlu, K.Srinivas, Sumanta Kundu and Anil Kumar Singh. Central Research Institute for Dryland Agriculture, Hyderabad. pp.266-278	CRIDA

10. Media Products Developed/Disseminated

S. No.	CD, Bulletins, Brochures, etc. (Year wise)	No. of Copies	Distri-bution	Responsible Partner
1	NPM Dhall processing unit (2009)	1000	1000	WASSAN
2	Ramlamb rearing (2009)	1000	1000	WASSAN
3	Groundwater sharing through pooling of borewells (2010)	1000	1000	WASSAN
4.	Non pesticidal management (NPM) of crop pests and NPM dal processing initiatives – Initial Experiences			WASSAN
5.	Bulletins – 2011-12	25	25	AAI
6.	Zero budget– Agriculture - Leaflets – 2011-12	300	300	AAI
7.	Cluster Intervention – English & Telugu – 2011-12	50 & 50	100	AAI
8.	Video film - NRM resdulting tank – 2011-12	10	10	AAI
9	Booklet on 'Emerging best practices and lessons from NAIP Comp-3 project in Khammam Distrct, Andhra Pradesh'	500	100	CWS
10	Annual Report 2008			CRIDA
11	Annual Report 2009			CRIDA
12	Annual Report 2010			CRIDA
13	Demography, Land Use and Agriculture. NAIP-SRL Series-1	500	450	CRIDA
14	Demography, Land Use and Agriculture. NAIP-SRL Series-1	500	450	CRIDA
15	Pasuvulaloo adhikotpattiki samagra poshana mariyu adhunika yaajamanya paddatulu	500	450	CRIDA
16	Livestock in Rainfed Agriculture: Status and Perspective	500	450	CRIDA
17	Potassium deficiency in soils and crops emerging soil fertility constraint in dryland agriculture	500	450	CRIDA
18	Pantalalo mareu nealalo potassium lopam metta vayavasaya utpathilo peruguthuna poshaka samashya	500	450	CRIDA
19	Improved livestock feeding and management practices for higher productivity (Telugu)	500	450	CRIDA
20	Garamina vyavasaya vignyana samachara kendramulu-Karadeepika.	500	450	CRIDA
21	Benefits from micro and secondary nutrients : Impacts on farm income and livelihoods in rainfed tribal and backward regions of Andhra Pradesh	500	450	CRIDA
22	Soil health improvement with Glyricidia: Greenleaf manuring in rainfed agriculture – on-farm experience.	500	450	CRIDA

11. Meetings/Seminars/Trainings/Kisan Mela, etc. organized

Year	Training		Workshop		Exposure Visit		Other Programme	
	No	Participants	No	Participants	No	Participants	No	Participants
07-08	4	54	1	30	5	146	-	-
08-09	46	987	7	215	15	231	21	615
09-10	28	484	4	165	14	275	19	511
10-11	23	971	5	184	5	77	20	511
11-12	2	122	1	25	3	199	3	140

12. Performance Indicators

(As per the enclosed format in Appendix-1: Component-wise; and Sub-component-wise)

S. No.	Indicator	Total Numbers
1	Number of improved technologies made available in disadvantaged areas	118
2	Number of improved technologies adopted in disadvantaged areas	109
3	Number of farmers using these technologies in disadvantaged areas	2610
4	Increase in agriculture services and processing enterprises in project area	9
5	Increase in agriculture-based employment in participating farming households	438
6	Number of farmer groups involved in project component activities	351

13. Employment Generation (man-days. year)

Sl. No.	Type of Employment Generation	Employment Generation up to End of Sub-project	Responsible Partner
1.	Vermicompost sheds erection and labour works in 2007	1000	SAIRD
2.	Biogas construction and farm labour in 2008	1200	SAIRD
3.	Biogas, shed net & vermicompost in 2009	2500	SAIRD
4.	Vermicompost, bio gas & shade net in 2010	2000	SAIRD
5.	Vermicompost, bio gas & vermicompost in 2011	1500	SAIRD
6.	Vermicompost, bio gas& Azolla production in 2012	1600	SAIRD

Sl. No.	Type of Employment Generation	Employment Generation up to End of Sub-project	Responsible Partner
7.	Raising of nursery and plantation	356	MARI
8.	Digging of farmponds	268	MARI
9.	Repairs to defunct check dams	72	MARI
10.	Recharging of defunct open wells	46	MARI
11.	Plantation one field funds and Waste land	635	MARI
12.	Vermi Hatchery Fedaration (2008-2012)	2960	AAI
13.	Nursery (2009-2012)	920	AAI
14.	NRM (Contour Bunding)	380	NREGS
15.	NRM (Bund Strengthening)	117	ANGRAU

14. Assets Generated

(Details to be given on equipments and works undertaken in the sub-project, costing more than ₹10,000/- in each case)

Equipment

Sl. No.	Name of the Equipment with Manufacturers Name, Model and Sr. No.	Year of Purchase	Quantity (Nos.)	Total cost (Rs.)	Responsible Partner
1.	Taiwan sprayers	2007	25	2,52,882	SAIRD
2.	Hands sprayers	2007	150	2,73,368	SAIRD
3.	Three tine cultivators	2008	222	3,99,498	SAIRD
4.	Bars	2009	50 units	34,950	SAIRD
5.	Soil Testing kit & Chemical reagents, Soil Test Crop Response Scheme, 59.STK	19.02.08	6	12750	AAI
6.	Taiwan Sprayers & Accessories, Prakash Mill Gin Storer, PGMS.10	21.03.08	2	15000	AAI
7.	Weighing Scales & Accessories, Essae-Teraoka Limited ETL.AA9.PSR.385	29.03.08	1	17231	AAI
8.	Vegitable grading & Accessories - G.Kullayappa	29.03.08	1	126850	AAI
9.	Feed Pulverizer, Agri Tech System, 12.ATS	15.04.08	1	18500	AAI
10.	Computer & Accessories , Prestige. Hyd.332	20.12.07	1	74324	AAI

Sl. No.	Name of the Equipment with Manufacturers Name, Model and Sr. No.	Year of Purchase	Quantity (Nos.)	Total cost (Rs.)	Responsible Partner
11.	Camera, VSS Computer & Peripherals, 200.VSSQ	12.03.08	1	24290	AAI
12.	Multi Media Projector, VSS Computer & Peripherals, 199.VSSQ	11.03.08	1	150850	AAI
13.	Mini Seed Processing Unit, Renuka Enterprises, RE.UKD	15.04.08	1	166000	AAI
14.	Power Operated Brush Cutter, Karshak Brothers, KB.3433	23.03.09	1	25480	AAI
15.	Greaves Rotator Tiller model DWG-25-2c 4 HP Diesel Engine (Cultivator & Ridger, Karshak Brothers, KB.3433	23.03.09	1	102445	AAI
16.	Chaff Cutter, Karshak Brothers, KB.3433	23.03.09	2	64680	AAI
17.	Multi Media Projector, VSS Computers & Peripherals, 199.VSSQ	12.03.08	1	150850	AAI
18.	Leaf Plate machines (3 sets)	05.02.10		102336	ANGARU
19.	Digital Camera Nikon Cool Pix	06.02.10		16000	ANGARU
20.	Pulvariser Amruth 3 HP	20.02.10		19500	ANGARU
21.	Sewing Machines – Usha ZigZag (10)	20.02.10		79000	ANGARU
22.	Usha Tailor sewing machine (10)	20.02.10		37000	ANGARU
23.	HP M1005 All in One Printer	22.02.10		13988	ANGARU
24.	Counter tables 2x4 (2)	25.02.10		4200	ANGARU
25.	Wet grinder (3)	26.02.10		18600	ANGARU
26.	Cotton plant pluckers	06.03.10		4000	ANGARU
27.	Dual Display Computerized KIOSK	08.04.08	10	11,85,419	IKisan
28.	22" Touch Screen Monitors	19.03.09	03	62,088	IKisan
29.	HP Desktops & Monitors	14.04.08	20 &10	6,03,720	IKisan
30.	Webcam VX 1000	10.03.08	10	12,900	IKisan
31.	MS office 2007 Prof. & Norton Antivirus 2008	17.03.08	23 & 23	2,88,075	IKisan
32.	D-Link Ext. Modem, Ethernet Cable UTP & RJ45 Connectors	15.03.08	10 & 03	30,100	IKisan
33.	Multimedia Speakers	10.04.08	10	3,450	IKisan
34.	HP LaserJet Printers	24.10.08	11	1,36,397	IKisan
35.	1KVA & 3KVA UPS Online	15.05.08	10 &1	3,51,728	IKisan
36.	IVRS Software	02.07.09	01	4,47,200	IKisan

Sl. No.	Name of the Equipment with Manufacturers Name, Model and Sr. No.	Year of Purchase	Quantity (Nos.)	Total cost (Rs.)	Responsible Partner
37.	Television Set Integra 27HD	14.03.08	10	2,83,000	IKisan
38.	Video Distribution Amplifier	21.05.08	10	40,685	IKisan
39.	Grandtech Ultimate 2000AX-TV Coders	21.05.08	10	29,613	IKisan
40.	Cables & Connectors	04.11.08	10	4,004	IKisan
41.	Audio, Video Power Cables	15.04.08	10 each	46,345	IKisan
42.	Storewel, Computer tables, chairs	24.04.08	11	1,52,907	IKisan
43.	Conference Speaker Phones	02.10.09	10	3,72,800	IKisan
44.	Dell Desktops & DVD Writer	18.03.08	3	1,14,750	IKisan
45.	160 GB External Portable Hard Disk~	05.03.08	01	5,050	IKisan
46.	Thermal Binding Machine & Covers	28.03.08	01	10,606	IKisan
47.	2.0 Ton Vertis Split AC & 5kva Stabilizer	10.03.08	02	62,200	IKisan
48.	Agricultural Books	03.03.09	12	7,122	IKisan

Works

Sl. No.	Name of the Equipment with Manufacturers Name, Model and Sr. No.	Year of Work Done	Quantity (Nos.)	Total cost (Rs.)	Responsible Partner
1.	Vermi compost sheds at Jalamalakunta than Chinnagarakunta thanda and Chinnasetharam thanda	2007-08	15	1,20,000	SAIRD
2.	Bio-gas, Banjara co-op society Jalamalkunta thanda	2009	1	8,00,000	SAIRD
3.	Silt traps	2009-10	26	26,000	SAIRD
4.	NAIP room renovation	2007	1	96,000	SAIRD
5.	Tank De-silting and check dam Jalamalkunta thanda	2009-10	1	2,80,000	SAIRD
6.	Bio gas renovation	2011	1	2,00,000	SAIRD
7.	Godown construction	2008	1	1,94,195	SAIRD
8.	VRC Building	2008-09	1	850000	MARI
9.	Makeshift Godown	2009-10	1	250000	MARI
10.	Roof water harvesting structure (30,000 L capacity)	2010-11	1	107000	MARI
11.	Barbed wire fencing	2010-11	1	130000	MARI
12.	Repairs to defunct check dam at Kusumbai thanda	2010-11	1	75000	MARI

Sl. No.	Name of the Equipment with Manufacturers Name, Model and Sr. No.	Year of Work Done	Quantity (Nos.)	Total cost (Rs.)	Responsible Partner
13.	Construction of Office Cum Godown	2008	500 m^2	4,00,000	AAI
14.	NRM Contour Bunding (NREGS)	2009	850 m	81,000	AAI
15.	NRM-Bund Strengthening	2010	850 m	49500	CRIDA & AAI
16.	NRM-Deeping of Kuntas	2009	1(736 m^3)	24900	ANGRAU & AAI
17.	NRM-Deeping of Kuntas	2010	5 (2250 m^3)	49950	ANGRAU & AAI
18.	NRM-Deepening of Kuntas	2011	7 (25309 m^3)	4,43,260	ANGRAU & AAI
19.	Constructed 3 Syntex Tanks With Motor at B.Yerragudi	2010	3	94,000	AAI
20.	Constructed 2 Syntex Tanks With Motor at Madigapalli	2011	2	1,00,000	AAI

Revenue Generated

(Details may be given on revenue generated in the sub-project viz., sale of seeds, farm produce, products, patents, commercialization, training, etc.)

Sl. No.	Source of Revenue	Year	Total amount (Rs.)	Responsible Partner
1.	Vegetable seed	2007	25,000	SAIRD
2.	Vegetable seed and ground nut seed	2008	1,54,500	SAIRD
3.	Vegetable and jowar seed	2009	95,000	SAIRD
4.	Vegetable, greengram and ground nut seed	2010	1,43,000	SAIRD
5.	Vegetable seed	2011	30,000	SAIRD
6.	Seed Production (G.Nut-ICGV-91114)	2007	49220	AAI
7.	Seed Production (G.Nut-ICGV-91114,K6, Narayani)	2008	847811	AAI
8.	Seed Production (Bajra)	2008	70170	AAI
9.	Redgram (LRG-41,LRG_30)	2008	1110	AAI
10.	Redgram (LRG-41)	2009	8010	AAI
11.	Fieldbean (TFB-5), Horsegram, Chilles	2009	65995	AAI
12.	Redgram (LRG-41)	2010	154250	AAI
13.	Cluster bean	2010	24350	AAI
14.	Redgram (LRG-41,TRG-222, Cowpea, Horsegram, Castor (PCH-111, PCH-222) TFB-5	2011	129844	AAI

Sl. No.	Source of Revenue	Year	Total amount (Rs.)	Responsible Partner
15.	Production of Vermi Compost	2008-12	3,57,000 (102 Tons @3.50.-)	AAI
16.	Production of Nursery	2009-12	55900 (223900 Seedlings raise @0.25.-Paise)	AAI
17.	Ram lamb rearing	2011	60,000	BAIF
18.	Calf rearing	2011	18560	BAIF
19.	Implements hiring	2011	15,000	BAIF
20.	Castor seed production and multiplication	2011	8,000	BAIF
21.	Poultry	2011	6,000	BAIF
22.	NPM Dhal Marketing	2011	52545	WASSAN
23.	Custom Hiring centre	2011	42360	WASSAN

Livestock

S. No.	Details of Livestock (Breed, etc.)	Year of Procurement/ Production	Nos.	Total Cost (Rs.)	Responsible Partner
1.	Chicks (Rajasree)	2008	1600	30,000	SAIRD
2.	Animals and Books	2008	1	49,968	SAIRD
3.	Sheeps (local)	2010	18	1,80,000	SAIRD
4.	Poultry chick, Rajashree breed	2007-08	1200		MARI
5.	Ram lamb Units	2008	28		AAI
6.	Ram lamb Units	2009	45		AAI
7.	Poultry	2009	740	18500	AAI
8.	Ram lamb Units	2010	30		AAI
9.	Ram lamb Units	2011-12	33	99000	CRIDA

15. Awards and Recognitions

S. No.	Name, Designation, Address of the Person	Award. Recognition (with Date)	Institution. Society Facilitating (Name & Address)	Responsible Partner
1	Director, CRIDA	e-India Award		IKISAN
2	Director, CRIDA	e-Asia Award		IKISAN
3	Director, CRIDA	e-World Award	e-World Conference	IKISAN

16. Steps Undertaken for Post NAIP Sustainability

The project tried to build institutions and processes around interventions so that these could be practiced by the community and the changes brought in by the project interventions could be sustained even after the project is concluded. This effort was made right from the beginning of the project and all the cluster anchoring partners were encouraged to constitute an advisory body consisting of villagers belonging to different sections. These were called Salaha Samithi, Navakalpana Society, Village Action Team or cluster action team etc. Such community organizations were engaged by the project staff in implementing interventions that were meant for the village community as a whole. This arrangement was particularly useful to negotiate with the community and arrive at consensus when interests were diversified. Besides, many interventions were promoted in the form of enterprises by forming common interest groups (CIGs). Such groups will carry on as long as there is mutual benefit for those involved in the enterprise. Efforts were also made to introduce seed production as an enterprise through training and capacity building both by individual and community approaches. These are in a way institutions that will carry on as long as there members perceive relative advantage over their original practices. This apart, sustainability fund concept coupled with revolving fund was instituted in all the clusters to ensure that the participating households will perceive a stake in it. This fund was built over the years by promoting democratic and transparent processes so that the community as a whole inculcates values of participatory processes and common good. Community was also organized around ICT kiosks so that there is appreciation for scientific knowledge and improved practices.

Project exit workshops were conducted involving all the stakeholder at each of the clusters to raise awareness about the institutions and assets created by the project and the need for their perpetuity. A set of guidelines was developed for maintenance and continued use of the assets created by the project. A set of bylaws to guide the judicious use of the funds was also evolved. The line departments and the district administration were impressed upon to continue to make use of the infrastructure and the community preparedness for furthering the agenda of different development programmes.

17. Possible Future Line of Work

The project framework was a robust one and created many leads for further research initiatives. Though many innovative systems and processes were initiated as part of the project, most of the time and energy of the project staff was consumed by implementing interventions and building and maintaining assets. There is a large variation in the ability of the communities to participate in the project, absorb the project assistance and build further on the project outcomes. Thus, the length of period requiring handholding for making the communities completely self reliant also varies greatly. This requires able facilitation, continued staffing and funding. Though the project was successful in establishing the role of support systems in enhancing rural livelihoods, in depth analysis of the typologies of support systems based on the ability of the community and existing institutional infrastructure could not be carried out due to paucity of time. Institutions play very significant role in determining the course and speed of development. However, there is a need to investigate this aspect across different resource endowments through systematic research. This project also gauged the scope of promoting rural social enterprises. There is a need to carry out an in depth analysis of viable enterprises that have scope in the emerging climate change scenario. Finally, this project also made significant contribution in terms of adopting innovative project delivery mechanisms. This area is far less researched as far as the rural sector is concerned.

18. Personnel

(Staff of Lead Centre & Partner-wise, their Name, Designation, Discipline and Duration)

	From – To (DD.MM.YYYY)
Research Management (CL)	
Dr Y S Rama Krishna	01.09.2007 to 30.06.2008
Dr B Venkateswarlu	07.07.2008 to 31.03.2012
Scientific (CPI, CCPI, others)	
CRIDA	
Dr B Venkateswarlu (CPI)	01.09.2007 to 06.07.2012
Dr Sreenath Dixit (CPI)	07.07.2008 to 31.03.2012
Dr Sreenath Dixit (CCPI)	01.09.2007 to 06.07.2012
Dr B Sanjeeva Reddy (CCPI)	07.07.2008 to 31.03.2012
ANGRAU	
Dr.B.Sahadeva Reddy, Senior Scientist (Agronomy), ARS, Anantapur (ANGRAU)	01.09.2007 to 31.03.2012
Dr.Y.Padmalatha, Principal Scientist (Agronomy), ARS, Anantapur (ANGRAU)	01.09.2007 to 31.03.2012
Dr.G. Karuna Sagar	01.01.2011 to 31.03.2012
AAKRUTHI	
K. Kalyan Chakravarthi, CCPI	01.09.2007 to 20.10.2008

	From – To (DD.MM.YYYY)
R. Kishore, CCPI	21.10.2008 to 31.03.2012
G. Subba Rao, Head of the Institution	01.09.2007 to 31.03.2012
IKisan	
Mr. Vijay Jesudassan, DGM (National O&D), Co PI	01.09.2007 to 31.03.2012
SAIRD	
N. Venkata Reddy	
R.Veeraiah	
BAIF	
B.Shivarudrappa	01.09.2007 to 31.03.2012
CWS	
R.V.Ram Mohan	01.09.2007 to 31.03.2012
MARI	
R.Murali	01.09.2007 to 31.03.2012
WASSAN	
G.Surendranath	01.09.2007 to 31.03.2012
ICRISAT	
Dr S P Wani	01.09.2007 to 31.03.2012
Technical	
BHP Durga Prasad, Account Officer	01.09.2007 to 31.03.2012
B Senthil Kumar, Manager- Coordination	01.09.2007 to 31.03.2012
K V Gopal, Purchase Manager	14.12.2007 to 31.03.2012
Ch Ramshankar, Officer – IT	01.02.2008 to 31.03.2012
K Suresh, Asst Manager – IT	12.11.2007 to 31.03.2012
B Vinodh, Senior Officer – IT	01.09.2007 to 31.03.2012
Contractual	
MARI	
K.VishwanathaRaju R.A	01.09.2007 to 31.03.2012
Sujatha S.R.F	01.09.2007 to 31.03.2009
P.Ugendar S.R.F	01.06.2007 to 31.03.2012
SAIRD	
Sundari suresh (RA)	01.09.2007 to 31.08.2010
Rama chudamani (SRF)	01.09.2007 to 30.12.2008
Dhiravath Nagender (SRF)	01.01.2009 to 31.03.2012
Gutti konda Gopalakrishna (RA)	01.09.2010 to 31.03.2012

	From – To (DD.MM.YYYY)
AAI	
P. Sekhar, RA	01.09.2007 to 30.06.2010
N. Obulesh, SRF	01.07.2007 to 31.03.2009
M V S Prasada Rao, RA	01.07.2010 to 31.03.2012
S. Ravinder Goud, SRF	01.04.2009 to 31.03.2012
ANGRAU	
Sri.S.Chandra Sekhar	Jan, 2011 to Nov, 2011
Sri. M.Chennakesavulu	Dec, 2011 to Jan, 2012
V.Ramana	28.12.2007 to 29.10.2008
B.Sreehari Naik	01.11.2008 to 07.02.2009
A.Malleswar Reddy	04.03.2009 to 31.08.2009
P.Aruna	01-09-2009 to 31-07-2010
B.Vatsala	25-08-2010 to 16-05-2011
P.Venkat Rao	06-06-2011 to 31-03-2012
IKisan	
Mr.Ravi Kumar, Project Manager	08.08.2007 to 30.11.2008
Mr.D.Sridhar, SRF, ML & ARM	30.01.2008 to 30.06.2008
Ms.Archana, SRF, Content Management	01.01.2009 to 30.04.2009
Mr. Syed Dastagiri, Project Manager	16.01.2009 to 31.03.2012
Mr. L.Uday Kiran, SRF, ML & ARM	25.01.2009 to 31.03.2012
Ms. Shelly Patwar, SRF, Content Management	12.05.2005 to 25.07.2009
Ms. Bala Purnima, SRF, Content Management	03.08.2009 to 03.08.2010
Ms. Ch. Jayapriya, SRF, Content Management	01.12.2010 to15.01.2012
CRIDA	
Lakshmi Aruna Gayatri	01.11.2007 to 03.07.2008
K. Gayatri Devi	01.11.2007 to 30.09.2008
K. Gayatri Devi	01.10.2008 to 30.09.2010
K.V.Vijay	01.11.2007 to 20.12.2007
Y.Ravi Kiran Reddy	01.11.2007 to 31.03.2008
G.Venkat Yadav	01.01.2008 to 16.08.2008
A.Vijay Kumar	01.01.2008 to 03.01.2011
B. Anuradha	06.02.2008 to 31.03.2012
P.Dharani Kumar	10.07.2008 to 27.09.2009
S Raghava Sarma	04.07.2008 to 31.01.2012
D.G.M.Saroja	09.07.2008 to 03.02.2010

	From – To (DD.MM.YYYY)
H. Nanjunda Reddy	17.03.2010 to 03.12.2010
M.Uday Kumar	14.11.2008 to 30.06.2010
Sailesh B.Borkar	09.11.2010 to 31.03.2012
M. Harika	01.11.2010 to 31.12.2010
Mani Maheswari	31.01.2011 to 28.12.2011
Venkata Lakshmi	05.01.2011 to 18.03.2011
Mallesh	05.01.2011 to 30.07.2011
M.Srinivasulu	02.02.2011 to 31.03.2012
G.Srisailam	15.04.2011 to 31.03.2012
P.Deni Manikya Rao	20.07.2011 to 31.01.2012
M.Parimala Kumar	08.08.2011 to 05.09.2011
R.Srinivasa Rao	15.09.2011 to 31.03.2012

19. Governance, Management, Implementation and Coordination

Composition of the various committees (CIC, CAC, CMU, etc.)

S. No.	Committee Name	Chairman (From-To)	Members (From-To)
1.	CIC	Dr Y S Ramakrishna (01.09.2007 to 30.06.2008) Dr B Venkateswarlu (07.07.2008 to 31.03.2012)	Dr.S.P.Wani R. Kishore, CCPI Mr. Vijay Jesudassan, R.Veeraiah B.Shivarudrappa R.V.Ram Mohan R.Murali G.Surendranath Dr B Venkateswarlu Dr sreenath Dixit
2.	CAC	Dr I V Subba Rao Dr S M Ilyas	Dr.N.K.Sanghi Dr.M.V.R.Prasad Sri D. Ramakrishna Reddy Dr.V. Rukmini Rao Sri S. Siva Kumar Sri K. Vidya Sagar Sri K.I.Shariff Dr.A.P.Srivastava Dr.B.Venkateswarlu Dr.Sreenath Dixit

3.	CMU	Dr B. Venkateswarlu (01.09.2007 to 06.07.2012) Dr Sreenath Dixit (07.07.2008 to till the project completion)	Dr..K Sreedevi Dr.Arun Shankar Dr.B.M.K. Reddy Dr.B.Sanjeeva Reddy Dr.C.A. Rama Rao Dr.C.R.Thyagaraj Dr.Ch. Srinivasa Rao Dr.D.B.V. Ramana Dr.G Ravindra Chary Dr.G. Pratibha Dr.G.Nirmala Dr.G.R.Maruthi Shankar Dr.G.Rajeshwar Rao Dr.I. Srinivas Dr.J.V.N.S. Prasad Dr.K Nagasree Dr Dr K. Kareemulla Dr.K.A.Gopinath Dr.K.L.Sharma Dr.K.Ravi Shankar

List of Meetings organized (CIC, CAC, CMU, etc.)

S. No.	Details of the meeting	Date	Place & Address (Where meeting was organized)
1.	**CIC**		
	First	02.09.2007	CRIDA
	Second	19.01.2008	CRIDA
	Third	15.05.2008	CRIDA
	Fourth	22.07.2008	CRIDA
	Fifth	16.10.2008	CRIDA
	Sixth	11.02.2009	CRIDA
	Seventh	19-20.05.2009	CRIDA
	Eighth	19.10.2009	CRIDA
	Ninth	28-29.05.2010	CRIDA
	Tenth	2-3.12.2010	CRIDA
	Eleventh	18-19.05.2011	CRIDA
2.	**CAC**		
	First	02.09.2007	CRIDA
	Second	19.01.2008	CRIDA
	Third	23.09.2008	CRIDA

S. No.	Details of the meeting	Date	Place & Address (Where meeting was organized)
	Fourth	21.03.2009	CRIDA
	Fifth	24.10.2009	CRIDA
	Sixth	22.01.2011	CRIDA
	Seventh	05.11.2011	CRIDA
3	**CMU**		
	First	07.08.2007	CRIDA
	Second	19.02.2008	CRIDA
	Third	10.05.2008	CRIDA
	Fourth	22.06.2008	CRIDA
	Fifth	16.09.2008	CRIDA
	Sixth	11.02.2009	CRIDA
	Seventh	02.05.2009	CRIDA
	Eighth	19.08.2009	CRIDA
	Ninth	15.05.2010	CRIDA
	Tenth	01.12.2010	CRIDA

Part-III: Budget and its Utilization

STATEMENT OF EXPENDITURE (Final)

Period from 24.07.2007 to 31.03.2012

Sanction Letter No	NAIP (SRLS-S) III-20/2006
Total Sub-project Cost Sanctioned/Revised Sub-project cost	1734.8919
Date of Commencement of Sub-project	24.07.2007
Duration	24.07.2007 to 31.03.2012
Funds Received in each year	
I Year	539.9618
II Year	337.5146
III Year	303.7841
IV Year	290.7038
V Year	262.7277
Bank Interest received on fund	0
Total amount received	1734.6920

S. No	A. Recurring Contingencies	Funds allocated					Funds released					Expenditure incurred					Total Expenditure	Refund during the year 2011-12	Closing balance as on 31st March, 2012	Requirement of additional funds	Remarks
		1st year	2nd year	3rd year	4th year	5th year	1st year	2nd year	3rd year	4th year	5th year	1st year	2nd year	3rd year	4th year	5th year					
1	TA	23.9700	23.9700	22.9700	20.5200	20.1200	13.1600	16.2242	12.8561	16.8180	17.3017	7.3606	13.4679	17.7098	17.7073	13.0415	69.2871	6.2480	0.8249	-	
2	Workshop	3.5000	2.5000	1.5000	0.5000	4.0000	1.7500	1.7196	0.6943	0.2903	4.0000	0.9696	1.6943	1.2903	0.5000	0.4780	4.9322	3.2500	0.2720	-	
3	Contractual Staff	69.7320	69.7320	74.7240	98.2680	98.2680	22.3560	57.3959	65.6622	87.1907	80.6514	18.2049	54.1346	59.9153	82.4454	85.8263	300.5264	11.7289	1.0008	-	
4	Operational Cost	168.2700	177.4250	172.9550	146.1000	124.5300	84.1350	137.8624	141.7942	133.4412	121.8901	49.8450	141.2805	161.4133	142.3477	114.4461	609.3325	5.4358	4.3545	-	
	Sub- Total of A (1-4)	265.4720	273.6270	272.1490	265.3880	246.9180	121.4010	213.2021	221.0067	237.7403	223.8432	76.3800	210.5773	240.3287	243.0003	213.7919	984.0783	26.6627	6.4523	-	
	B. HRD Component																				
	(B) Training Udertaken																				
5	(a) International Training	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-	
	(b) National Training	4.0000	3.5000	0.0000	0.0000	0.0000	2.0000	1.3750	-1.3782	-0.7500	0.0000	0.1250	1.1218	0.0000	0.0000	0.0000	1.2468	0.0000	0.0000	-	
	(c) Training organized for farmers	12.0000	12.0000	11.0000	9.5000	0.0000	6.0000	10.4806	7.8268	7.0369	-1.9678	6.2865	8.0605	7.4973	7.5322	0.0000	29.3764	0.0000	0.0000	-	
6	Consultancy	11.2500	7.0000	1.0000	0.0000	0.0000	5.6250	2.9750	0.7500	0.0000	0.0000	1.6000	6.7500	1.0000	0.0000	0.0000	9.3500	0.0000	0.0000	-	
	Sub- Total of B (5-6)	27.2500	22.5000	12.0000	9.5000	0.0000	13.6250	14.8306	7.1986	6.2869	-1.9678	8.0115	15.9323	8.4973	7.5322	0.0000	39.9733	0.0000	0.0000	-	
	(C) Non - Recurring																				
7	Equipment	156.1800	14.2700	0.0000	0.0000	0.0000	156.1800	14.2700	0.0000	0.0000	-0.2535	63.6717	98.7954	7.6835	0.0499	0.0000	170.2005	0.0000	-0.0040	-	
8	Furniture	8.7500	0.0000	0.0000	0.0000	0.0000	8.7500	0.0000	0.0000	0.0000	-0.0302	4.9410	2.4013	1.3775	0.0000	0.0000	8.7198	0.0000	0.0000	-	
9	Work/New/Renovation	52.5000	5.0000	0.0000	0.0000	0.0000	52.5000	5.0000	0.0000	0.0000	-0.0369	24.6181	33.6013	0.1383	0.0000	0.0000	58.3577	-0.0700	-0.8245	-	
10	Other Books	13.3000	5.3000	3.0000	0.9000	0.4000	13.3000	5.5000	2.9000	0.9000	-2.1770	4.6369	6.5336	8.7014	0.4054	0.0000	20.2772	0.1459	0.0000	-	
	Sub- Total of C (7-10)	230.7300	24.5700	3.0000	0.9000	0.4000	230.7300	24.7700	2.9000	0.9000	-2.4976	97.8676	141.3316	17.9007	0.4553	0.0000	257.5551	0.0758	-0.8285	-	
	(D) Institutional Charges	16.5098	16.8176	16.6351	14.9158	15.6097	7.4917	10.7211	15.5468	14.6482	15.3916	2.5269	15.3466	15.6383	14.6779	13.8526	62.0422	0.0682	1.6890	-	
	Grand Total (A+B+C+D)	539.9618	337.5146	303.7841	290.7038	262.7277	373.2477	263.5237	246.6520	259.5753	234.7694	184.7860	383.1878	282.3649	265.6657	227.6444	1343.6487	26.8067	7.3127	-	

Name & Signature of CPI :

Date:_____

Date:_____

Name & Signature of Competent Financial authority:

Date:_____

Signature, name and designation of Consortia Leader:

PART-IV: DECLARATION

This is to certify that the final report of the Sub-project has been submitted in full consultation with the consortium partners in accordance with the approved objectives and technical programme and the relevant records, note books; materials are available for the same.

Place:_____

Date:_____

Signature of Consortium Principal Investigator

Organization	Name	Consortium Co-Principal Investigator
BIRD	B.Shivarudrappa	
CWS	R.V.Rama Mohan	
WASSAN	G.Surendranath	
SAIRD	R.Veeraiah	
MARI	R.Murali	
ANGRAU	R.Sudhakar Rao	
AAKRUTHI	R.Kishore	
IKISAN	Vijay Jesudassan	
ICRISAT	S.P.Wani	

Place: Hyderabad
Date: 20th March, 2012

Comments of Consortium Leader

Place: Hyderabad
Date: 28th March, 2012

Signature of Consortium Leader

Annexure I

Impact of Interventions aimed at Rainwater Harvesting & Use

Cluster	RWH Structures	No's	Storage Capacity (cu m)	No. of farmers benefited	Protective Irrigation potential created* (ac)	Increase in Cropping intensity %
Seethagondi, Adilabad	Farm ponds & desilting FP (4)	16	16608	30	99	100
	Remodeled FP with convergence MREGS	14	15554			
Pampanur, Ananthapur	Farm Pond	15	3000	28	5	100
	Check Dam	1	1800	45	Indirect impact on groundwater recharge	
	Repaired CD	1	2500	38		
	MPT	24	23050	186		
	Repaired MPT	2	1500			
	Field Bunds	8	1210	12		
	CCT	7	782	6		
	Gully Controls & RFDs	25	-	25		
	Roof Top Water Harvesting Tank	1	10			
B.Yerra Gudi, Kadapa	Desilting of existing water bodies and Deepening of Tanks	10	28295	238	562.6	100
	Farm pond renovation	1	300	2	2	
	Contour Bunds convergence with NREGs & Bund Strengthened	7	1480	7	Moisture conservation	
	Drinking Water Tank	5	5	77	Drinking purpose	
Thummala-Cheruvu, Khammam	Bandlavagu pipe line irrigation work,	1	NA	32	60	150
	Ippalakuntla renovation work	1	1,45,692	24	30	150
	Pulikunta Sluice gate renovation work	1	1,50,000	54	62	150

Cluster	RWH Structures	No's	Storage Capacity (cu m)	No. of farmers benefited	Protective Irrigation potential created* (ac)	Increase in Cropping intensity %
Jamisthapur, Mahabub-nagar	Farm Ponds	5	1126.8	16	43.22	100
	Repaired check dams	3	2348	36	85.22	100
	Mini Percolation Tanks	3	3308	26	To reduce runoff velocity, Moisture conservation up to 20%and recharge of groundwater	
	Repaired Mini Percolation Tanks	3	4850	37		
	Gully controls	29	-	22		
	Hillock Deep Trenches and Field Bunding	-	5271	42		
	Roof Top Water Harvesting Tank	1	13			
Dupahad, Nalgonda	Open well recharge	27	-	55	Recharge open wells	
	Percolation Tanks	1	3695	21	39	100
Ibrahimpur, Rangareddy	Networking of bore wells with social regulation	7	NA	18	45	250
	Earth work excavations of diverting water from field	1	262.5			100
	Check Dam Repaired & Deepening & Strengthening of side bunds	2	255.75			100
	Roof Top Water Harvesting Tank	1	10			
Jaffergudem, Warangal	Farm Ponds	11	11132	143	16	100
	Check Dam Repaired	1	6300	35	Moisture conservation and recharge of groundwater	
	Desilting Check dam	1	1600	3		
	Dried up Open wells	23	5742	23	Recharge open wells	
	Roof Top Water Harvesting Tank	1	30			
Total	**260**	**4,37,730**	**1596**	**1049**	**152**	

* Two protective irrigations at a depth @ 5 cm per irrigations

Annexure II

Productivity Enhancement through NAIP Interventions

Sl. No.	Cluster	Major Crop	Variety	NAIP intervention	No of HH covered	Area covered (ha)	Average Productivity (kg ha^{-1})	
							Current	Base line yield (2006#)
	Adilabad							
	Kharif	Redgram*	PRG-158	Variety replacement	110	167.5	591	695
	Rabi	Bengal gram	JG-11	INM, SSNM	97	75	875	1538
	Anantapur							
	Kharif	Groundnut	K-6	Variety replacement	70	67.5	506	350
	Rabi	Groundnut	K-6	Variety replacement	39	34.5	1589	1049
	Kadapa							
	Kharif	Groundnut	K-6	Variety replacement, INM	198	804.5	620	268
	Kharif	Horsegram	CRIDA 18 R	Variety replacement	5	8.75	489	434
	Khammam							
	Kharif	Paddy	MTU 1010 & JGL 1798	Ensuring water security	62	107.5	3245	2460
	Kharif	Redgram	NTL-30, Durga	Replaced with hybrid	82	12.5	2750	545
	Mahbubnagar							
	Kharif	Castor	DCH-519	Variety replacement with hybrids	90	85	985	456
	Kharif	Redgram	PRG-158	Variety replacement	19	12.5	1125	208
	Rabi	Groundnut	K-6	Variety replacement	25	98.75	1439	1010
	Nalgonda							
	Rabi	Groundnut	K-6	INM, SSNM	11	33.75	6272	1023
	Rabi	Tomato	Annapurna	INM, SSNM	141	40	22734	NA

Sl. No.	Cluster	Major Crop	Variety	NAIP intervention	No of HH covered	Area covered (ha)	Average Productivity (kg ha^{-1})	
							Current	Base line yield (2006#)
	Rangareddy	Greengram	WGG-37	Variety replacement and seed production of WGG37	129	197	455	315
	Warangal							
	Kharif	Cotton*	Private Hybrids	Altered spacing	86	120	1183	397
	Kharif	Redgram	PRG-100	Variety replacement	216	168.8	723	349
	Rabi	Cowpea	C-152	Variety replacement	20	70	686	NA
	Rabi	Groundnut	K-6	INM, SSNM	5	10	1644	1445
	Rabi	Maize	Kargil	Zero-tillage	130	82.5	5676	4700

Redgram* = Redgram+Cotton (1:7); Cotton* = Cotton + Redgram (4:1); # District average

Annexure III

Livelihoods provided and additional income generated through different livestock rearing activities in NAIP cluster villages

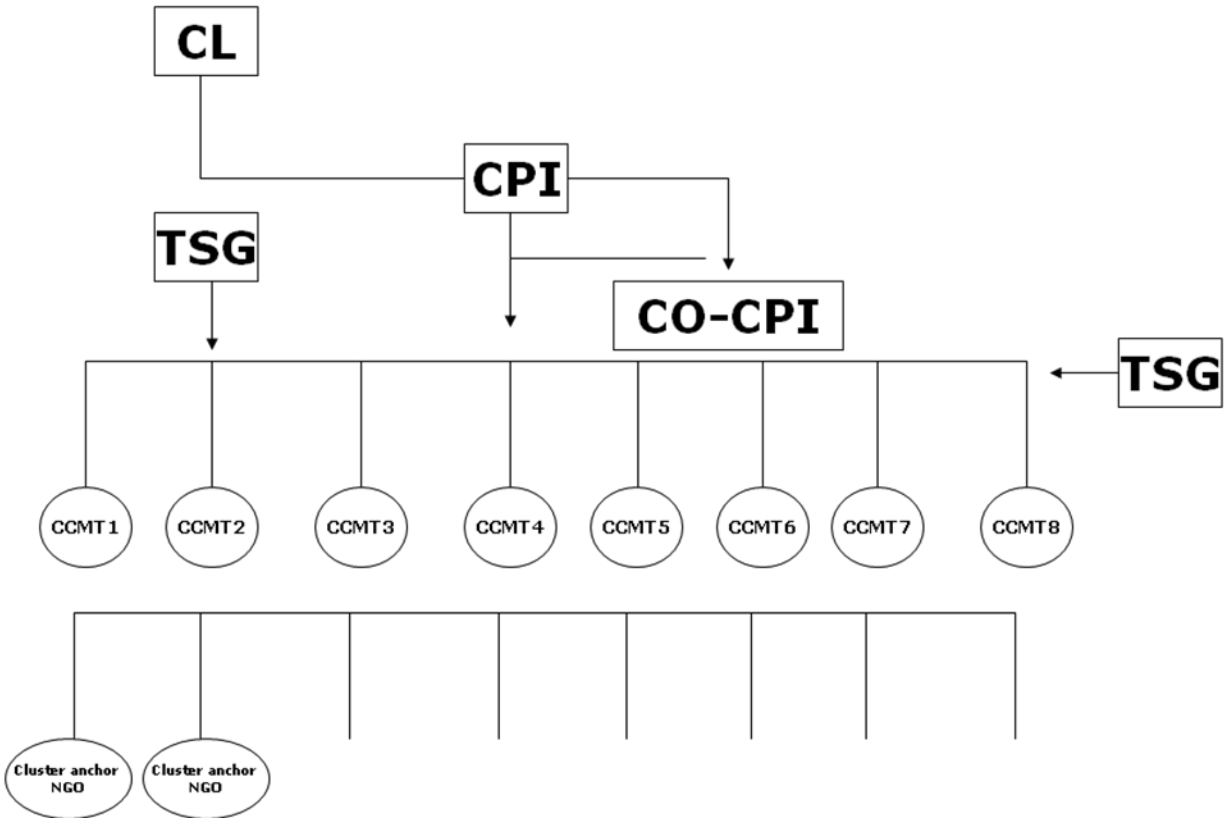
District	No. of livestock & poultry rearing units owned by the farmers with the support of project as subsidiary livelihoods			No of HH covered	Additional income generated (Rs.)
	Milch animals	Small ruminants	Poultry		
Adilabad	-	93	460	75	217080
Anantapur	15	80	-	135	264000
Kadapa	-	30	740	83	133920
Khammam	42	201	110	134	709680
Mahaboobnagar	10	74	-	159	213200
Nalgonda	-	27	1600	114	221400
Ranga Reddy	04	-	-	98	32000
Warangal	15	158	-	181	404400
Total	**86**	**663**	**2910**	**979**	**2195680**

Annexure IV

Cluster	CBOs before project implementation (No)	CBOs after project implementation (No)
Adilabad	25	30
Anantapur	28	42
Kadapa	37	45
Khammam	44	52
Mahaboobnagar	17	40
Nalgonda	40	50
Ranga Reddy	22	42
Warangal	30	32
Total	**243**	**333**

Annexure V

Project Management Framework



Annexure VI

Innovative approach to address livelihoods capitals

SL capital	Broad Issue identified	Intervention undertaken	Innovation employed	Examples
Human	Lack of knowledge & skills for managing resources	Capacity development of individuals and groups	Development and mentoring of local knowledge leaders; application of state-of-the-art ICT tools	Exposure visits to innovative farms; innovative farmers as master trainers; frequent interaction with source of knowledge
Natural	Degrading soils, scant & erratic rainfall leading to frequent droughts	A range of site specific soil and water conservation practices	A process of empowering people to take part in conserving & building natural resources	Renovation and repair of defunct RWH structures; sharing of groundwater
Financial	Lack of capital to adopt new tools and technologies	Promotion of sustainability fund and revolving funds	Empowering communities to manage funds & attract funding; convergence with on-going development programmes	Custom hiring center for agri implements; CIGs for calf & ram lamb rearing, vermicomposting mango marketing etc.
Social	Many defunct CBOs & lack of economic activities within CBOs	Reviving of CBOs through reorganization & mobilization	Encouraging CBOs to take up challenging work aimed at improving community resource base	Repair of minor irrigation tanks through empowerment of Rythu Mithra groups
Physical	Inadequate physical infrastructure to prevent loss or add value to agri produce	Identifying & motivating the communities to build physical infrastructure	Involving community participation by ensuring their contribution in building community assets	Village resource centers buildings on community lands; community drying yards; water drinking points for livestock etc

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