

**Project Proposal (DPR) for funding under
National Adaptation Fund for Climate Change**

**Title of the Project: Climate Resilient Interventions in Dairy Sector in
Coastal and Arid Areas in Andhra Pradesh**



**Submitted by: Department of Animal Husbandry,
Government of Andhra Pradesh, Shantinagar, Hyderabad**

Table of Contents

1.	PROJECT BACKGROUND	3
1.1.	Project / Programme Background and Context	3
1.2.	Project / Programme Objectives	12
1.3.	Details of Project/ Programme Executing Entity	13
1.4.	Project / Programme Components and Financing	19
1.5.	Projected Calendar	23
2.	PROJECT / PROGRAMME JUSTIFICATION.....	24
3.	IMPLEMENTATION ARRANGEMENTS.....	56

List of Tables

Table 1: Comparative Morbidity in Cattle and Buffalo across four Indian States.....	5
Table 2: Thermal Heat Index and level of Stress on Bovine Stock	6
Table 3: Demographic details of Selected Mandals	10
Table 4: Animal Husbandry Department Staff Position	14
Table 5: Three major Climate Change Programmes handled by the Department	15
Table 6: Component wise Details.....	19
Table 7: Milestone wise Project Calendar	23
Table 8: Socio, economic and environmental benefit particulars	42
Table 9: Activity wise national standards and monitoring of the programme	45
Table 10: Responsibilities of Animal Husbandry Department	49
Table 11: Overview of the environmental and social impacts and risks.....	53
Table 12: Year wise bifurcation of district wise target across the project timeline	56
Table 13: Departmental Strengths	56
Table 14: Financial and Project risk management	61
Table 15: Monitoring and Evaluation Plan	65
Table 16: Results Framework	66
Table 17: Detailed Budget	78
Table 18: Time Line.....	85
Table 19: Disbursement schedule	Error! Bookmark not defined.

Project Proposal

for funding under National Adaptation Fund for Climate Change

Title of Project/Programme:

Climate Resilient Interventions in Dairy Sector in Coastal and Arid Areas in Andhra Pradesh

Project/Programme Objective/s:

1. Establishing community based shelters for heat/cyclone resilience
2. Develop business models to sustainably grow and supply fodder
3. Ensure steady incomes of small and marginal farmers by enhancing their bovine stock to at least 5 per household
4. Ensure social safety net for small and marginalized households dependent on climate resilient indigenous cattle breeds within project boundary
5. Create knowledge management and skill development opportunities for managing the cattle sustainably in a heat/cyclone prone future scenario

Project/ Programme Sector:

Agriculture Allied Sector –Livestock

Name of Executing Entity:

- Department of Animal Husbandry, Government of Andhra Pradesh

Beneficiaries:

Five thousand Small and Marginal Farmers and 25 unemployed rural youth (entrepreneurs) of three selected districts of Andhra Pradesh, prone to climate-induced weather extremes.

Project Duration:

Years: Five years

Start Date: 01.06.2016

End Date: 31.05.2021

Amount of Financing Requested (Rs.): 16,26,30,900

Project Locations:

State: **Andhra Pradesh**

Districts: Ananthapur, Nellore and Vizianagaram

Mandals: Pamidi and Dharmavaram (Ananthapur),

Allur and Podalakur (Nellore) and

Gantyda and Badangi (Vizianagaram)

Contact Details of Nodal Officer of the Executing Entity/ies/:

Dr. Somasekhar
Director
Department of Animal Husbandry
Mobile: 09989998048

1. PROJECT BACKGROUND

1.1. Project / Programme Background and Context

a. *Brief information on the problem proposed project/programme is aiming to solve*

Livestock management is a typical weather-dependent livelihood, extremely vulnerable to climate-induced weather extremes like heat stress, drought, cyclones, tropical disease, shortage of fodder etc. Hence, climate change demonstrates a cascading effect on livestock sector, in terms of morbidity & mortality, drastic decline in yield, severe shortage of feed, fodder and water, low economic returns, migration of dependent communities etc.

Climate change is likely to cause a loss of 1.6 million tons in milk production by 2020 and 15 million tons by 2050 from current levels in India. The decline in yield may vary from 10-30% in first lactation, and 5-20% in second and third lactations¹. The decline in milk production will be higher in crossbreds (0.61%) followed by buffaloes (0.5%) and indigenous cattle (0.4%). A rise of 2-6°C due to global warming between 2050s and 2080s is projected to negatively impact growth, puberty and maturity of crossbred animals and buffaloes. Time to attain puberty of crossbred cows and buffaloes will increase by 1-2 weeks due to their higher sensitivity to temperature than indigenous cattle. Increase in temperature and humidity is likely to cause an increase in incidence of animal diseases (bacterial, protozoan and viral) that are spread by insects and vectors. Frequency and incidence of mastitis and foot and mouth diseases affecting crossbred cows and other high milk producers may increase due to increase in the number of stressful days. Increased temperature would enhance lignification of plant tissues, reducing the digestibility. Increased water scarcity would also decrease production of feed and fodder.

In this scenario, it might become unsustainable for small and marginal farmers to manage livestock at individual household level. A study carried out in 2006 in Andhra Pradesh², indicates that small and marginal farmers can gain better milk yields and hence income from their bovine stock if they gain access to more fodder from public land, and their bovine stock joins drought-relief cattle camp to avoid heat stress, and expands herd size to at least 5 well managed indigenous bovine stock. A further rethink on the strategy for sustainably increasing milk yields in the State may be required to avoid the potential risks of relying too much on crossbred cows and Murrah buffaloes, which is the current scenario. Consequently native indigenous cattle such as Ongole from Andhra Pradesh, Gir from Gujarat, Sahiwal from Punjab and Tharparkar from

¹Srivastava, A.K. (2010). Climate Change Impacts on Livestock and Dairy Sector: Issues and Strategies, pp 127-135. Lead Papers. 2010. National Symposium on Climate Change and Rainfed Agriculture, February 18-20, 2010. Indian Society of Dryland Agriculture, Central Research Institute for Dryland Agriculture, Hyderabad, India.

²Garcia Otto, AmitSaha, Khalid Mahmood, AsaahNdambi and TorstenHemme, 2006. Dairy Development Programs in Andhra Pradesh, India: Impacts and Risks for Small-scale Dairy Farms. PPLPI working Paper number 38. Published by FAO under its Pro Poor Livestock Initiative Programme

Rajasthan with higher tolerance to heat stress can be additionally propagated in the State.

The proposed project adopts an integrated and ecosystem-based approach for enhancing the adaptive capacities of small and marginal farmers dependent on dairy in drought and cyclone prone areas of Andhra Pradesh in the light of climate change.

b. Outline of the economic social, development and climate change in line with the State Action plan on Climate Change and relevant Missions under National Action Plan on Climate Change

The objectives of the Project are in conformity with the Andhra Pradesh State Action Plan on Climate Change (AP SAPCC). The project works contribute towards pursuing the objectives of the **AP SAPCC** listed in **Section 5.5.1** under the “**Prioritization of Sectors**”. The project is also in line with the National Mission on Sustainable Agriculture, with a systems approach for integrating livestock management with agriculture, micro-watershed management, renewable energy based chilling technologies for reducing post-harvest losses, enhancing household incomes of dependent smallholder farmers etc.

Livestock rearing is an attractive rural livelihoods option for small and marginal farmers in India. Undivided Andhra Pradesh ranked 3rd in milk production amongst all States in India, and even after its bifurcation, the present Andhra Pradesh is ranked 7th. About 6.74% of the State GDP comes from livestock sector and within livestock sector milk alone supports the livelihood of 36.68% of rural households³. The State government is further looking towards doubling the milk production⁴(by 2019) which is at 6.6 million tons per annum⁵. Of the total bovine in milk, about 68% are buffalo and the rest are cows. The buffalo population is dominated by graded Murrah and the cow population consists of cross breeds and indigenous cattle such as Ongole, Deoni, Hallikar, Punganur and nondescript cattle. Due to sustained technical interventions, the State has been able to achieve on an average, milk yield of 7kg per day from cross breed’s as against 2 kg from Non descript cattle⁶. A comparative analysis indicates that graded Murrah buffalos are the most productive as against the cross bred and ND varieties (see Figure 1).

But interestingly, as demonstrated in Rajasthan state, which stands second in India’s total milk production by contributing about 10% of India’s total milk production, more than 93% of total cow milk yield is from indigenous cows(BWC website), disproving the stereotype notion that indigenous cows always give low yield of milk. Even if the indigenous breeds give less milk-yield, some breeds have potential to be highly

³ Demand Note XXVIII. 2015-16. Animal Husbandry and Fisheries Deptt. Government of Andhra Pradesh.

⁴As per the discussions with the Principle Secretary, department of Animal Husbandry and Fisheries.Gov of AP

⁵(Integrated Sample Survey Report - A.P. - 2008-09 & 2009-10 (P).

⁶GoA, 2010.Integrated Sample survey report on milk yield in Andhra Pradesh.Statistical Wing, Department of Animal Husbandry, Government of Andhra Pradesh.

productive under optimal nutrition and farm management conditions along with selective genetic breeding.

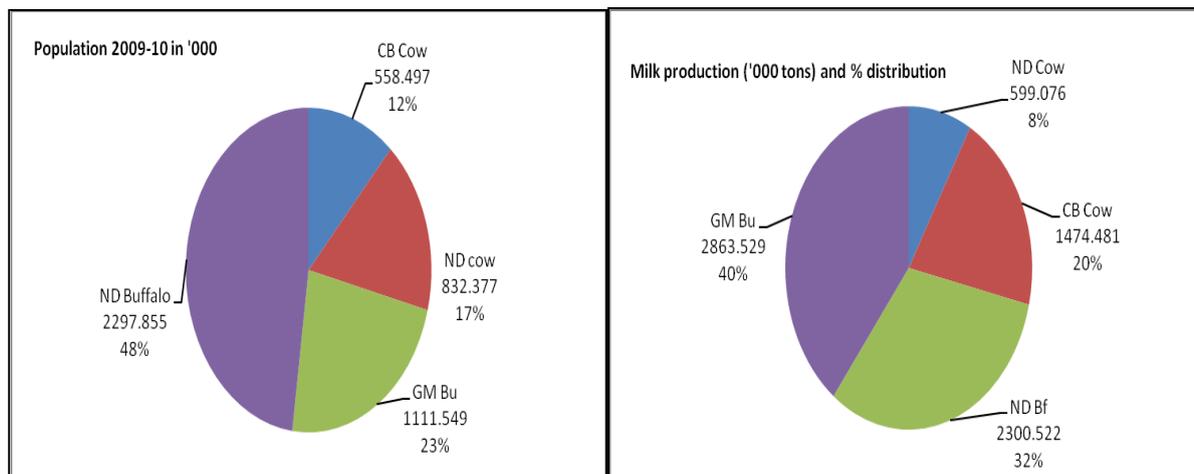


Figure 1: Milk production and distribution across various bovines

	% total Livestock population	% of total milk produced in the State
Crossbred cows(CB) ⁷	12	20
ND Cows	17	8
Graded Murrah (GM Bu) ⁸	23	40
ND buffaloes	48	32

Source: District statistical reports, Government of Andhra Pradesh (2011)

Table 1: Comparative Morbidity in Cattle and Buffalo across four Indian States				
State	Indigenous Cow	Crossbred Cow	Indigenous Buffalo	Graded Murrah
Andhra Pradesh	6%	44%	2.8%	13.5%
Maharashtra	11%	27%	25%	NA
Tamil Nadu	10%	28%	12%	NA
Rajasthan	17.5%	30.8%	21.2%	24%

Source: 100 animal survey (WOTR and Rainfed Livestock Network Study)

A study conducted by WOTR an NGO, in four Indian States, indicates that in Andhra Pradesh, morbidity of crossbreds is the highest followed by that of the graded Murrah, indigenous cows and indigenous buffalos (See Table 1)⁹.

As indigenous bovine breeds are more hardy and robust, they are much less affected by extreme temperature and high humidity conditions. Some of them can potentially

⁷Crossbred: Crossbred in Andhra Pradesh are combination of jersey cows and non-descript/indigenous

⁸Graded Murrahs: Are the pure Murrah variety of buffalos from Haryana which are bred with local buffaloes.

⁹WOTR, 2013.Livestock systems, Vulnerability and Climate Change, pp 23.Published by WOTR in creative comments.ISBN 978-81-86748-37-4.

produce equivalent amounts of milk as crossbreds. Therefore the Indian indigenous livestock breeds (37 breeds of cattle and 13 breeds of buffalo¹⁰) can be harnessed for ensuring sustainable levels of milk production in India. However, an alarming finding by the 19th Livestock Census India, 2012, that the country's population of indigenous cattle fell by 8.94%, compared to 2007 numbers (Table 3.1 of 19th Livestock Census, 2012), prompted the Government of India to launch Rashtriya Gokul Mission to conserve and develop indigenous breeds in a focused and scientific manner. The Government of India (GoI), in its annual budget for the year 2014-15, announced development of climate-resilient indigenous cattle breeds to supplement the income of vulnerable dairy farmers,. An allocation of Rs. 1500 million for 2014-15 has been made for development of indigenous cattle breed. "Rashtriya Gokul Mission" was launched in July 2014, to be implemented on 100% grant-in-aid basis with an amount of Rs 5000 million during the remaining period of 12th Five Year Plan, till 2017.

Rashtriya Gokul Mission is for conservation of germplasm of 18 Indigenous breeds in the country in one location. All the activities will be focused against that activity. This may include increasing the productivity levels, genetic engineering, ET technology etc.

There is no duplication of interventions (if any) in the activities or fund utilization with the given project with existing projects/ programmes because, the project sanctioned to AP state under RGM in 2014-15 was for establishment of National Kamadenu Breeding Centre (NKBC) in Chintaldevi farm Nellore District with an outlay of Rs25.00 Crores.

But the proposed project demonstrates advantages of indigenous cows over crossbreds and exotic cows from climate change perspective thus proving the Rashtriya Gokul Mission as part of a number of steps being taken in Adaptation to climate change, in Agriculture and its allied sectors. The activity is focused on spread of best quality Indigenous animals in specified locations for their proven climate-resilience when compared to the crossbreds. This project demonstrates how indigenous cows would contribute to improvement in the livelihoods on one hand and to climate-resilience co-benefits by means of their Adaptation and Mitigation value, on the other.

c. Climate analysis and Vulnerability analysis

Earnings of the farmers dependent primarily on animal husbandry becomes vulnerable when heat stress conditions prevail. Heat stress is measured as Thermal Heat Index (THI) which is a function of temperature and relative humidity. THI greater than 72 causes discomfort to the animals (see Table 2). Higher the THI, higher is the stress level and lower is the productivity of animals.

Table 2: Thermal Heat Index and level of Stress on Bovine Stock	
THI	Stress level on Bovine Stock
<72	Comfort zone

¹⁰National Kamdhenu breeding Centre.

<http://dahd.nic.in/dahd/WriteReadData/National%20Kamdhenu%20Breeding%20Centre.pdf>

72-78	Mild stress
79-88	Moderate stress
89-98	Severe Stress
>98	Mortality Occurs
Source: DAHDF, Ministry of Agriculture, Government of India	

Numerous literature, have corroborated that there is a decline in fertility of bovine stock during heat stress conditions leading to a decrease in lactation length thus impacting milk ^{11,12,13}production. These impacts are more pronounced in bovine stock with high genetic merit³. A recent experiment conducted on high yielding variety of cross breeds and indigenous varieties in India, indicates that the milk yields reduce by 40-44% as the THI¹⁴ increases beyond 72¹⁵. The productivity of indigenous cows like Sahiwal also show a decline due to increase in temperature and relative humidity¹⁶. Indigenous buffalos also are impacted due to heat stress. A study carried out by Upadhyay et al (2007)¹⁷, on Murrah Buffalo indicates that there is a decline in milk production by 20% when THI increases from 72 to 85. High air temperatures even affect goats, reducing their milk yield. The problem is compounded by recurrent drought conditions, leading to perpetual shortage of fodder by 11-40%¹⁸, decreasing grasslands and shortage of potable water across Indian States. Despite such evidences, farmers in different parts of India are rearing cross bred cows that are resource intensive.

Fodder derived from rice (dry fodder) and maize (dry and green) crops, both of which are likely have a decline in productivity with increasing temperature by 8-35%. However, sorghum another fodder crop, show a marginal increase with respect to the current production levels¹⁹.

¹¹Indias 2nd National Communication to UNFCCC, 2011.MoEF, Government of India.

¹²Smita Sirohi & Axel Michaelowa, 2007. Sufferer and cause: Indian livestock and climate change, *Climatic Change* (2007) 85:285–298 DOI 10.1007/s10584-007-9241-8

¹³Beede .D.K and R.J.Collier, 1986. Potential management strategies for intensive managed cattle during thermal stress

¹⁵Kohli, Atheya and Thapliyal, 2014. Assessment of optimum thermal humidity index for crossbred dairy cows in Dehradun district, Uttarakhand, India *Veterinary World*, EISSN: 2231-0916.

Available at www.veterinaryworld.org/Vol.7/November-2014/3.pdf

¹⁶Mandal DK, Rao AVMS, Singh K, Singh S P, 2002. Comfortable macroclimatic conditions for optimum milk production in Sahiwal cows. *J Appl Zool Res* 13(2/3):228–230

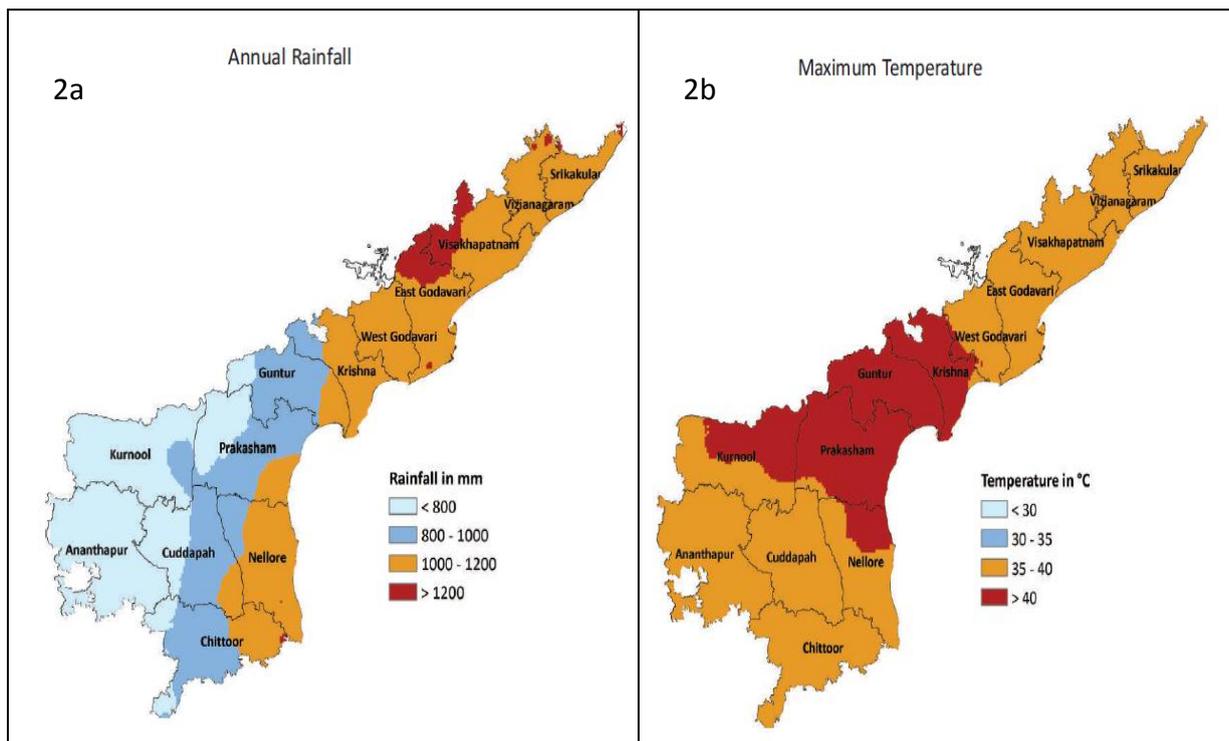
¹⁷R.C. Upadhyay, S.V. Singh, A. Kumar, S.K. Gupta, Ashutosh, 2007. Impact of Climate change on Milk production of Murrah buffaloes. *Ital.J.Anim.Sci.* vol. 6, (Suppl. 2), pp1329-1332.

¹⁸Planning Commission, 2012. Report of the working group on animal husbandry and dairying, 12th five year plan (2012-17), Government of India.

¹⁹Venkateswarlu B and V. U. M. Rao, Climate Change and its impact on Indian Agriculture. Chapter 15 in the book

In Andhra Pradesh, annual rainfall ranges from a minimum of <800 mm in the Rayalaseema region to >1200 mm in the Coastal areas (See Figure 2a.). The State receives rainfall in the form of southwest and northeast monsoon. As a result the rainy season extends from June to Dec, with maximum rainfall happening in the month of October. The October- November months are also the period when cyclones strike the Andhra coast, and Nellore is the district where maximum cyclones have hit so far. The average maximum temperature prevails around 30-35°C, and in central Andhra it exceeds 40°C. The average maximum relative humidity in the mornings exceeds 75% in the northern districts including Vizianagaram and remains around 70-75% in central, and in the coastal regions of southern Andhra Pradesh including Nellore and in the western parts of Ananthapur and Kurnool. The entire southern Andhra Pradesh, including the coastal and landlocked areas are drought prone (See Figure 2e) and fodder is scarcely grown in most parts of Andhra Pradesh.

A vulnerability ranking of the districts have been made using the parameters shown in Figure 2, that are essential for sustainability of livestock, namely, temperature, rainfall, humidity, drought frequency, drought proneness, area under fodder cultivation, land holding of small and marginal farmers. The weighted numbers of each parameter for the different districts have been estimated, added up separately for each district and then averaged. Our analysis indicates that for rearing of bovine stock, Ananthapur is the most vulnerable (score 1), and the least is Krishna district – score 0.74 (see Table 4). This is also in sync with the agriculture vulnerability estimates done by Central Research Institute for Dry Land Agriculture (CRIDA²⁰).



²⁰Rama Rao CA, BM K Raju, AVM SubbaRao, KV Rao, VUM Rao, Kaushalya Ramachandran, B Venkateswarlu, AK Sikka, 2013. Atlas on Vulnerability of Indian Agriculture to climate change. Published by CRIDA as a part of NICRA, ICAR, MoA

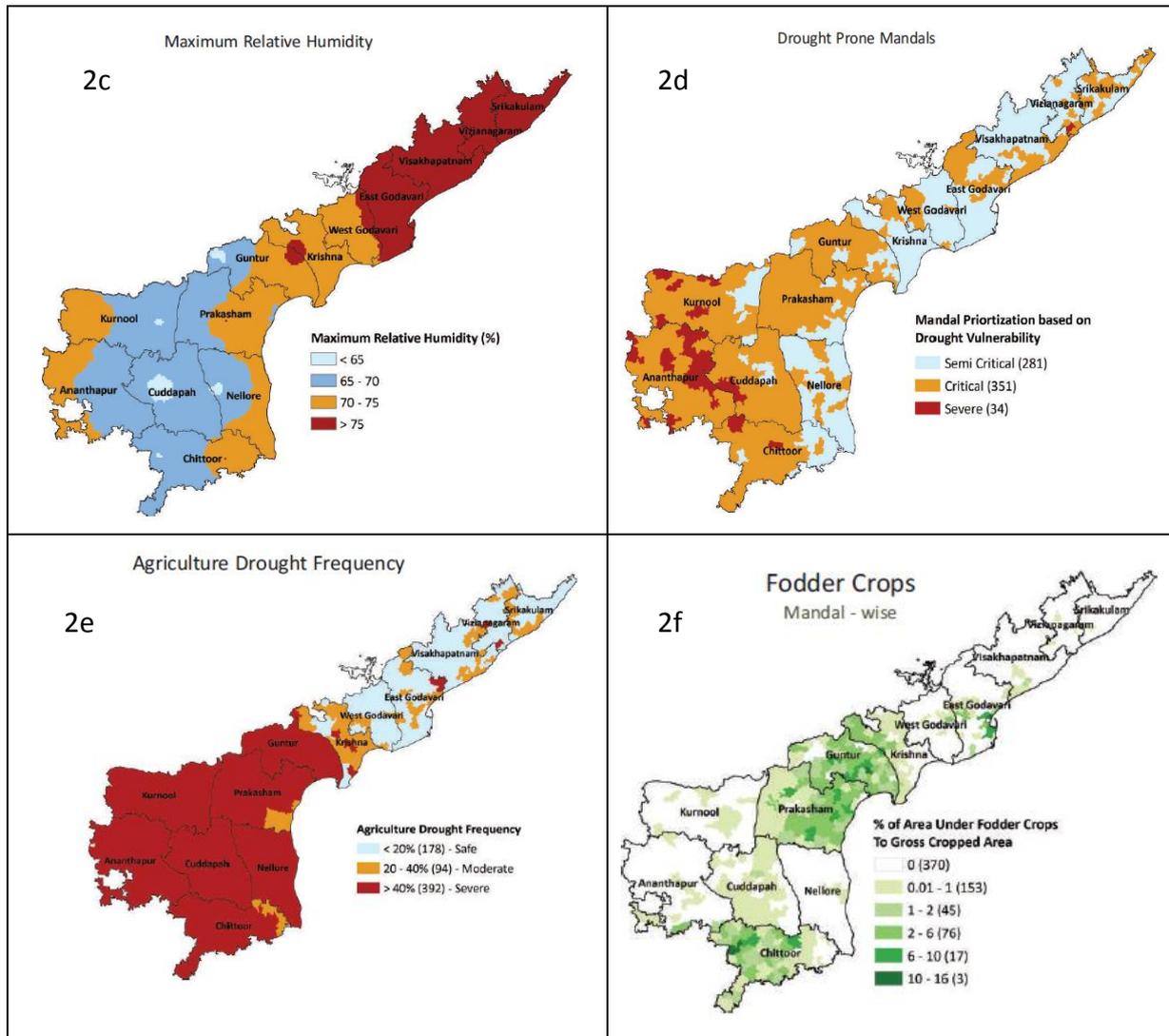


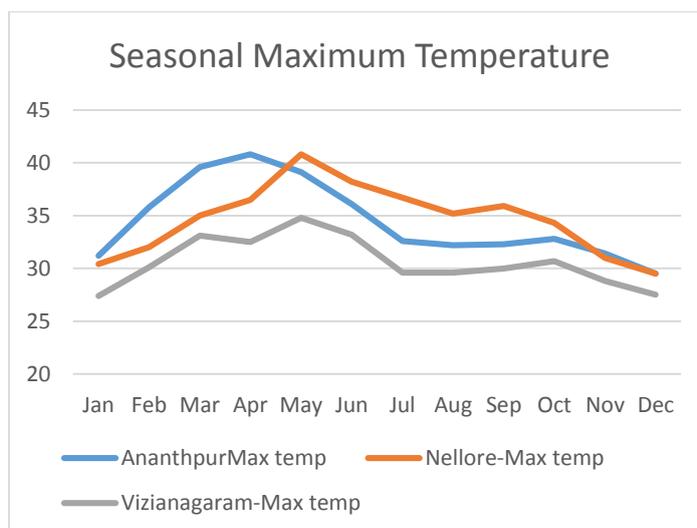
Figure 2 (a,b,c,d,e): A comparative picture of spatial spread of parameters which drive livestock health in AP

d. Project Location details – villages, block/ mandal, district

The project will be implemented in six mandals namely, Pamidi, Dharmavaram, Allur, Podalkur, Gantyada and Badangi located in the Ananthapur, Nellore and Vizianagaram districts. The locations are selected using the vulnerability assessment score being developed by Central Research Institute of Dry Land Agriculture (CRIDA) and in consultation with the Animal Husbandry Department of the State. The population and other demographic details of these mandals are given in below (Table 3).

The vulnerability of select districts, in terms of rainfall pattern is as given below:

- i. Ananthapur, the most vulnerable district,
- ii. Vizianagaram, a moderately vulnerable district and
- iii. Nellore, one of the least vulnerable district



Source: Data from district statistical reports GoAP (2011)

Figure 3: Graph representing seasonal maximum temperature

e. Demographic details of the population – total population (for area in operation), sex- disintegrated data, small and marginal, etc.

Table 3: Demographic details of Selected Mandals						
	Pamidi	Dharmavaram	Allur	Podalakur	Gantyda	Badangi
Villages						
In habited	22	13	14	36	44	27
Uninhabited	0	1	1	0	1	2
Total	22	14	15	36	45	29
Population						
Male	39957	75265	26630	31654	65579	49348
Female	38142	71911	26360	31088	32696	24881
Total	78099	147176	52990	62742	32883	24503
SC	6384	10598	13570	12401	1760	6577
ST	2746	4644	9615	737	2238	7581
Literacy Rate	66	70	61	61	56.99	53.99
Land holding						
Marginal Farmers (<2.47 acres)	3582	5066	8811	6348	15072	9153
Small farmers (2.47-4.93 acres)	2807	4446	1918	3811	1982	2203
Semi medium farmers (4.94-9.87 acres)	1946	3303	707	1994	1145	542

Medium farmers (9.88 – 24.7 acres)	781	1017	202	825	347	139
Large farmers (>24.7 acres)	89	127	11	116	16	110
Total	9205	13959	11649	13094	18562	12041
Livestock						
Female Cattle- nos.	2971	7903	1055	1655	5881	5736
Female Buffaloes- nos.	2764	15328	9714	14666	4231	1268
Veterinary institutions-nos.	4	2	4	9	9	5
Source: District Statistical books (Anantapur, Nellore, Vizianagaram)						

Pamidi mandal

Pamidi mandal belongs to Ananthapur division of Ananthapur district is located. The mandal has 10,302 households with a population of 78099 comprising 39957 male and 38142 female. Marginal farmers contribute 39%, followed by Small farmers (30%), Semi medium (21%), Medium (8%) and large less than 1%. More than 70% are into livestock keeping and on an average every household keeps one bovine produce milk and sell in local markets. Agriculture is main occupation of the village among crops sorghum and rice are the principal food crops and groundnut is the main oil seed crop. During last three years the mandal has been receiving more than more than the normal rainfall of 344 mm.

Dharmavaram

This mandal is located in Dharmavaram division of Ananthapur district. This division is popular for silk weaving industry and sarees produced from this place are exported to all over the world. The mandal has 14 villages with one being uninhabited. The mandal has 32,186 households with a population of 1,47,176 including 75,265 male and 71,911 female. About 36% farmers are classified as marginal, 31% small, 23% semi medium , 7% medium and less than 1% large farmers. Against a normal rainfall of 607 mm it has been receiving about 500 mm except in 2007- 08 where it was 702 mm. Groundnut is the main crop among commercial crops and within food crop rice is very important. The mandal has 15328 female buffaloes and 7903 white cattle producing about 40000 litres of milk every day. Dharmavaram is the main milk market.

Allur

The mandal is located 6 kms from the Bay of Bengal and in Kavali division of Nellore district. The mandal has 15 villages of which one is uninhabited. Water salinity is the major problem of the mandal and due to lack of potable water farmers purchase water for their daily consumption needs. The mandal has 13573 households with a population of 52,990 comprising 26630 male and 26360 female About 75% farmers are classified as marginal, 16% small, 6% semi medium , 1.7% medium and less than 1% large farmers. Against a normal rainfall of 1133.7 mm it has been receiving deficit rain excepting in 2010 where it was 1237 mm. Rice is the major crop grown in both the seasons. The mandal has 9714 female buffaloes and 9714 white cattle producing

about 50000 litres of milk every day. Nellore is the nearest market and milk to this market is supplied through milk collection centers. The major constraint observed in the mandal is increase in mosquito population and high disease incidence like FMD.

Podalakur

The mandal is located in Nellore division which is a dry land area with very low irrigation facilities. Against a normal rainfall of 1046.6 mm it has been receiving deficit rain excepting in 2010 where it was 1308 mm. Rice is the major crop grown in both the seasons. The mandal has 36 villages and all of them are inhabited in some villages farmers started to move out from rice to non food crops causing fodder deficiency to cattle. In many villages mineral deficiency is observed which is impacting the livestock productivity. The mandal has 15066 households having a population of 62,742 including 31654 male and 31088 female About 48% farmers are classified as marginal, 29% small, 15% semi medium, 6% medium and less than 1% large farmers. The mandal has 9714 female buffaloes and 9714 white cattle producing about 50000 litres of milk every day. Nellore is the nearest market and milk to this market is supplied through milk collection centers.

Gantyda

The mandal is located in Vizianagaram division in Vizianagaram district which is a dry land area with very low irrigation facilities. Against a normal rainfall of 1220 mm it has been receiving excess rain for last three years. Rice, sugarcane and black gram are the major crop grown in both the seasons. The mandal has 45 villages and all of them are inhabited. The mandal has 17,255 households having a population of 65,579 including 32,696 male and 32,883 female About 81% farmers are classified as marginal, 10 % small, 6% semi medium, 2% medium and less than 1% large farmers. The mandal has 5881 female buffaloes and 4231 white cattle producing about 32000 liters of milk every day. Visakhapatnam is the nearest market and milk to this market is supplied through milk collection centers.

Badangi

The mandal is located in Parvathipuram division in Vizianagaram district which is a tribal area dry. Against a normal rainfall of 1268 mm it has been receiving excess for last three years. Rice is the major crop grown in both the seasons. The mandal has 29 villages of which two are un-inhabited. The mandal has 12,225 households having a population of 49,348 including 24881 male and 24503 female About 76% farmers are classified as marginal, 18 % small, 5% semi medium, 2% medium and less than 1% large farmers. The mandal has 5736 female buffaloes and 1268 white cattle producing about 32000 liters of milk every day. Visakhapatnam is the nearest market and milk to this market is supplied through milk collection centers.

1.2. Project / Programme Objectives

1. Establishing community based shelters for heat/cyclone resilience
 - a. Build sheds for at least 200 bovine stock belonging to small and marginal farmers.
 - b. Create green cover around cattle hostel
 - c. Provision for rain water harvesting/ponds for ensuring adequate water availability
 - d. Introduce innovative renewable energy based chilling technologies for reducing post-harvest losses

- e. Collection of Urine from cattle hostels, along with the slurry from biogas by Farmer Interest Groups for agricultural manure purpose in entrepreneurship model
2. Develop business models to sustainably grow and supply fodder
 - a. Use existing community tank beds that retain moisture in dry periods and private lands (on lease) for production of climate resilient fodder
 - b. Promote production and marketing of crop residue bales
 - c. Establish fodder banks
3. Ensure steady incomes of small and marginal farmers by enhancing their bovine stock to at least 5 per household
 - a. Enable capacities of Farmer Interest Groups (FIGs) to choose small and marginal households that agree to artificial insemination of at least one from their bovine stock which is either indigenous cow, non-descript cow, crossbred cow with 100% Sahiwal/Gir /Ongole²¹
 - b. Procure and distribute Sahiwal/Ongole/Gir heifers amongst small and marginal farmers on a cost sharing basis between farmer and project.
 - c. Establish indigenous cattle milk collection centers and link to niche market
4. Ensure social safety net for small and marginalized households dependent on climate resilient indigenous cattle breeds within project boundary
 - a. All heifers procured in this project are protected from mortality
 - b. All animals admitted in hostels are protected from mortality
 - c. All cattle chosen for artificial insemination and surviving progeny within project are protected from mortality
 - d. Improving the service delivery system by creating/strengthening field level veterinary institutions to tackle climate-induced weather extremes like heat stress conditions
5. Create knowledge management and skill development opportunities for managing the cattle sustainably with heat/cyclone resilience
 - a. Document the best practices of managing cattle in hotels for dissemination
 - b. Document best practices for promoting indigenous cattle varieties in AP
 - c. Awareness raising amongst department and amongst farmers on climate change impacts on animal husbandry and dairy
 - d. Awareness raising among department officials and farmers on benefits of rearing indigenous graded cattle vs. crossbreds/exotic breeds.

1.3. Details of Project/ Programme Executing Entity

- 1.3.1. Name, Registration No. & Date, Registered Address, Project Office Address
 - **Department of Animal Husbandry**

²¹All indigenous varieties are included here as artificial insemination between pure breed indigenous varieties and other cattle will be carried out subject to the availability of these varieties

Directorate of Animal Husbandry,
Shanthi Nagar,
Masab Tank,
Hyderabad-45,
Ph Nos:040-23391335/23316855,
Fax:040-23313431

1.3.2. Available technical manpower for the proposed project implementation

- Department of Animal Husbandry**

Available manpower for the proposed project implementation:

Table 4: Animal Husbandry Department Staff Position		
S.no	Name of the cadre	No.
1	Head of the Department	1
2	Additional Directors	2
3	Joint Directors	13
4	Deputy Directors	34
5	Assistant Directors	314
6	Veterinary Assistant surgeons	1526
7	Veterinary Livestock Officers	298
8	Junior Veterinary Officers	595
9	Livestock Assistants	927
10	Veterinary Assistants	1261

1.3.3. Three largest Climate Change Adaptation Projects handled (if already implemented)

- Department of Animal Husbandry

Table 5: Three major Climate Change Programmes handled by the Animal Husbandry Department, A.P.				
Project	Objectives	Amount Sanctioned	Funding Agency	Geographical Coverage
Hud-hud Cyclone	To prevent animal loses during cyclone. To provide compensative to the livestock loses	41.60 crores	Government of Andhra Pradesh	<ul style="list-style-type: none"> ▪ Vishakapatnam ▪ Srikakulam ▪ Vizianagaram ▪ East Godavari
Drought	To prevent animals from starving, to prevent distress sale of animals, to provide feed & fodder to the livestock.	30.00 crores	Government of Andhra Pradesh	Anantapur, Chittoor, Kadapa, Prakasam, Guntur, Nellore & Kurnool

1.3.4. Three largest community based NRM based projects handled

- Department of Animal Husbandry

1. Accelerated Fodder Development programme
2. Additional Fodder Development programme
3. Centrally sponsored Fodder & Feed development programme

- 1.3.5. Availability of suitable infrastructure for implementation proposed projects (vehicles, computers, required software/ tools, etc.)

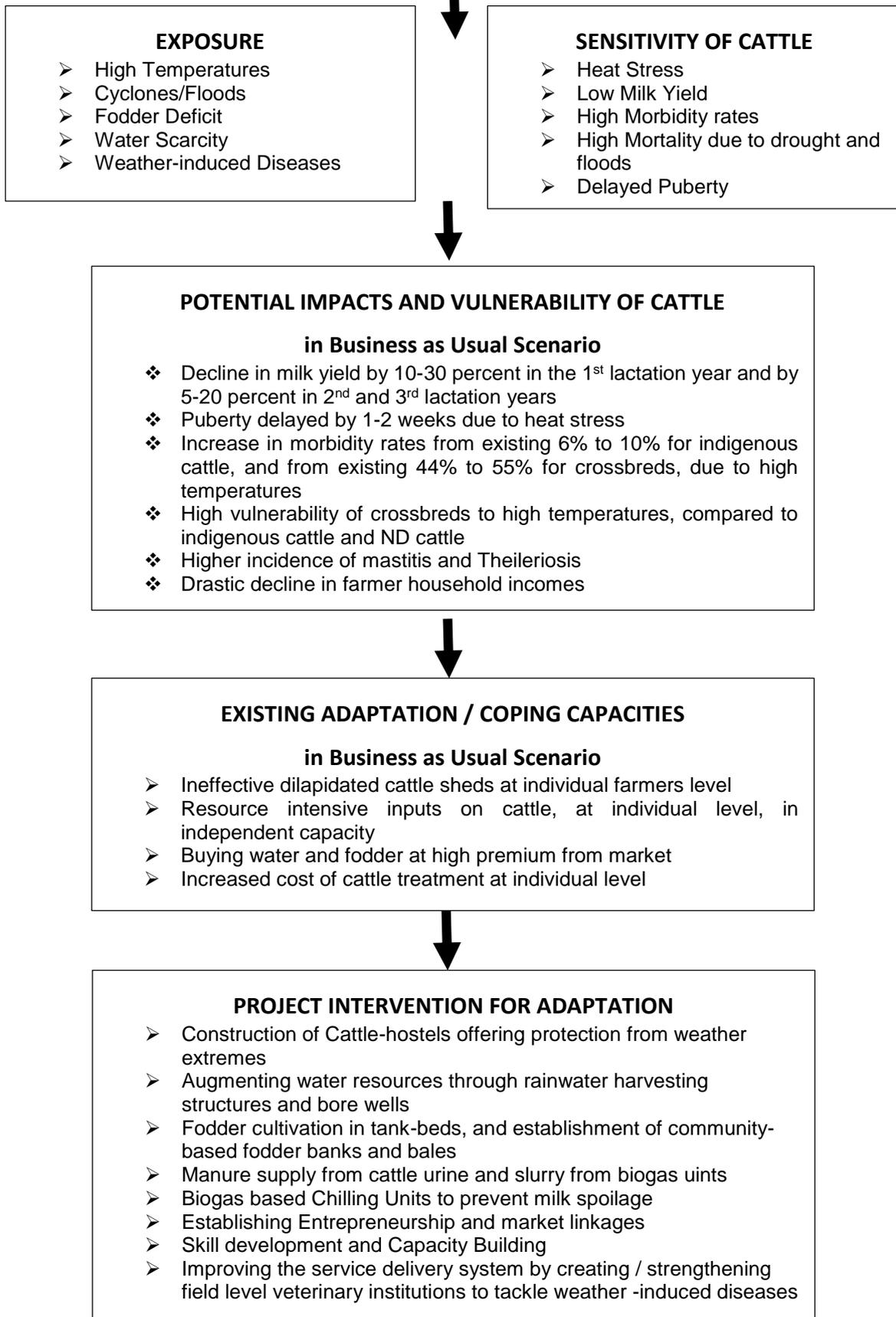
Department of Animal Husbandry:

1. District Training Centres with LCD Projectors and accommodation facilities.
2. Infrastructure for Artificial Insemination (AI) processes
3. Jeeps at district and division level
3. Computers and Internet facilities at district and division level

- 1.3.6. Whether Executing Entity (EE) was blacklisted, barred from implementation of projects, faced any charges / legal cases related to mismanagement of project and funds. (please list any such incidences and reasons):

- **Department of Animal Husbandry: No**

Vulnerability Matrix



1.4. Project / Programme Components and Financing

Table 6: Component wise Details			
Project/Programme Components	Expected Outputs	Expected Outcomes	Amount (Rs)
1. Managing heat stress and Cyclones	Six hostels built. Two hostels in each of the 3 districts built with surrounding green cover	1.1. Enhanced and assured milk production with respect to heat stressed and cyclone conditions	3,19,93,000
	Underground storage tanks created for harvesting roof top water and also ponds dug to store rain water as complementary intervention in area surrounding the shed	1.2 Adequate and potable quality water facility provided for 365 days	
	-Six biogas units established -Six milk chilling units established powered by biogas	1.3 Milk spoil reduced with respect to base line conditions	
	-Value chain studied -Facility created for Collection of urine from cattle hostels, along with slurry from biogas units by Farmer Interest Groups for marketing manure in entrepreneurship model -Market link established	1.4 Additional income for farmers participating in the hostel model	
	MIS system operationalised with -Six automatic weather stations installed, one each in each of the hostels recording daily data on max temp, min temp, average temp, early warning of cyclones, rainfall, and humidity -Data on type and quantity of feed, milk production, breeding parameters, lactation length, disease prevalence, any other also recorded daily	1.5 MIS system on livestock parameters and climate built to optimise livestock management system	
2. Develop business models to	Established fodder production facilities	2.1 Existing tank beds and private land	3,75,65,000

Table 6: Component wise Details

Project/Programme Components	Expected Outputs	Expected Outcomes	Amount (Rs)
sustainably grow and supply fodder for the animal hostel and in areas where there is an identified fodder deficiency in selected districts		leased and developed as fodder production centers of varieties that are heat tolerant and water stress resistant	
	Production and marketing of crop residue bales established	2.2 Entrepreneurs start producing crop residue bales	
	Establish community based fodder banks by harvesting and storing locally available crop residue	2.3 Dry Fodder available for use during deficit period from any source	
3. Ensure steady incomes of small and marginal farmers by enhancing their bovine stock to at least 5 per household	<ul style="list-style-type: none"> -Pure indigenous variety (Sahiwal/Ongole) chosen for artificial insemination -Small and marginal households identified which are ready to give one of its Non-Descript (ND)/crossbred/indigenous stock for insemination with 100% indigenous Sahiwal/ongole -Semen of Sahiwal/Ongole procured -Artificial insemination undertaken of at least 3000 cattle, 1000 each in the 3 districts chosen. 	<p>3.1 Self Help Groups and FIGs strengthened to</p> <ul style="list-style-type: none"> - chose small and marginal households for interventions, - chose indigenous variety suitable and available for undertaking artificially inseminating bovine stock existing with farmer households - undertake artificial insemination 	8,90,80,000
	2500 families (800 each in 3 of the identified districts) have one each of Sahiwal/Ongole through cost sharing amongst farmer, and project at 40% and 60% respectively	3.2 Indigenous pure strained heifer cattle procured one per family for small and marginal farmers	
	<ul style="list-style-type: none"> -FIGs establish farm producer companies in each village -Establish one milk collection centre at each village -Identify market and sell milk 	3.3 Indigenous cattle milk collection centers and link to niche market established	

Table 6: Component wise Details

Project/Programme Components	Expected Outputs	Expected Outcomes	Amount (Rs)
4. Ensure safety net for small and marginalized households dependent on climate resilient indigenous cattle breeds within project boundary	All heifers procured in this project are protected from mortality	4.1 Risk of loss of income due to mortality amongst heifers averted	2,83,13,000
	All bovine stock admitted in hostels are protected from mortality	4.2 Risk of loss of income due to mortality amongst bovine stock admitted in hostels averted	
	All cattle chosen for artificial insemination and surviving progeny within project are protected from mortality	4.3 Risk of loss of income due to mortality amongst artificially inseminated progeny and mother averted	
	Improving the service delivery system by creating/strengthening field level veterinary institutions to tackle climate-induced weather extremes like heat stress conditions	4.4 Risk of income due to loss in milk yield due to heat stress averted	
5. Create knowledge management and skill development opportunities for managing the cattle sustainably in a heat stress and cyclone prone future scenario	Workshops held, one each in each district of AP and manual on design of heat resistant cattle sheds and best practices for managing bovine designed and distributed and put up on animal husbandry website	5.1 Best practices for managing cattle in hostels documented and distributed to all districts amongst milk related FIGs and policy makers	1,77,45,000

Table 6: Component wise Details

Project/Programme Components	Expected Outputs	Expected Outcomes	Amount (Rs)
	Workshops held, one each in each district of AP and document on best practices and benefits of raising indigenous cattle varieties designed and distributed amongst farmer FIGs and policy makers and put up on animal husbandry website	5.2 Eagerness of farmers to increase indigenous cattle breed in their livestock mix to avoid milk yield reduction due to heat stress generated	
	About 1000 officials trained-together at district and State level	5.3 Officials of the animal husbandry, dairy development department and veterinary personnel trained on best practices for planning for dairy development in the State and managing livestock health in heat stress conditions	
6. M&E Cost			13,50,000
7. Project/Programme Execution Cost			20,60,45,000
8. Programme Execution cost for Animal Husbandry Department, AP			2,06,04,500
9. Project/Programme Cycle Management Fee charged by the Implementing Entity			61,81,400
10. Project Formulation cost- to be paid to Consulting agency			10,00,000
11. Total Project cost			23,38,30,900
12. Farmer Contribution			4,15,00,000
13. Department Contribution			2,97,00,000

Table 6: Component wise Details			
Project/Programme Components	Expected Outputs	Expected Outcomes	Amount (Rs)
14. Amount of Finance Requested			16,26,30,900

1.5. Projected Calendar

The following are the milestones for the proposed project/programme (projects which have four or more than four years of implementation period would require to have mid-term review after two years of implementation).

Table 7: Milestone wise Project Calendar	
Milestones	Expected Dates
Start of Project/Programme Implementation	01.06.2016
Mid-term Review	01.11.2018
Project/Programme Closing	31.05.2021
Terminal Evaluation	01.11.2021

2. PROJECT / PROGRAMME JUSTIFICATION

a. Component wise details

i **Business as usual**

Milk production is an important livelihood activity of more than 70% farmers in these mandals. Farmers from villages keep animals in sheds which are not designed to protect animals from high temperatures and humidity leading to development of high (Picture 1 below) Thermal Heat Index (THI) in excess of 85²² causing reduction in milk yield. In cyclone prone regions, animal mortality is very high for want of protective shelters. In addition, due to lack of knowledge on heat/cyclone resistant sheds and finances for constructing such sheds farmers mostly keep their animals either in open place and bring them into the house or construct low cost, poor quality sheds.



Picture 1: Conventional sheds of small holders in Andhra Pradesh

²²Average temperatures in centigrade for the year 2012

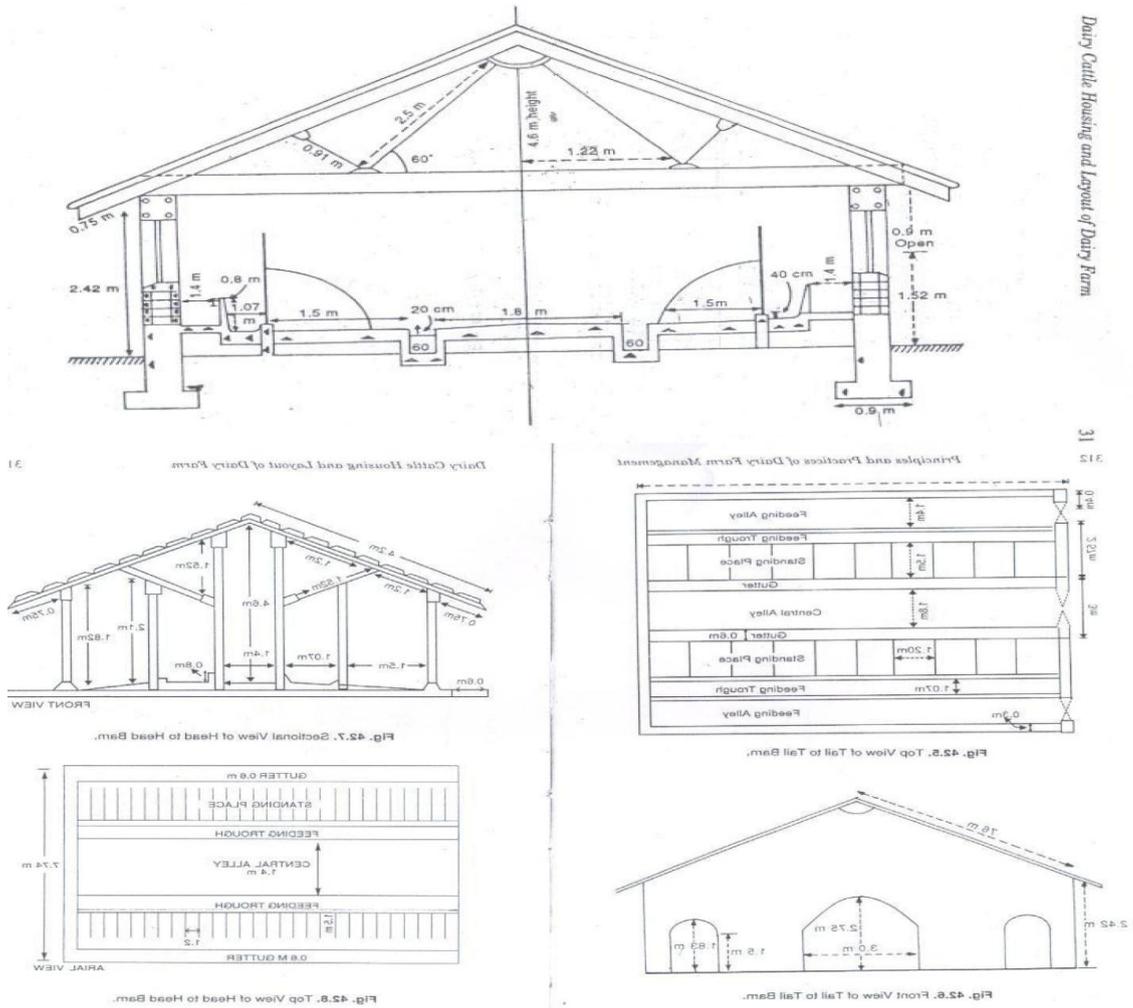
Fodder production is critical factor in the animal management. The production is declining because farmers are unable to feed quality fodder across all seasons. The fodder production is affected due to recurring droughts, incidence of cyclones and farmers preferring food crops. Small and marginal farmers not able to feed cattle are selling away to butchers.

Crossbreeding program in the districts is implemented by the department. District wise crossbred population is 12% Ananthapur, 16% Nellore and 23% in Vizianagaram. In addition to crossbreds the department is upgrading local buffaloes as graded murrhah. Artificial insemination is mostly adopted technology in the breeding programme. Increased temperature and humidity causing decline in yields of high genetic merit animals although they perform better than nondescript cattle. Government of ²³India reported that due to crossbreeding few native species are disappearing such loss and increased exotic blood level narrows the scope to respond to changes in the environment, disease challenges, or demand patterns. The most concern of Government of India is to address the loss of locally adapted popular breeds. Despite proven resilience of indigenous cattle to high temperatures and their adaptability to locally grown low quality fodder, farmers are rearing cross bred cows that are not only resource intensive, but contribute to GHG emissions on one hand and highly vulnerable to tropical diseases and weather extremes on the other.

ii **Specific adaptation strategies**

Adaptation strategies proposed in the project are:

Establishing heat/cyclone resilient cattle sheds in mandal locations with all support services. (About 200 farmers having good quality cows and buffaloes are organized into group and keep their animals under one shed specially designed to withstand heat stress and cyclones. Quality livestock services will be provided to animals through qualified veterinarian. The performance of animals will be monitored regularly by the entrepreneur who is identified jointly by the project and farmer group). The sketch of the cattle shed design is given below



31

31

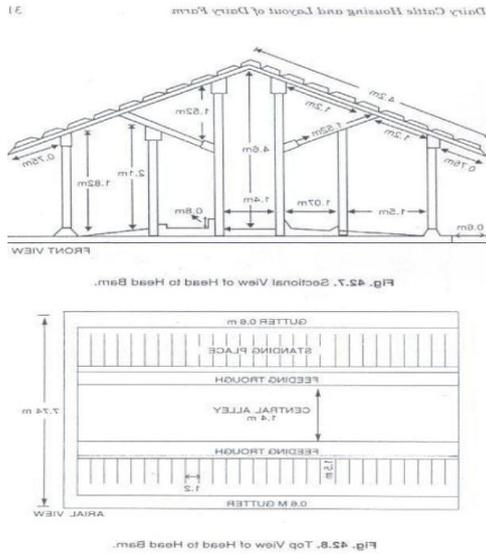


Fig. 42.8. Top View of Head to Head Bar.

Fig. 42.7. Sectional View of Head to Head Bar.

Fig. 42.5. Top View of Tail to Tail Bar.

Fig. 42.6. Front View of Tail to Tail Bar.

The GoAP in order to address fodder issues has been supplying dry fodder by procuring from far off places where it is available. Since, such transportation of fodder leads to GHG emissions from fossil fuel burning, it is proposed to convert dry fodder into bales and transport them so that fossil fuel burning will be reduced. The project intends to popularize ongoing government fodder production on tank beds with improvements and community participation. Fodder when available will be harvested and stored in fodder banks for using during crisis.

Conserving indigenous breeds and their promotion will be taken up in project locations. The strategy is to inseminate non-descript cattle with pure indigenous animals. Since sufficient semen stock may not be available, the department will procure semen from north Indian states.

Enhancing knowledge of farmers and officers of the department on climate change, its impacts on livestock and how to adapt to these changes will be taken up in the project. Component wise adaptation strategies proposed in the project is explained in the below section.

iii Justification for funding with regards to components as on the concrete adaptation activities of the project, and how these activities contribute to climate resilience

Enhanced adaptive capacities of livestock farmers are needed in the project villages. While identifying beneficiaries from local communities, selection criteria would ensure active involvement of at least 80% of beneficiaries amongst landless/marginal farmers, women headed households, schedule caste and schedule tribe households etc. The establishment of shelters will play a vital role in improving health of livestock and contribute to increased milk production by reducing vulnerability to heat stress resulting in increased incomes. The indigenous cattle breed conservation will lead to their popularization due to their higher adaptive capacities over high genetic merit animals. Although fodder shortage has been talked over years so far concrete solution could not be developed. Many farmers unable to manage bovines on account of fodder shortage are moving out from the livestock sector. Through this project we can develop sustainable solutions for addressing fodder issues. The component-wise comparison of baseline situation with the project scenario is presented below:

Component 1: Establishing community based best practices for managing heat stress and impacts of cyclones on dairy animal

From field survey it was evident that most of the farmers keep animals under bad conditions. Small and marginal farmers having no investment capacity keep animals outside during day time bring them inside during summer. The quality of sheds is much below the prescribed standards i.e. lack of ventilation, lack of sufficient space and very unhygienic flooring resulting in poor health of the animals and almost all sheds are not well designed to address heat stress.

Adaptation Alternative: Under the component 1 we attempt to provide conducive environment to animals so that in all seasons animal will be comfortable in a well-designed shed .In each shed about 200 animals will be kept and all the animal owners will be organized into groups. By organizing farmers into group, collecting milk jointly and marketing chilled milk will increase milk price. In addition, the dung and urine produced out of the animals is more efficiently used. Cattle dung will be fed into biogas plants. Urine collected from cattle hostels, along with the slurry from biogas units will be marketed as agricultural manure in entrepreneurship model by Farmer Interest Groups. The power generated from biogas will be used for chilling the milk.

Output 1.1 Two hostels in each of the 3 districts established

Activity 1.1.1 Create climate and cyclone resilient designs with roof top water harvesting systems

The conventional cattle shed although found protective but will be less effective during extreme weather conditions. ²⁴By establishing proper shelter, one can eliminate 50% effect of climate changes.

The activity is therefore to design cattle sheds in such a way that animals kept in side are comfortable in all seasons. Care is taken to build the shed in wind direction i.e. east to west so the morning sun light gives good lighting and also being in wind direction will have good ventilation. In summer about 3 inch dry grass is spread on roof top to reduce the heat. Six hostels one in each mandal will be established. Since 20,000 liters of water is required every day for 200 animals, roof water harvesting structures will be designed to collect rain water. The water is collected in an underground tank and used during acute water shortage period. The department of animal husbandry is planning to establish veterinary hostels in the state. This activity will synergize with the department activity to add value by addressing climate risk factors.

Activity 1.1.2 identification of locations

Identification of right location is crucial in the success of the program. Interactions with the mandal and district level officers will be held to identify land for hostel to keep 200 animals. The location selection will only be finalized when sufficient land (at least 10 acres) is available and nearby place sufficient private or waste land available for fodder cultivation, good number of bovines are available in the villages and the location is not far from the village.

Activity 1.1.3 Meeting with farmer and explaining the concept of hostels and procedures of animal management, milk collection, manure supply

Since this concept is new, farmers' participation from day one will be ensured to enhance their understanding on the concept and benefits. In the initial meetings, farmers will be oriented on changes in climate, climate change impacts on dairy sector and how the envisaged hostels are likely to reduce climate vulnerabilities.

Activity 1.1.4 Organising farmer groups who will participate in the hostel system

Those farmers having dairy animal, convinced with the concept will be formed into a single or 2-5 groups depending upon number. Once the group is formed its norms will be developed along with members which includes frequency of meeting, leadership issues, management of group and book keeping. Once the group is ready then they will be oriented for developing guidelines of the hostel which includes selection criteria of entrepreneur, his/her costs, roles and responsibilities, monitoring gobar gas production, managing chilling unit etc. these. These meetings will help the community to understand the objectives, approach and operations of

²⁴ Climate smart agriculture ; The way forward, Indian perspectives. Kirit N. Shelat, 2015.

veterinary hostel. Farmers will be oriented to implement shed cleaning by the families on rotation basis regularly.

Activity 1.1.5 Identification and training of entrepreneurs who will run the hostel and provide veterinary services and market linkages

The responsibility of managing hostel lies with the entrepreneur. Selection of right entrepreneur based on a criteria being developed jointly by the farmer group and the project. Upon selection, the entrepreneur will be trained on key topics such as: Impacts of climate change on livestock, farm management, enterprise development, communication skills, fodder production, feeding, data entry etc. Key services like breeding and health will be sourced from veterinarian on cost basis. Preference will be given to interested veterinarians while selecting entrepreneurs.

Activity 1.1 6 Short listing and award of contractor for building of hostels The construction of hostel will be initiated through standard government bidding policy. After completion of civil works by the contractor additional works like adding biogas unit, chilling unit and slurry and urine collection unit for manure purpose will be added from project funds.

Output 1.2 Green cover created around cattle hostel

Activity 1.2.1 Identify mix of species that will be planted around the hostels through stakeholder consultation will include trees that will provide fodder, as well as trees that maximize cooling.

Natural cooling of shelter will reduce construction cost also. Fodder tree plantation along will not only reduce heat but also provides fodder during drought and summer.

Activity 1.2.2 Arrange for saplings from the forestry department

The plantation material requirement is planned, as per the plan the forest department will be contacted well in advance to procure the planting material.

Activity 1.2.3 Undertake plantation with the help of farmers, one day wages provided by Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA).

Group meeting conducted before receiving the planting material to fix the date for plantation. Poor farmers having job card will be involved in the plantation.

Output 1.3 Underground water structures created for harvesting roof top water and also bore wells dug to complement water availability

Activity 1.3.1 identify the area for digging bore well

Systematic hydrological study will help not only in identification of right locations for drilling 2 bore wells but also benefit in getting adequate water for animals and the shelter. The survey will be taken up in consultation with geological survey/irrigation

department and in case such support is difficult private player services will be availed.

Activity 1.3.2 Construction of storage tank and bore well

One big underground tank will be constructed within the premises and create pipeline to collect roof top water available during the rainy season. One more underground tank constructed next to the borewell for storing water daily pumped from the bore well. One overhead tank is created with water supply channels to shelter and chilling unit to meet day to day consumption needs of the shelter and chilling unit.

Activity 1.3.3 Water pumping mechanism of capacity 2 HP through solar water pumps

Usage of roof top water is very occasional hence it will not have pump but will have facilities to connect to pipeline laid from other tanks. Second underground tank created for usage of day to day water will be connected with 2HP pump to pump water to overhead tank daily. Both pumps used for pumping bore well water and underground water to overhead tank will be solar based. In emergency, one of these pumps used by disconnecting to pump roof top water stored in the tank.

Output 1.4 Six biogas based chiller units established

Activity 1.4.1 Design for generating 10 KVA of electricity from corresponding size of biogas units for cooling 1000 litres of milk for each site.

About 2400 kg dung is expected daily from 200 animals kept in the centre and likely to produce 10KVA power. The dung collected from the shelter is transferred to bio gas unit after processing manually. The power generated from the unit is used for chilling milk by establishing small 1000 litres chilling unit close to the bio gas unit.

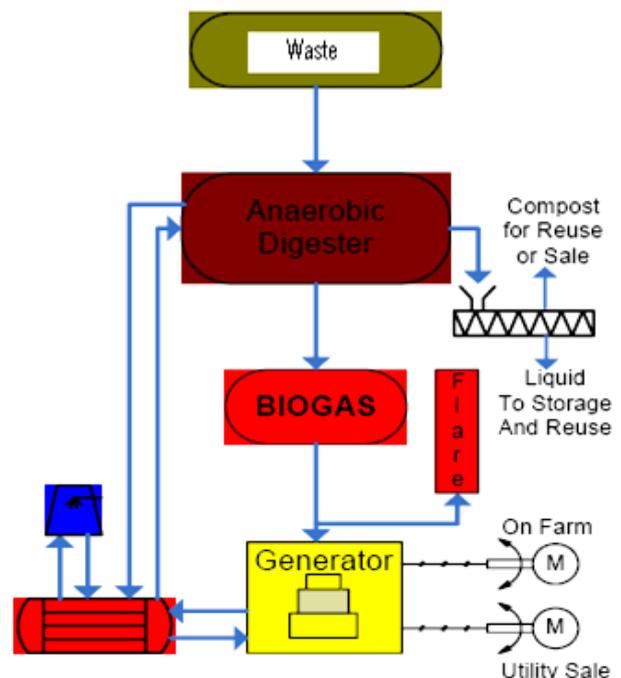


Figure 4: Envisaged biogas based chilling unit design

Activity 1.4.2 Award the contract for building biogas and generating electricity

Once the design is finalized building the bio gas unit along with chilling unit will be initiated through standard government bidding policy.

Activity 1.4.3 Training the entrepreneur on maintaining the chilling units, biogas etc.,

The entrepreneur will be identified in line with the one identified for managing the shelter with a responsibility of running biogas units and managing chilling unit. The slurry produced from bio gas unit is converted into manure and sold to farmers at a price determined by the committee. Day to day milk produced from the farm is collected, chilled and supplied to dairy at an agreed price. The entrepreneur will be trained on standards with regard to yield, inputs etc and operational skills to manage the unit. Other training includes running chilling unit, maintaining milk temperature, quality check of milk, milk pricing and book keeping monitoring day to day payments of all producers who supply milk to the unit.

Output 1.5 Facilities created for Collection of cattle urine and slurry for agricultural manure marketing purpose

Collection of urine from cattle hostels, along with the slurry from biogas units by Farmer Interest Groups for agricultural manure purpose in entrepreneurship model

Activity 1.5.1 Integrate within the design for collection of urine from cattle hostels and slurry from biogas units

Urine produced by each animal will be collected through gravitational force from shelter to underground tank located close to each shed. The urine collected in the tank along with slurry from biogas unit will be converted into manure for marketing.

Activity 1.5.2 Tie up with an entrepreneur who will collect the manure and sell:

Manure collection Meetings will be organized with farmers market players.

Output 1.6 MIS system operation tracking - type and quantity of feed, milk production, breeding parameters, lactation length, extreme heat and cold days, disease prevalence, any other

Activity 1.6.1 Hire assistant for data collection by department

The project will engage unemployed youth to collect animal wise data regularly and submit to the district in the format. The data collected in the field is sent to AHD where it is monitored

Activity 1.6.2 Design the framework for data collection and synthesis

The project will develop design framework for data collection and train staff and data entry persons. Animal wise data is made available with the project to assess how conditions in the shelters are contributing to reduced risks from extreme heat.

Activity 1.6.3 Infrastructure for data collection and software for data analysis

Software will be developed covering key parameters. Computers will be made available in shelters, divisional animal husbandry office, district office and state office. The monitoring officer at the state level trained on data analysis.

Component 2 : Develop business models to sustainably grow and supply fodder for the animal hostel and in areas where there is an identified fodder deficiency in selected districts

Feeding animals during summer is a serious concern of all farmers. Mostly farmers rely on extensive grazing for feeding their animals. In summer due to lack of availability of sufficient fodder animals go on to negative energy which will impact milk production. Some



Picture 2: Farmer practices in storing dry fodder

farmers having land cultivate food crops and stock crop residue for feeding animals.

During field visits out of the 200 farmers interacted more than 60% indicated that they cannot feed their cattle during summer due high cost of dry fodder. Some farmers producing milk although willing to purchase fodder is not available in the village.

Adaptation Alternative: The envisaged business model will definitely make fodder availability in all seasons. The entrepreneur will procure fodder from the places where it is available in abundance and convert them into bales and supply farmers at an agreed price. Trainings and group mobilization for promoting fodder banks will ensure to provide fodder during critical period. Cultivation of fodder on tank beds is a mechanism to optimally utilize moisture in the tank. Fodder available in abundance during the season will be collected and stored in a fodder bank for using during crisis. The group trainings will play important role in fodder production and distribution of fodder either produced in tank beds or stored in the bank.

Output 2.1 Established fodder production facilities

Activity 2.1.1 Farmer meetings will be conducted in villages to identify tanks and potential private lands

From the interaction with the district animal husbandry officers list of tanks (dried in summer) will be collected from villages where fodder shortage is severe.



Picture 3: Tankbed cultivation of fodder in Ananthpur district

In these villages meetings will be conducted with farmers to identify dried tanks for raising fodder to cope up with fodder shortage as one of the options. In addition, private lands having water facility available in village kept as fallow (willing to lease) will be identified.

Activity 2.1.2 Meeting with district officers to get user rights and private land owners for lease agreement

On identification of tanks concerned district officers will be met to obtain user rights for the farmer groups to use the tank in summer by growing fodder. Similarly, interaction with private land owners will be held to assess their willingness to lease the land to shelter entrepreneur for growing fodder. Once willingness is sought, agreement will be prepared between both parties with detailed terms and conditions.

Activity 2.1.3 Formation of fodder producing groups

All those farmers willing to use fodder during scarcity period will be organized into groups. Only small and marginal farmers will become members of the group and participate in the fodder production.

Activity 2.1.4 Developing procedures amongst farmers for fodder usage

After group formation members will be oriented on possible short duration fodder crops could be grown and using participatory techniques plots will be allocated to farmers. For producing drought resistant fodder crops.

Activity 2.1.5 Procurement of fodder seed from department

The resources available with department will be availed for procuring fodder seed. The seed requirement will be planned well in advance to avoid non receipt of seed. In case of non-availability of seed with the department then it will be purchased from private players.

Activity 2.1.6 Fodder production and distribution

The fodder is produced as per the technical guidance of Animal Husbandry Department. The crop is monitored as agreed in groups to avoid conflicts and harvesting is completed at an agreed date to avoid grazing of animals.

Output 2.2 Production and marketing of crop residue bales established

The general practice is to transport crop residue from distance places to fodder deficit places which is uneconomical and contributing to carbon emission. Baling crop residue to 25 kgs is simple technology and easy to transfer from place to place. Procuring fodder bales storing for using during deficit period is a best adaptation strategy although the program is being implemented in the department but much success is not observed. To popularize this strategy the project will use business models and address fodder shortage.

Activity 2.2.1 Farmer meetings to disseminate crop residue technology

Farmers will be trained on climate change risks and likely impacts on livestock especially in fodder production. After mapping current feeding practices crop residue bales importance and its technology and benefits will be discussed.

Activity 2.2.2 Estimate demand for crop residue bales

The demand for bales in the mandal will be estimated based on number of livestock units. Estimating 7 kg dry fodder requirement per livestock unit per day the requirement is calculated by multiplying number of days fodder shortage period for total number of livestock units. Based on the requirement and availability of dry fodder baling machines will be selected.

Activity 2.2.3 Identify six entrepreneurs, one from each location

Interested and interesting unemployed from the community will be identified as entrepreneur based on a criteria being developed by the department, community and the project team.

Activity 2.2.4 Preparation of agreement between department and entrepreneur

Training and exposure for entrepreneur

An agreement will be developed between the entrepreneur and the department including expected support from the department, tasks of the entrepreneur, and his /her transparency in the business, cost sharing mechanism maintenance of machinery etc.

Activity 2.2.5 Training of entrepreneur

The entrepreneur will be trained on simple skills related to business, managing machinery, book keeping etc. In addition to training the entrepreneur also sent on exposure trips to nearby places where the initiative is successfully running.

Activity 2.2.6 Purchase of twelve crop residue bailing machinery on cost sharing basis (10: 25:65)

Before procuring machinery 10% cost of the unit will be collected from the entrepreneur either in form of cheque or bank guarantees. Whereas 25% contribution will come from the department The procurement of machinery will be initiated through standard government bidding policy.

Activity 2.2.7 Provision of revolving fund to entrepreneur

Each entrepreneur provided revolving fund for running the enterprise without any break. The exact amount required for revolving funds is estimated based on turn over.

Activity 2.2.8 Marketing of fodder bales at an agreed price

The cost of bale is determined by the department based on cost of the raw material (crop residue), processing and labour. The concept of crop residue bale is disseminated to villagers by producing extension and publicity material.

Output 2.3 Establish community based fodder banks by harvesting and storing locally available crop residue

Activity 2.3.1 Identification of severe fodder deficit areas

From the interactions with the departments and the community severe fodder shortage village will be identified along with the reasons and livestock details. Only those villages with severe shortage and having importance of livestock in the livelihoods of farmers will be identified.

Activity 2.3.2 Conduct farmer meetings to discuss fodder bank concept

In these village meetings will be conducted involving farmers to conduct seasonality of fodder. The concept community based fodder bank, its advantages and costs will be discussed with the community.

Activity 2.3.3 Estimate fodder requirement

The demand for fodder is estimated based on number of livestock units. Estimating 7 kg dry fodder requirement per livestock unit per day the requirement is calculated by multiplying number of days fodder shortage period for total livestock units.

Activity 2.3.4 Design the fodder bank and develop its management system

Based on the requirement and availability of fodder the size of the fodder bank will be designed. All participating farmers will be organized into group and project supports the group in taking decisions like its management, distribution, costs etc.

Activity 2.3.5 Short listing and award of contract for constructing six fodder banks

The construction of six fodder banks will be initiated through standard government bidding policy.

Activity 2.3.6 Fodder stocking and its usage in deficit period

When fodder available in abundant is harvested at right stage, dried and stored in the fodder bank and locked. Fodder from bank will be utilized only when all members collectively decide to use it.

Component 3: Strengthen existing FIG institutions to take up indigenous breed propagation, management and milk marketing

From PRA exercises it is observed that managing high genetic merit animals during heat stress is increasingly becoming a challenge. High incidence of diseases (vector borne), low tolerance to heat stress and low fertility rate are the most common issues indicated by the farmers. However, crossbred population has been increasing due to promotion of Artificial Insemination (AI) work by the department. Even the current non-descript population is very high but their tolerance level is higher than high genetic merit animals. Although their productivity is low, its decline during the summer is less compared to high genetic animals. Most of the farmers in project mandals do not have much information on high potential indigenous animals their values etc. In fact few indigenous breed are as potential as that of crossbreds in Indian context.

FIGs will be formed in line with SHGs for implementing project activities. The group structure includes those farmers who are having interest and need in the activity. About 4-5 FIGs will be organized, each comprising 10-15 farmers. Preference will be given to women. The groups will nominate a leader, meet once in a week on a fixed date to discuss issues related production, status of animal comfortless and review benefits of the program.

Adaptation Alternative: By mobilizing farmers and organizing them into group imparting training on indigenous animal, their adaptive capacities and merits over crossbreds will result into expediting indigenous breed conservation program and also introduction of indigenous animals as an alternative to the crossbreds.

Output 3.1 Support artificial insemination process of local indigenous cows with 100% Sahiwal, Gir or 100% Ongole

Activity 3.1.1 Farmer trainings on importance of indigenous breeds

Farmer trainings will be conducted to bring awareness on climate change concerns and likely impacts of extreme climatic conditions on livestock especially crossbreds. Tolerant level of indigenous animal to local conditions, its yield, management conditions and benefits in comparison to crossbred are required will also be covered in trainings. In order to conserve local indigenous cows farmers trained to cross either with pure Sahiwal, Gir or pure Ongole.

Activity 3.1.2 Support department to purchase semen

The data will be collected from the semen stations to know whether pure Sahiwal, Ongole and Gir semen is available or not. If not department may be supported for procuring the semen from the northern Indian states.

Activity 3.1.3 Conduct AI program through field staff of the department

All livestock institutions, private AI workers and other NGOs associated with breeding programme will be provided with pure semen and advice the inseminator to use indigenous bull semen. In addition extension material will be developed and used in institution for farmers.

Output 3.2 Support artificial insemination of non descript cows with 100% ongole and or sahiwal or gir

Activity 3.2.1 Farmer trainings on importance of indigenous breeds

Same as done in case of 2.2.1

Activity 3.2.2 Support department to purchase semen

As above 2.2.2

Activity 3.2.3 Conduct AI program through field staff of the department

As above 2.2.3

3.3 Support artificial insemination of cross bred cattle with crossbred semen having 50% sahiwal/gir/ongole blood levels.

Activity 3.3.1 Farmer trainings on importance of indigenous breeds

Same as done in case of 2.2.1

Activity 3.3.2 Support department to purchase semen

As above 2.2.2

Activity 3.3.3 Conduct AI program through field staff of the department

As above 2.2.3

Output 3.4 Support procurement of Sahiwal/Gir/Ongole heifers for farmers through cost sharing amongst farmer, animal husbandry department and project

Activity 3.4.1 Formation of farmer groups

All those farmers attended the training convinced and interested in rearing indigenous animals are organized into groups to rear indigenous heifers. Small, marginal and medium farmers also included in the group. Once the group is organized their norms developed along with the members.

Activity 3.4.2 Identification of interested farmers to rear pure indigenous Sahiwal heifers

Farmers interested in rearing heifer will deposit 40 % cost with the group and remaining 60% will be contributed from project fund. Only small and marginal farmers are eligible to receive 60% subsidy. Interested big farmers can purchase heifers at full cost.

Activity 3.4.3 Prepare agreement- Farmer and project

Agreement will be prepared between farmer and the project with clear terms and conditions including points such as cost to be borne, rearing animal as per guidelines of the department, registration with the department etc.

Activity 3.4.4 Procure 2500 heifers for six locations and supply to farmers

Four hundred animals per mandal (1-2 for each farmer) are procured from the north India based on department procurement policy. To enhance transparency farmers buying animals will accompany the procurement team. This will enhance their understanding on rearing practices adopted in the procurement region.

Activity 3.4.5 Inseminate heifers with pure Sahiwal/Gir/Ongole

Once heifer reaches puberty they will be crossed with pure indigenous bull semen through AI.

Output 3.5 Facilitate establishment of milk collection centre exclusively for indigenous cattle

Activity 3.5.1 Interaction with organized dairy players to link the farmer collective

Demand for indigenous cow milk is on high rise in India especially in Project districts. The project facilitates interactions with organized dairy players to supply 100% indigenous cow milk.

Activity 3.5.2 Establish milk collection centers and collect indigenous milk separately

Based on the agreement milk collection centers will be established in the project locations by the organized sector and start collecting milk daily.

Activity 3.5.3 Monitor payment system regularly

Project will develop concrete monitoring system to see collection of volumes, milk payment to producers, incentives offered to producers and mixing of buffalo or crossbred cow milk.

Component 4: Create knowledge management and skill development opportunities for managing cattle sustainably in a changing climate scenario

Animal husbandry officers although highly competent in the profession are still to develop clarity on climate change issues. Farmers having experienced in production losses are not able to correlate the issue with climate change. In project mandals climate change is observed by farmers. The key observations made by farmers in comparison to 25 years are as under:

- Dramatic reduction in rainfall
- Reduction in rainy days
- Increase in temperature especially mean temperature
- Crop residue shortage due to crop diversification which is due to delayed monsoon
- Increase in vector population
- Increased incidence of diseases especially in crossbreds
- Loss of local fodder species

Adaptation Alternative: Through capacity building awareness will be created among farmers on climate change and its likely impacts on livestock. National and international trainings will be organized for the department officers on climate change issues. Adequate training and extension material will be developed to educate farmers. Similarly training modules will be developed to train department field staff that in turn can develop modules for training farmers in the field. All experiences gained in the field will be documented and shared with all likeminded institutions for adopting successful adaptation programs.

Output 4.1 Enhanced awareness within animal husbandry department on climate change impacts on animal husbandry and dairying

4.1.1 Develop climate change training modules

The project will develop training modules incorporating climate change issues, likely impacts on livestock, envisaged adaptation strategies and benefits from adaptation methods. The modules will be field tested before finalization.

4.1.2 Conduct trainers training programs

Trainers training program will be conducted as per training module including officers of training centers, division and institution level officers. The performance of officers will be monitored and if required additional trainings will be organized. Senior officers from the department will be deputed to attend international training to enhance overall climate change concepts.

4.1.3 Facilitate trainers to develop modules for farmer training program

As part of training the trainers will be trained on how to prepare training module for training farmers in the field. The modules prepared will be tested in the field and revised. Further the trainings organized by field staff will be monitored and guided wherever necessary in the field.

4.1.4 Develop training and publicity material

Wall posters, painting will be developed on climate change concerns to bring awareness among farmers on climate change concerns. All trainers will be equipped with flip charts and running material for conducting trainings in the field.

Output 4.2 Enhanced awareness among farmers on benefits of rearing indigenous graded cattle vs. crossbreds/exotic breeds

Activity 4.2.1 Conduct farmer trainings on likely impacts of climate change on livestock

Trainings on advantages of indigenous cows over crossbreds will be conducted in all project villages.

Activity 4.2.2 Trainings on advantages indigenous cows over crossbreds

As above

Output 4.3 Best practices documented for managing cattle hostels

Activity 4.3.1 Conduct workshops involving farmers, entrepreneurs and other stakeholders to identify good practices

The project experiences are documented involving key stakeholders. workshops, personal interviews, small group discussions will be conducted to document good case studies for upscaling.

Activity 4.3.2 Publish a manual with elaborate guidelines to run cattle hostels

One manual will be published by the end of the project describing procedures and guidelines for running the cattle shelters under different climatic stress conditions

Output 4.4 Documentation of indigenous cattle management practices

Activity 4.4.1 Conduct workshops involving farmers, entrepreneurs and other stakeholders to identify good practices

Workshops, one to one interviews will be conducted involving farmers rearing indigenous animals to identify good practices.

Activity 4.4.2 Indigenous cattle rearing with its benefits over high genetic merits on health, breeding, feeding and production will be documented.

Component 5: To suggest specific social safety measures for marginalized communities dependent on climate resilient indigenous cattle breeds

Currently high genetic merit animals only receive attention from all service providers for providing livestock health, breeding and feeding services demotivating indigenous cattle owners rearing the stock.

Adaptation Alternative: In collaboration with the Animal Husbandry Department all indigenous cattle will be covered under the respective schemes meant for crossbreds. Project intends to procure indigenous heifers from North India. Upon reaching project villages they will be covered under intensive health care and other popular schemes.

All beneficiaries will be encouraged to insure their heifers at the site of procurement from their own funds. All heifers will be vaccinated and dewormed free of cost by AHD before their transport from the locations. All veterinary institutions will be provided adequate vaccinations and deworming medicines well in advance.

Output 5.1 All heifers protected from mortality

Activity 5.1.1 Timely vaccinations and deworming conducted

Immediately on reaching the villages faecal examination of all animals will be carried out to identify which type of parasites has attacked and accordingly all animals will be dewormed as per schedule. Vaccination against common bacterial and viral diseases will be carried and continued as per the schedule. The department of animal husbandry will carry out the program in the villages.

Activity 5.1.2 All animals receive mineral mixture

Most of the heifers suffer from deficiency of minerals in the body making the animal to grow slow and reach late puberty. All heifers will be covered under mineral mixture supplementation program. This program is not included in the department program hence it is covered under project funding.

Activity 5.1.3 Heifers receive feed under Sunandini scheme

All animals will be enrolled under department's Sunandini Programme and provide feed and other technical support for a period of 300 days.

b. Details on economic, social and environmental benefits project / programmes

Social benefits: Mobilization and organization of the community into groups will help them to implement and monitoring the program major benefits of the project. In all groups marginal farmers, women headed households, socially excluded groups (tribes, schedule caste etc) will have maximum participation. Preference will also be given to these groups while selecting entrepreneurs. This will help in improving the social standing of the poor livestock keeping community. Capacity building is the key component in the program through trainings conflicts related to fodder will be controlled and harmony among the community is developed. The project will ensure to identify women leaders, women entrepreneurs and train them on communication skills, enterprise development, leadership and book keeping aspects this will ensure higher transparency in the program. The shelter concept brings all types of community together thereby learning good practices will be fast.

Economic benefits: Employment opportunities for the unemployed youth in form of entrepreneur will be created during the course of project implementation. Linking shelters to market will enhance higher price to milk and regular market. Establishing bio gas based chilling unit will provide more market opportunities for the farmers. By establishing milk collection centers to collect indigenous cow milk at a premium price is an excellent benefit for the poor farmers to increase incomes. The concept of utilizing dung as bio gas to produce energy for the chilling unit and also using slurry as fertilizer in rice fields can lead to organic agriculture which fetches higher price in the markets as compared to rice grown using chemical fertilizers. Collection and marketing of urine and slurry for manure purpose will increase incomes of the group.

Environmental benefits: The main environmental benefits include co-benefits accruing from programme activities. These include:

- Reduction in emission of CH₄ from dung as CH₄ generated from dung will be used as energy and direct emissions into the atmosphere will be avoided if it

were to be used as direct organic fertilizer in flooded rice fields and if piled together

- Further, the slurry from the biogas can replace chemical fertilizers used in rice cultivation in the area which is richer in nutrient as compared to dung and emits less methane, as the carbon in the dung is perused for generating methane in the biogas
- Rainwater harvesting from the roofs of the sheds ensures low water footprint by avoiding extraction from conventional water resources
- Greening of the area around the sheds will ensure groundwater recharge by recharging related aquifers and facilitating growth of vegetation in the area

In summary, the main social, economic and environmental benefits from the project are as given below, compared to the baseline scenario:

Table 8: Socio, economic and environmental benefit particulars		
Benefit areas	Key benefits	Baseline scenario
Social benefits	<p>Community mobilized and organized for improved bovine management through shelter concept.</p> <p>Facilities created for keeping animals in the shelter</p> <p>Project contributes to social equity by involving at least 80% of beneficiaries amongst landless/marginal farmers, women headed households, schedule caste schedule tribe households etc.</p> <p>Entrepreneurs trained and capacitated to produce blocks and supply to farmers</p>	<p>Lack of village-based institutional mechanism to address climate risks on high genetic merit animal issues.</p> <p>Animal management is individual activity and there is no mechanism where all farmers to come together and participate in the program and reduce drudgery.</p> <p>Information on importance of quality fodder is not available</p>
Economic benefit	<p>Indigenous cattle adapted to local conditions can maintain milk productivity levels in heat stress conditions.</p> <p>Key interventions like production of crop residue bales, production of fodder in tank bed will contribute to increased milk production.</p> <p>Timely preventive health services would enhance the production, lactation length and lifespan of cattle</p>	<p>Presently no importance is given to indigenous cows. There is no motivation for farmers to rear indigenous cows as the focus is on crossbred cows.</p> <p>Presently during fodder deficit period animals do not have access to fodder hence the production is declining.</p>
Environmental benefits	<p>Potential emission of CH₄ reduced as dung is directly used in the biogas.</p>	<p>Rice fields use dung directly as fertilizer in flooded rice fields, leading to CH₄ emission</p>

Table 8: Socio, economic and environmental benefit particulars

Benefit areas	Key benefits	Baseline scenario
	Substituting chemical fertilizers with biogas slurry will not only avoid GHG emissions from conventional use of fertilizers; but it also contributes to soil health.	GHG emissions are increasing from agriculture & allied sectors, besides other environmental implications
	Ground water recharge and restoration of degraded land.	The sheds are generally built on degraded land
	Water footprint is low. The water in the shed is drawn from the underground tank built within the sheds and filled with rain waters. This water will be used during summer period.	Generally there is a high scarcity of potable water, and morbidity and mortality of cattle is reported
	Planting heat stress/drought tolerant varieties of fodder in the tanks will ensure again high water use efficiency	At the moment villagers do not plant such fodder at large scale and hence face shortage of fodder during summers.

c. Sustainability of interventions

Demonstrating the tangible benefits as best practices would motivate local communities to own the programme beyond the lifetime of the project and it can be institutionalized and scaled up by formalizing the community activities under MGNAREGS. Financial mechanisms like value addition through forward and backward market linkages would motivate communities for entrepreneurship. In addition the project ensure fair financial participation of farmers and the department.

d. Analysis of the cost – effectiveness

Quantifying the cost effectiveness may not be prudent as only potential effectiveness can be inferred when the project is implemented on ground. Therefore at this point a qualitative description of the cost effectiveness is being provided below:

- Due to high vulnerability on account of climate change, sustainability of animal husbandry amongst small and marginal farmers is at stake. The community based care being proposed will enable the farmers to collectively look after their herd as they will be able to provide them with climate resilient sheds as well as adequate fodder in leased land which they are not able to grow due to their very small land holdings
- Thus loss in milk yield from crossbred due to heat stress and hence loss in income averted in the long run by introducing indigenous varieties whose milk yield in optimal conditions can potentially substitute the yields of crossbreds. Thus ensuring the sustainability of State's Aspiration to steadily grow its milk production volumes
- Adequate fodder generation at village level, not only avoids excess money spent on buying fodder from outside but also ensures additional income for people whose land is leased and for people who become the fodder business entrepreneurs
- Additional income of the farmers participating in the hostel is established when profits from sale of manure and other benefited products are shared

- At each shed, biogas generated from the dung collected from 200 cows is powering the chilling units, thus enabling farmers to avoid distress selling
- It is proposed that the chilling units will also be used for horticulture produce. Therefore extra produce stored in these chilling units can be sold in the market during offseason when it may fetch higher prices.

The project program brings new dimensions like entrepreneur development and community mobilization in order to sustain the activities in the long run.

e. Alignment with State and National action Plan

The proposed project is consistent with the **Rashtriya Gokul Mission** launched by the Government of India for development of climate-resilient indigenous cattle breeds to supplement the income of vulnerable dairy farmers, as part of a number of steps being taken in Agriculture and its allied sectors, in Adaptation to climate change – under the **National Mission on Sustainable Agriculture (NMSA)** of the National Action Plan on Climate Change (**NAPCC**). One of the main objectives of the Project for “Breed Improvement of Indigenous Cattle with Genetic Merit” is consistent with the mandate of the **National Kamadhenu Breeding Centre** for development, conservation and preservation of indigenous cattle breeds that was inaugurated in Chintaladeevi, Nellore District of Andhra Pradesh, as a Centre of Excellence to develop and conserve Indigenous Breeds in a holistic and scientific manner.

The ultimate objective of the proposed Project is to enable the vulnerable dairy farmers to achieve higher monetary returns from indigenous cattle rearing through forward and backward linkages to market, capacity building and skill development.

The programs also can dovetail with the Sunandini scheme of the Andhra Pradesh government which is helping Scheduled caste /Scheduled Tribe households to acquire exotic/crossbred cows and graded Murrah in the three districts.

f. Component wise technical standards

Table 9: Activity wise national standards and monitoring of the programme		
Activity	Application standard	Standard Application to the project
Establishment of shelters	Guidelines of Rashtriya Gokul Mission, Government of India Ministry of Agriculture Department of Animal Husbandry, Dairying & Fisheries (2014). As per Disaster Management Guidelines	Heat / cyclone resilient shelters including roof top harvesting facilities, fans with water sprinklers powered by biogas and greening of surrounding area to lower the temperature of the microclimate.
Conservation and promotion of indigenous breeds	Report of the National Commission on Cattle (Rashtriya Govansh Ayog) July 2002, Department of Animal Husbandry & Dairying Ministry of Agriculture, Government of India	Provide indigenous heifers to farmers based on group decisions
Establishment of bio gas	Large commercial scale biogas plants in line with the ones built in Punjab mid-sized dairy farms This is in conformity the National Biogas and Manure Management Programme (NBMMP) of MNRE, GoI	Floating drum type biogas plant to be built
Establishment of chilling units	Action plan 2007-08 on dairy development – Empowering dairy farmers through milk procurement by Indira Kranthi Patham groups, Government of Andhra Pradesh 2007.	BMCU to chill 1000 liters using power from Biogas is designed
Collection of urine and slurry for agricultural manure supply	Guidelines of Rashtriya Gokul Mission, Government of India Ministry of Agriculture, Department of Animal Husbandry, Dairying & Fisheries (2014)	Simple technology manageable at the community level Promotion of entrepreneurships in villages
Production and marketing of crop residue bales	FAO Animal production and health- Crop residue based densified. Total mixed ration A user-friendly approach to utilise food crop by-products for ruminant production (2012)	
Fodder banks	Government of Andhra Pradesh demand note XXVIII -2015-16	Constructed as per standards of the department
Fodder production in tank bed	Guidelines for fodder production and fodder management under drought relief measures 2010	Convergence with government departments

Table 9: Activity wise national standards and monitoring of the programme

Activity	Application standard	Standard Application to the project
		Social mobilization

g. Duplication Check

The project programmes do not duplicate other funding agencies. However, they complement on Government of India programs of Andhra Pradesh State government, Animal Husbandry and Fisheries Department.

h. Stake- holder consultation

The stakeholders of the project include livestock keepers, community based organizations such as milk cooperatives, breeders associations, grass roots CBOs, Animal Husbandry department and other government agencies such as Andhra Pradesh Dairy Development Cooperative Federation (APDDCF), Visaka Milk Union, Nellore Milk Union, Rural Development, Forest, Revenue, and Agriculture department, Veterinary University, Central Research Institute for Dry Land Agriculture and International Livestock Research Institute.

The task of conducting PRA exercises, Field Visits and Stakeholder Workshops for identifying the vulnerability of dairy sector to climate change impacts, and also the task of designing and developing the Concept Note and DPR for climate-resilient interventions in dairy sector in the project area have been taken up by the Intercooperation Social Development India (ICSD). A total of twelve village meetings and PRA exercises were organized in two phases covering six mandals in three districts, and three Stakeholder Workshops were conducted by ICSD, for designing and developing Concept Note and DPR for the proposed project.

So far three consultative meetings were held at Hyderabad along with the animal husbandry department officials. As a follow-up three visits were organized to proposed project sites to conduct PRA Exercises.

- (I) First Stakeholder Workshop with CBOs, Climate Change Experts and Animal Husbandry Department 12th November 2013
- (II) Second Stakeholder Workshop with CBOs, Climate Change Experts and Animal husbandry Department, 22nd September 2014
- (III) Field visit to Ananthapur 13th to 14th February 2015
- (IV) Field visit to Nellore, 15th to 17th February 2015
- (V) Vizianagaram, 26th to 28th February 2015
- (VI) Third Stakeholder Workshop with CBOs, Climate Change Experts and Animal Husbandry Department, 17th April 2015

First stakeholders meeting

The first consultative meeting with CBOs, Climate Change Experts and staff of the Animal Husbandry, Government of Andhra Pradesh was held in Hyderabad on 12th November 2013 at Hotel Pearl Regency. The Principal Secretary - Animal Husbandry and Fisheries, chaired the session and following officials attended the event.

1. Director, Animal Husbandry

2. Additional Directorate Animal Husbandry
3. AP DDCF
4. Andhra Pradesh Livestock Development Agency
5. AP State Meat and Poultry Development Corporation
6. Acharya N.G. Ranga Agricultural University, Hyderabad
7. College of Veterinary Science, Department of Animal Nutrition, Hyderabad
8. Livestock Research Institute, Hyderabad
9. N.T. Rama Rao College of Veterinary Science, Gannavaram
10. ICAR Project Directorate On Poultry, Hyderabad
11. NABARD representative
12. Representatives of Intercooperation Social Development India
13. District Joint Directors participated.

In the event NABARD made a presentation on adaptation fund and NABARD's role in operationalizing the same as the National Implementing Entity. Intercooperation Social Development (ICSD) presented on "Livestock Sector and Climate Change". The participants discussed in groups to identify the key vulnerabilities of the livestock sector and envisaged adaptation strategies. The meeting concluded with identification of one arid and two coastal districts.

Second stakeholders meeting

The second stakeholder meeting was held in the chamber of Principal Secretary Animal Husbandry and Fisheries on 22nd September 2014. In addition to Principal Secretary, Managing Directors of Telangana and Andhra Pradesh Dairy Development Cooperation federations, Directors, Animal Husbandry, Additional Director Animal Husbandry, General Manager APDDCF and ICSD livestock and climate change persons have attended the meeting. In the meeting ICSD presented analysis weather data of the state and possible strategies. The Director Animal husbandry proposed to interventions like conservation of indigenous breeds and managing fodder during deficit period. Water scarcity need to be addressed in recurring drought districts. The Principal Secretary Animal Husbandry and Fisheries to take up any adaptive strategy but it should converge with on Government of India program of the department. From the data provided by ICSD the stakeholders decided to implement the project in Ananthapur, Nellore and Vizianagaram. He reiterated that dairy focused programs are slow and produce results after three years only hence he proposed to implement project work in five years period so that visible results could be manifested. By successfully implementing the program the department can replicate models in other locations.

Field visit

Twelve village meetings were organized in two phases covering six mandals during the period 13-28th February 2015. In these meetings, livestock keepers, cooperative society members, livestock service providers and Gram Panchayat Presidents participated. Participatory techniques such as seasonality, matrix ranking and time line and focused group discussion were held. Through discussions apart from collecting socio-economic situation following information was collected:

1. Cattle population trends

2. Productivity trends
3. Weather changes (rainfall and temperature)
4. Trends in milk production and productivity
5. Disease pattern
6. Trends and changes in fodder production

Most of the farmers wanted adaptation programs for reducing climate induced vulnerability among cattle. Villagers have come readily to participate in the climate resilient shelters. Women especially mentioned that they would like to work in the shelter on rotation basis. In some meetings the gram panchayat leaders mentioned that if user rights are given to them for using tank-bed for fodder cultivation then they will pass resolution to include the activity under MGNREGA.

Third stakeholders meeting

The third consultative meeting with staff of the Animal Husbandry, Government of Andhra Pradesh was held in Veterinary Council of India conference hall in Hyderabad on 17th April 2015. The theme of the discussion was on “Propagating Climate resilient interventions in Dairy Sector for small and marginal farmers in coastal and arid areas in Andhra Pradesh. Principal Secretary Animal Husbandry and Fisheries, chaired the session and following officials attended the event.

1. Director Animal Husbandry,
2. Additional Directorate Animal Husbandry
3. AP Dairy Development Cooperative Federation
4. Andhra Pradesh Livestock Development Agency
5. N.T. Rama Rao College of Veterinary Science, Gannavaram
6. NABARD representative
7. Concerned district Joint Directors
8. CRIDA representative
9. Representatives from Intercooperation Social Development India

Intercooperation Social Development shared the findings from field survey. NABARD shared the Adaptation Fund guidelines. In the afternoon the groups discussed on possible interventions and envisaged support from the department. In the concluding remarks the Principal Secretary clearly stated that the project should not only avoid duplication of existing departmental activities but it should also demonstrate additionality / value-addition in terms of achieving climate resilience in dairy sector.

i. Learning and knowledge management component to capture and disseminate lessons learned for the proposed project

The demonstrated project-benefits on economic, environmental and institutional fronts will be documented as modules for capacity building, to scale up the project by institutionalizing the community participation through MG NREGS,

j. Sustainability of the project/programme outcomes has been taken into account when designing the project /programmes

The project formulated by planning interventions which complements Government of India and Animal Husbandry Department activities. The department will implement activities and monitor the data to upscale the initiative when successful. The department apart from participating in interventions also participates in funding activities. The institution wise roles and responsibilities are as under:

Table 10: Responsibilities of Animal Husbandry Department			
Expected Outcomes	Expected Concrete Outputs	Sustainability Mechanism	Responsible party/ies
1.1. Enhanced and assured milk production with respect to heat stressed and cyclone conditions	Six hostels built. Two hostels in each of the 3 districts with surrounding green cover	The constructed hostels will remain functional beyond the project period, as the trained community stakeholders would own them	AHD with Local communities
1.2 Adequate and potable quality water facility provided for 365 days	Bore wells are dug for groundwater extraction and Underground storage tanks created for harvesting roof top water and also ponds dug to store rain water as complementary intervention in area surrounding the shed	Build of water resource assets to be owned and maintained by communities	AHD with Local Communities
1.3 Milk spoil reduced with respect to base line conditions	-Six biogas units established -Six milk chilling units established powered by biogas	Installation and maintenance of innovative technology Building the skills of local communities for Regular monitoring	AHD with Local Communities
1.4 Additional income for farmers participating in the hostel model	-Value chain studied -Facility created for Collection of urine from cattle shed and slurry from biogas unit -Market link established	Processing and establishing Market linkages	AHD with Local Communities
1.5 MIS system on livestock	MIS system operationalised with -Six automatic weather stations installed, one each in each of the	Continuous monitoring of local weather changes by	AHD

parameters and climate built to optimise livestock management system	hostels recording daily data on max temp, min temp, average temp, early warning of cyclones, rainfall, and humidity -Data on type and quantity of feed, milk production, breeding parameters, lactation length, disease prevalence, any other also recorded daily	trained local personnel	
2.1 Existing tank beds and private land leased and developed as fodder production centers of varieties that are heat tolerant and water stress resistant	Established fodder production facilities	Ensuring land use rights to communities for tank bed cultivation	AHD with Local Communities
2.2 Entrepreneurs start producing crop residue bales	Production and marketing of crop residue bales established	Providing machinery and linking entrepreneurs to local communities	AHD with Entrepreneurs and Local Communities
2.3 Dry Fodder available for use during deficit period from any source	Establish community based fodder banks by harvesting and storing locally available crop residue	Ensured fodder supply during fodder deficit period	AHD with Local Communities
3.1 Self Help Groups (SHGs) strengthened to - choose small and marginal households for interventions, - choose indigenous	-Pure indigenous variety (Sahiwal/Ongole) chosen for artificial insemination -Small and marginal households identified which are ready to give one of its Non Descript(ND)/crossbred/indigenous stock for insemination with 100% indigenous Sahiwal/ongole -Semen of Sahiwal/Ongole procured	Capacity building of SHGs	AHD with Local Communities

<p>variety suitable and available for undertaking artificially inseminating bovine stock existing with farmer households</p> <p>- undertake artificial insemination</p>	<p>-Artificial insemination undertaken of at least 3000 cattle, 1000 each in the 3 districts chosen.</p>		
<p>3.2 Indigenous pure strained heifer cattle procured one per family for small and marginal farmers</p>	<p>2500 families (800 each in 3 of the identified districts) have one each of Sahiwal/Ongole through cost sharing amongst farmer, animal husbandry department and project</p>	<p>Procurement of good animals on cost sharing by local communities</p>	<p>AHD with Local Communities</p>
<p>3.3 Indigenous cattle milk collection centers and link to niche market established</p>	<p>-FIGs establish farm producer companies in each village</p> <p>-Establish one milk collection centre at each village</p> <p>-Identify market and sell milk</p>	<p>Formation of Milk Groups</p>	<p>AHD, Govt. Dairy Sector</p>
<p>4.1. Risk of loss of income due to mortality amongst heifers averted</p>	<p>All heifers procured in this project insured for mortality</p>	<p>Timely health service delivery system</p>	<p>AHD</p>
<p>4.2. Risk of loss of income due to mortality amongst bovine stock admitted in hostels averted</p>	<p>All bovine stock admitted in hostels insured for mortality</p>	<p>Timely health service delivery system</p>	<p>AHD</p>

4.3. Risk of loss of income due to mortality amongst artificially inseminated progeny and mother averted	All cattle chosen for artificial insemination and surviving progeny within project insured for mortality	Timely health service delivery system	AHD
4.4. Risk of income due to loss in milk yield due to heat stress averted	Improving the service delivery system by creating/strengthening field level veterinary institutions to tackle climate-induced weather extremes like heat stress conditions	Timely health service delivery system	AHD
5.1 Best practices for managing cattle in hostels documented and distributed to all districts amongst milk related FIGs and policy makers	Workshops held, one each in each district of AP and manual on design of heat resistant cattle sheds and best practices for managing bovine designed and distributed and put up on animal husbandry website	Establishment of SOP and their dissemination	AHD
5.2 Preparedness of farmers to increase indigenous cattle breed in their livestock mix to avoid milk yield reduction due to heat stress generated	Workshops held, one each in each district of AP and document on best practices and benefits of raising indigenous cattle varieties designed and distributed amongst farmer FIGs and policy makers and put up on animal husbandry website	Establishment of SOP and their dissemination	AHD
5.3 Officials of the animal husbandry , dairy development department	About 1000 officials trained-together at district and State level	HRD through capacity building	AHD

and veterinary personnel trained on best practices for planning for dairy development in the State and managing livestock health in heat stress conditions			
Awareness creation and sensitization of farmers on climate change impact on dairy sector	About 2500 farmers are trained on climate change impact on dairy sector	Awareness creation and sensitization on climate change impact on dairy sector	AHD

Upscaling: The project will have a steering committee headed by the Principal Secretary, Animal Husbandry and Fisheries. The project activities will be reviewed half yearly by the steering committee and if any corrections are required it will be incorporated in the planning. Based on the decisions of the committee it will be recommended to the government for mainstreaming successful activities in to department programs.

k. **Overview of the environmental and social impacts and risks identified as being relevant to the project /programmes**

Table 11: Overview of the environmental and social impacts and risks		
Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>		None
<i>Access and Equity</i>	The project provides fair and equitable access to the project beneficiaries and will ensure to provide all services timely	None
<i>Marginalized and Vulnerable Groups</i>	The project aim is to provide opportunity to marginalised community living in the programme area and enhance their capacities in decision making processes through information dissemination and trainings.	None

Table 11: Overview of the environmental and social impacts and risks		
Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Human Rights</i>	The project does not foresee any violation of human rights	None
<i>Gender Equity and Women's Empowerment</i>	From the beginning of the project women will be encouraged to participate in programs. In all programs at least 50% women will be included. They will be involved in production of green fodder, crop residue bales, running chilling units, production and marketing of manure. For heifer management we intent to include 100% women, as women have proven experience in managing heifers.	None
<i>Core Labour Rights</i>	There will be no labour right issues and all payments will be made as per government norms.	None
<i>Indigenous Peoples</i>	We will cover indigenous people up to 50% where their population is high.	None
<i>Involuntary Resettlement</i>	Not applicable to this project	None
<i>Protection of Natural Habitats</i>	There is no affect on the natural habitats	None
<i>Conservation of Biological Diversity</i>	The project will contribute positively on n biological conservation	None
<i>Climate Change</i>	The project supports enhancing the adaptive capacity of the livestock farmers against adverse impacts of climate change and is not expected to contribute to GHG emissions.	None
<i>Pollution Prevention and Resource Efficiency</i>	There will be no pollution since dung is collected for producing bio gas. Urine and slurry are converted into manure	None
<i>Public Health</i>	No adverse impact on public health related issues is envisaged	None
<i>Physical and Cultural Heritage</i>	No adverse impact on cultural heritage related issues has been identified	None
<i>Lands and Soil Conservation</i>	No adverse impacts	None

Table 12: Year wise bifurcation of district wise target across the project timeline

No. of beneficiaries proposed to be covered	Year 1	Year 2	Year 3	Year 4
	400	700	700	700

3. IMPLEMENTATION ARRANGEMENTS

a. Describe the arrangements for project/Programme implementation

1. Who will implement the project and what are their comparative advantages and capacity compared to other potential implementing institutions

The department of Animal Husbandry GoAP will be the Executing Entity and the Director Animal Husbandry will be overall responsible for the execution of the project. Advantages of each institution in brief is explained in the below table:

Table 13: Departmental Strengths	
Institution/agency	Advantages
Animal husbandry department	<ul style="list-style-type: none"> • High network of institutions • Highly motivated staff • Competent professional in livestock, climate change, marketing and natural resource management • Excellent working relationship with local communities • Has been executing several flagship programmes related to livestock and dairy sector • Implementing Germplasm Conservation and Artificial Insemination (AI) techniques in the field • Strong ties with rural entrepreneurs

The project locations as identified by the Department are Ananthapur, Nellore and Vizianagaram districts covering two mandals from each district. For successful implementation of the programme, AHD will deploy one state level coordinator and engage three district level coordinators, six divisional and six mandal level coordinators. In addition, a senior climate change specialist will provide expertise in implementing the programmes.

2. How will the project be coordinated with related development activities of the targeted sector

The project will be coordinated by forming committees at the state level, district level and mandal level (please see below).

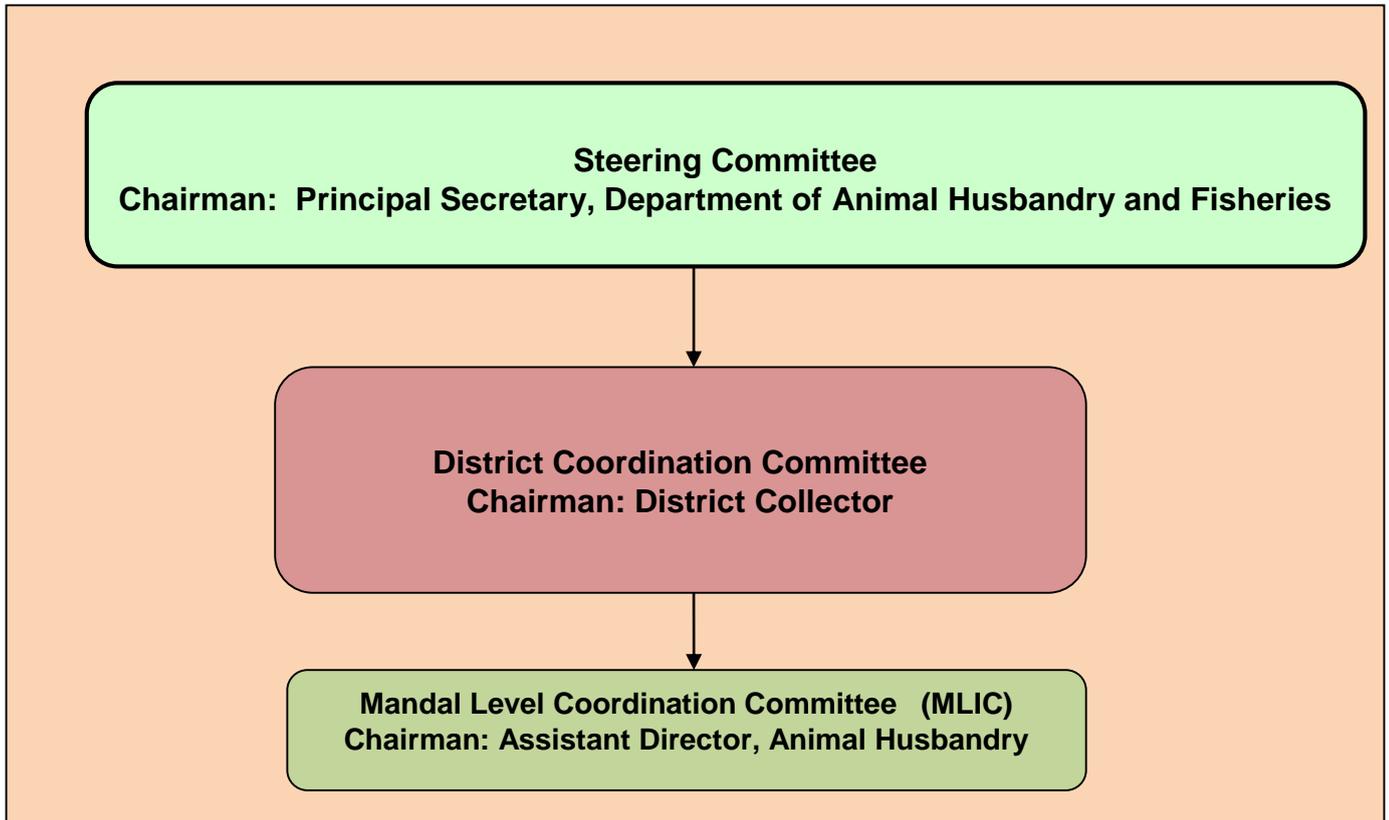


Figure 9: Flow chart of Steering Committee

Steering Committee (SC)

The Steering Committee is the apex monitoring and governing body. Principal Secretary, Animal Husbandry and fisheries will be the Chairman of the SC. Director, Animal Husbandry will be the member secretary. The functions of the SC Committee will be to:

- guide, supervise and monitor the strategic and conceptual orientation of the project
- approve yearly plans of operations and related budgets
- approve half-yearly and annual progress reports
- identify constraints in the implementation of the project and propose corrective measures, including modifications in the implementation of on-Government of Indian projects if deemed necessary

The SC meets at least twice a year and as need may arise. The SC will be composed of the following:

- **Principal Secretary Animal Husbandry and fisheries**, Government of Andhra Pradesh (Chairperson)
- Managing Director APDDCF

- Principal Secretary Forest
- Principal Secretary Rural Development
- Principal Secretary Agriculture
- NABARD Representative
- Director Animal Husbandry (member secretary)

District level Coordination Committee (DCC)

The district level committee will be chaired by the District Collector. The members of coordination will include:

1. Joint Director Animal Husbandry
2. Representative of Agriculture District
3. Representative of Forest Department
4. Representative of Rural Development Department
5. Representative of NABARD
6. Representative of dairy development cooperative federation
7. Livestock specialist as special invitee
8. 2-3 Farmer representatives
9. CBO / FIG representative

The Programme implementation responsibility lies with the Joint Director Animal Husbandry and who also function as Member Secretary. The committee meets once in a quarter. The purpose of the Coordination Committee is to ensure an effective implementation and co-ordination of activities at program level and to conceptualize policy directives of the Steering Committee.

Roles and responsibilities of the committee are:

- Discuss and co-ordinate yearly plans (including budget)
- Review activities at program level
- Analyse achievements and impact of the programme and formulate “lessons learnt”
- Follow-up of issues / directions of Steering Committee

Mandal Level Implementation Committee (MLIC)

The MLIC will be chaired by the Assistant Director Animal Husbandry. The members of MLIC will include:

- Assistant Director Animal Husbandry
- Veterinary Assistant Surgeon of the mandal
- Chairman of Shelter group
- Chairman of Fodder group
- Chairman of indigenous animal rearing group
- 2-3 Entrepreneurs
- CBO / FIG representatives

The committee meets once in a month on a fixed day. The purpose of the MLIC is to ensure an effective implementation of activities as per directives of the DLCC under overall policy guidelines of SC. Roles and responsibilities of the committee are:

- Discuss and co-ordinate yearly plans (including budget)
- Review activities at program level
- Identify critical issues and bring it to DLCC notice

- Follow-up of issues / directions of DCLL and SC

Project Implementation Structure at Organizational Level

As mentioned in 3.a.1 Department of Animal Husbandry will execute the project in consultation with the State Steering Committee and NABARD. For effective coordination AHD will deploy a senior expert to function as state level coordinator, three district level coordinators, six divisional and six mandal level coordinators. In addition, a senior climate change specialist will provide expertise in implementing the programmes.

Tasks of the Project Personnel

Animal Husbandry Department (AHD)

AHD will provide expert services in the climate change and livestock with regard to adaptation. Support the project in designing shelters, mobilizing community, develop training strategies, analysis of data and prepare interpretations and provide advises at different level. In addition, AHD will continuously monitor field activities as per decisions of the Steering Committee. Handle the funds provided by MoEF under NAFCC and submit utilisation reports as per department rules. The main tasks of the AHD personnel are as follows:

State Coordinator: The main tasks of the state coordinator will be to work under technical guidance of AHD, State Steering Committee and NABARD, and conduct field data analysis and assist director for day to communication to the field.

District Coordinator: The main tasks of the district coordinator will be communication between Director AHD, district and field, collection and consolidation of field report for submitting to AHD.

Divisional Coordinator: The main tasks of the divisional coordinator will be communication between district and field, collection and consolidation of field report for submitting to district. Facilitate field visits during visits of district and state officials.

Mandal Coordinator: The Mandal Coordinator responsible for organizing groups, facilitate trainings, support in managing groups, dissemination of any specific information.

Veterinary Assistant Surgeon: The Mandal Coordinator is the key implementing person responsible for supervision of day to day activities, data collection, be resource persons in field trainings and reporting to MLIC if any gaps in the implementation.

Divisional Assistant Director: Monitoring field programmes, provide guidance to Mandal VAS on technical issues and bring field issues to JD for corrections.

Joint Director: Monitoring of field activities, provide technical advice to field staff, coordinate with departments for mobilizing resources and report progress of work to DCC.

Director: Monitoring state level programs in coordination with NABARD, draw lessons, present the status to the SC. In addition synergize the project activities with Government of India and department activities and sanction funds.

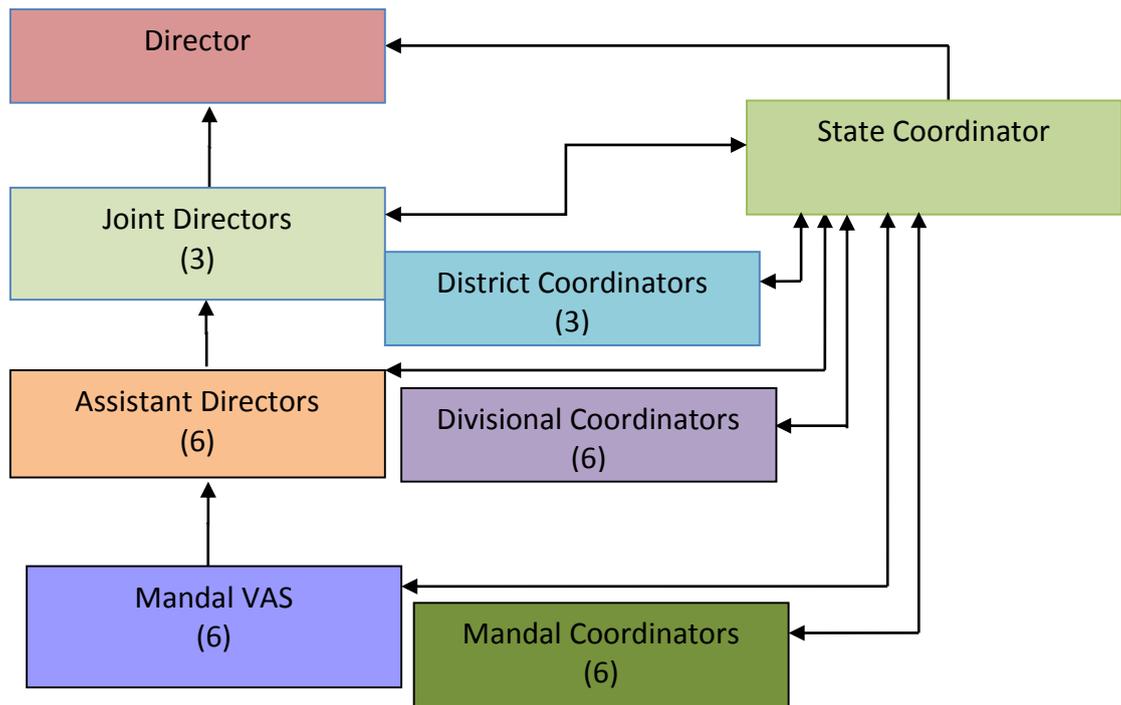


Figure 4: Implementation arrangement and staff deployment

Role of NABARD as National Implementing Agency:

NABARD will bear full responsibility for the overall management of the project, and will bear all financial, monitoring and reporting responsibilities to the National Adaptation Fund. NABARD would be involved in periodic monitoring (on-site and off-site) of the project. Periodicity and structure of monitoring is given below:

- On-site detailed round of monitoring would be done on a six monthly basis jointly by NABARD Regional Office (Andhra Pradesh) and Head Office. The frequency of monitoring would be increased if considered necessary
- District Development Manager i.e. NABARD officer stationed at the district would be a part of the monitoring committee for implementation of the project at local level
- NABARD as part of steering committee that would meet every six months, would deliberate and review the progress of implementation
- Quarterly report submission formats would be designed for submission by executing entities for desk appraisal of progress. This will be structured as a part of the off-site monitoring surveillance system and would be designed to generate warning signals, if any.
- Progress reporting would be done to NAFCC each half year or more frequently as per the requirement of NAFCC
- NABARD would create a platform for sharing and dissemination of knowledge at the regional and national level.

b. Describe the measures for financial and project / programme risk management

The project is not envisaged to pose any risks. However, any risks that may arise during the project implementation would be mitigated as indicated below:

- Project executing entities would be sensitized on these aspects
- Project Advisory Committee would specifically review issues related to social and environmental risk during its period meetings
- NABARD Regional and Head Office would identify specific risks that may arise during implementation based on the monitoring of project and built in reporting mechanism for the same

In order to ensure that executing entity is fully aware of their responsibilities with regards to provision of the National Adaptation Fund, NABARD would take-up following steps.

- Steps would also be taken to ensure that the direct beneficiaries would be made aware of the grievance and complaint mechanism.
- The mechanism would ensure that the grievances are received and addressed in a transparent manner:
 - Initial orientation during the inception of the project about the systems and procedures related to environmental and social policy and grievance mechanism.
 - Grievance mechanism would be informed to community during the project inception workshop. The same would include mechanism available in the country and of the
 - Complaint handling mechanism of the Fund.
 - Implementing Entity Coordinator and contact person would handle complaints received related to violation of any of the provisions of Environmental and Social Policy of the Adaptation Fund.
 - As part of grievance mechanism, communication details of implementation entity coordinator and contact person would be available to direct beneficiaries as well as community at large through display of project information boards placed at prominent common places within the project area.
- In the department the fund will be deposited in a separate bank account and it will maintain a separate ledger account. This ledger will be structured in line with the approved budget heads. Income and expenditure will be shown separately. The accounts will be maintained in such a manner that the auditor can ascertain that the funds received for the project have been utilized for the approved work plan. The department will establish an internal system of financial monitoring to examine proper use of the fund and the audited report will be presented to SC with copy to NABARD.

Details on identified risks, the perceived level of those risks, and the planned mitigation measures are presented below table:

Table 14: Financial and Project risk management		
Identified risk	Perceived level of those risk	Planned mitigation measure
Failure in mobilization of farmers to participate in shelters and fodder banks	Low	Training and exposure visits to successful locations
		Selection of right farmers
		Establishing locations convenient to all
Farmers may not show interest after some period	Low	Income received from milk sales is compared with baseline

Table 14: Financial and Project risk management		
Identified risk	Perceived level of those risk	Planned mitigation measure
of time and wants to withdraw animals		information and shown to farmers.
		Services availability under one roof is compared with baseline and shown to farmers
Entrepreneurs may show low interest for running hostels, milk collection, converting urine and slurry into manure and producing green fodder and crop residue bales	Low	Training and exposure
		Preparation of business plan
Farmers may show no interest to rear indigenous cows	Low	Trainings on importance of indigenous cattle in the climate change context.
		Strengthening of groups
Financial mismanagement by groups	Low	All funds at field level will be routed through VAS. Fund utilization will be regularly monitored by the VAS in close collaboration with coordinator.
Sudden outbreak of infectious diseases may affect the performance of animals	Low	All animals will be protected by timely intervention against bacterial, viral and parasitic diseases.

c. Monitoring and evaluation arrangements and budgetary plan

The details on the reporting and monitoring mechanism are given below:

- The **SC** will be the apex monitoring body for the project at State level and acts in this function as a review board. To this end, Yearly Plan of Operation (YPO) yearly budget, half-yearly and yearly reports are submitted to SC for approval. The overall responsibility of monitoring at the state level lies with the Director animal husbandry.
- At the district level the respective JDs are responsible for co-ordination, review and monitoring and evaluation. They will report to the DCC in the quarterly meetings and will contribute their part to the half-yearly and yearly report. These reports shall concentrate on assessment and analysis of progress and outcome and on constraints in program implementation.
- At Division level the AD will be responsible for co-ordination between the partners and the review, monitoring and evaluation of the programme as a whole.
- At the mandal level VAS will be responsible for the monitoring of mandal activities. In all three levels the emphasis will be on **documentation** of processes and experiences and promote their wider dissemination.
- The system and **indicators** for monitoring progress, output, outcome and impact at all levels, as described above, shall be developed and agreed upon by the SC. NABARD will guide the field staff in designing systems.

As part of the flexible planning procedure, a brief annual self-evaluation exercise within each partner shall be the first step, which will also form the base of the next yearly plan of operations. For monitoring following reports will be used:

i. Inception report

Immediately after sanction of the project a one day inception workshop will be held including all stakeholders (VASs, ADs, JDs, Senior Officers from the Animal Husbandry department, NABARD representatives) to orient on project, its concept, outputs, outcomes and financial procedures and reporting system. Filed teams will be oriented on formats and its time of submission.

ii. Monthly report

Simple format will be designed covering all activities including progress, constraints, expenses incurred and plan for next month

iii. Quarterly reports

Similar format will be designed covering all activities including progress, constraints, expenses incurred and plan for next quarter and comparative achievement with regard to last quarter

iv. Half yearly report

The half yearly report will be in line with quarterly report

v. Annual report

District wise annual report will be prepared based on review by JD involving ADS, VASs, farmers, entrepreneurs. In such reviews NABARD district officer and Director AHD will also participate to draw key learnings.

Animal Husbandry department staff will ensure timely submission of the report. It will analyse and submit the report to NABARD through Director.

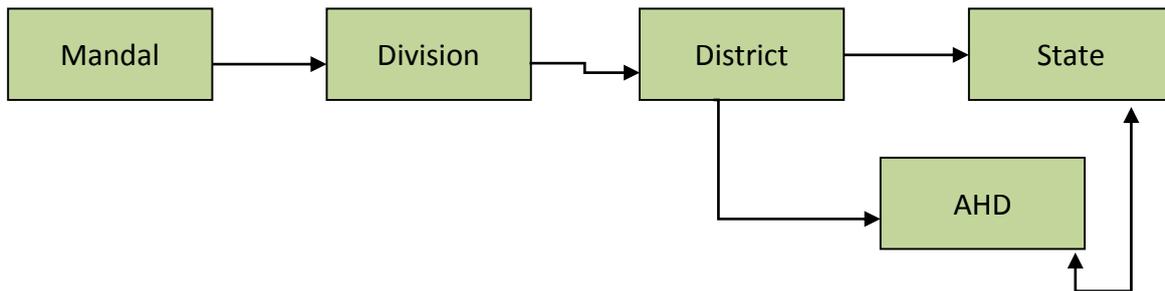


Figure 5: Information flow system

vi. Midterm review

Towards the end of second year a mid-term review will be conducted jointly by external and internal evaluators. The evaluation will review progress against milestones and assess progress made towards the delivery of outputs and achievement of objectives as well as identify corrective actions if needed. It will focus on the effectiveness of delivery, timelines and efficiency of implementation, and risk management. It will present the initial lessons of project design, implementation and management. The findings will be used to enhance implementation during the final half of the project’s term.

vii. Final Evaluation

The final evaluation will be conducted during the last semester of the project closure focusing on the impact and sustainability of project results. The report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, and make recommendations on any actions needed to ensure sustainability, replicability and scaling up. Results and lessons learned from the project will be periodically disseminated within and beyond the project intervention zone using a variety of media (briefing notes, website as well as through existing information sharing networks and forums).

In addition, field work will be monitored through field visits, workshops, participatory monitoring and evaluation exercises.

Budget for M&E Plan

The budget for M&E plan is given below table:

Table 15: Monitoring and Evaluation Plan								
M&E Activity	Responsibility	Years					Total	
		1	2	3	4	5		
Inception workshop		50,000					50,000	Within a month
Inception report	Director, AHD							Within one month
Monthly progress report	JD							Every month before 10th to reach Director with a copy to NABARD
Quarterly progress report	JD							Within 10 days on completion of the quarter
Self reflection workshop	AHD		30,000	30,000	30,000	0	90,000	Three workshop will be conducted to give an opportunity for the implementing teams to reflect their work
Participatory Monitoring and Evaluation	AHD		50,000	50,000	0	0	1,00,000	Two events will be promoted at each mandal level
Mid term evaluation	NABARD			2,00,000			2,00,000	Mid term evaluation will be held during the first semester of the third year by NABARD
Final Evaluation	External agency					2,00,000	2,00,000	Final evaluation will be held during the last semester of the project period
Monthly mandal meetings @ Rs.500/meeting	Assistant Director	36000	36000	36000	36000	36000	1,80,000	Meetings will be held in collectorate within 10 days from the end of quarter

Table 15: Monitoring and Evaluation Plan								
M&E Activity	Responsibility	Years					Total	
		1	2	3	4	5		
Quarterly district meetings	Joint Director	36000	36000	36000	36000	36000	1,80,000	The meeting will be held at state head quarter or one of the project districts as decided by the committee
Half Yearly Steering Committee Meetings	Director	20000	20000	20000	20000	20000	100,000	The meeting will be held at state head quarter or one of the project districts as decided by the committee
Half yearly statutory audit	Director/NABA RD	50000	50000	50000	50000	50000	250,000	End of each semester
Total							1,350,000	

- d. Include a results framework for the project proposal, including milestones, targets and indicators.

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
Component 1: Establishing community based best practices for managing its stress and impacts of cyclones on dairy animals					
Outcome 1.1 Enhanced Milk Production with respect to heat stressed conditions	200 Animals kept in each of the 6 shelters with all facilities	Due to poor quality shed animal produce very low during heat stress period	Provide quality sheds so that animals can produce milk during all seasons according to lactation status	Farmer wise data available with entrepreneur	Assumption: farmers keep their animals in the shed Private farmers continue to grow fodder as per agreement Risk: Sudden disease outbreaks even after vaccination

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
<p>Output 1.1.1</p> <p>Six Hostels Built. Two hostels in each of the three districts built with surrounding green cover</p> <p>The milk yield per animal on account of comfort created in hostels, is estimated to increase from current yield of 5 litres to up to 8 litres litres per day</p>	6 Shelters constructed as per the design	Managed by poor and marginal farmers is of neither heat stress resistant not cyclone resistant affecting the productivity of cows	Construct 2 hostels per district and demonstrate a good model so that farmers keeping animals in the hostel benefit from the new facility	Approved shelter design	<p>Assumption: Land available as per farmers convenience for constructing shelters</p> <p>Risk: Community may not respond for such proposal</p>
<p>Outcome 1.2</p> <p>Adequate And Potable Quality Water Facility Provided For 365 Days</p>	12 Bore wells dug in the plant and roof top water harvesting structures created	Animals on extensive grazing do not gettable potable water	Provide clean and fresh water to all animals for daily drinking purpose	Field Visit Report	<p>Assumption: Sufficient ground water available</p> <p>Risk: Bore well may get dried up due to digging of more bore well in neighbour fields</p>
<p>Output 1.2.1</p> <p>A total of 12 bore wells and 12 Underground water structures created for harvesting roof top water and also</p>	<p>2 bore wells dug for each hostel as per hydrological to supply water all throughout the year</p> <p>2 underground water structure dug for each hostel for</p>	Acute water shortage in villages for animals during summer.	Provide quality drinking water and water for animal washing and shed cleaning for 200 animals kept in the shelter	<p>Reports on bore well running hours</p> <p>Field visit report</p>	<p>Assumption: Positive hydrological reports for digging bore well</p> <p>Risk: Failure of Hydrological Report</p>

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
Bore wells dug to complement water availability	sufficient storage facility				
Outcome 1.3 Milk Spoil Reduced With Respect To Base Line Conditions	6 Chilling Centres established to reduce milk spoilage	At least 2% of milk collected and sold in the market is spoiled during summer To reduce spoilages practise of adding neutralisers in on high rise affecting human health	Reduce milk spoilage, and discourage the practise of adding neutralizer to milk from its spoilage	Milk Bill Report of Shelter	
Output 1.3.1 Six Biogas Based Chiller Units Established, each with a capacity of 1000 litres The established chilling units would prevent spoilage of 120 litres of milk per day (2% of total collection), accounting to 1100 litres saving during the peak summer period	Milk produced in the shelter is stored in 6 biogas-based chilling centres	Chilling Units established By Organised Sector Is Expensive And Not Energy Efficient	To efficiently use farm waste for producing bio gas and use the energy to chill milk and lower the chilling cost	Temperature Records Of Milk Gas Production Reports	Assumption: Labour available to mix the dung daily Risk: in winter due to low temperature enough bio may not be produced
Outcome 1.4 Additional Income for	5% reduction in traditional fertilizer	Farm waste is mostly	Increase incomes of farmers	Farmers Passbooks	Assumption: No established

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
Farmers Participating In The Hostel Model	consumption by use of slurry from biogas based chilling units	used in field as manure	rearing animals in the shelter through technology development and establishing market linkages		markets for slurry Risks: Not able to market
Output1. 4.1 Facilities created for for collection of urine from cattle hostels, along with the slurry from biogas units by Farmer Interest Groups for agricultural manure in entrepreneurship model	6 Collection Units of cattle urine and slurry established for manure marketing	Cow urine is mostly dried in the shed or percolated into soil making sheds unhygienic	Collect urine and slurry for manure and link the initiate with markets	Inventory Sales Reports	Assumption: High demand from local farmers and markets
Outcome 1.5 MIS system on climate and livestock parameters built to optimise livestock management system	MIS system developed and field tested	Government systems are complex and not customised for entrepreneurs	Develop simple, efficient and effective data collection formats	Entrepreneur computer reports	Assumption: entrepreneur trained to fill the formats Risks: low capacities of entrepreneurs to understand data entry systems
Output 1.5.1 MIS System Operationalised With -6 AWSS installed, one in each of the hostels recording daily data on max temp, min temp, average	Data collection system in all 6 centres developed and animal wise data available	Only marketable surplus milk particulars Are available with organised sector and diseases incidence particular with the	Collect data of all animals on key parameters, analyse at project level to come up with conclusions on how heat stress resistant	Daily and Monthly Report	Assumption: Efficient Functioning of Internet Risks: quality of report may be not good resulting in poor decisions

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
temp, rainfall and humidity -Data on type and quantity of feed, milk production, breeding parameters, lactation length, disease prevalence, any other also recorded daily		Animal Husbandry Department	sheds contributed to animal performance		
Component 2: Develop Business Models to sustainably grow and supply fodder for the animal hostel and in areas where there is an identified fodder deficiency in selected districts					
Outcome 2.1 Existing tank beds and private land converted to water stress resistant fodder production centres of varieties that are heat tolerant and water stress resistant	Farmer Groups Identified at least 1 Tank Bed in each site Entrepreneur and Private Lands for Fodder Production	Acute Fodder shortage during Summer and tank beds are not optimally utilized	Optimally use tank by cultivating short duration fodder crops to meet summer demand	List of farmers producing fodder	Assumptions: government permitted the group by giving user rights Risks: Lack of discipline in groups may lead to conflicts
Output 2.1.1 Established Fodder Production Facilities About 16 acres of tank-bed/private land in each Mandal, cumulating to 100 acres in total project area, would utilized for fodder production	In each site, farmer groups received user rights for 16 acres of tanks bed for producing fodder in summer Private land owners agreed to provide land for producing green fodder	Very limited success stories are available	Develop successful models to address fodder shortage in summer	Fodder production reports	Assumption: timely seed supplied Risks: crop failure due to poor quality seed Back out by the landlord
Outcome 2.2 Entrepreneurs Start Producing Crop Residue Bales	6 Entrepreneurs Trained on the Technology for Producing Bales	Farmers not having sufficient dry fodder	Introduce innovation in villages for meeting	Training report	Assumption: High demand from

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
		purchase from neighbouring villages and district for feeding their animals	fodder shortage during summer	Trial run report	entrepreneurs Risks: right entrepreneurs may not be available
Output 2.2.1 Production And Marketing of crop residue bales established	Crop Residue Bales available for about 2500 farmers at an affordable price	No Information of the technology	Generate employment opportunities for young people in village by involving them in the crop residue bale production	Entrepreneur sales data	Assumption: Sufficient Crop Residue available in close area Risks: Right Entrepreneurs may not be available
Outcome 2.3 Dry Fodder Available for use during deficit period when not available from any source	2500 Farmers would avail Fodder from Fodder Bank	Farmers use their own fodder in case of unavailability they purchase from outside to meet the demand	Popularize the model in addressing fodder shortage in critical period	Farmer wise fodder usage	Assumption: All farmers come together to store the fodder in the bank Risk: Individual demand may not match group demand thereby conflicts
Output 2.3.1 Establish Community based Fodder Banks by harvesting and storing locally available crop residue	6 Fodder Banks established for Crop Residue available in seasons	The concept is still not popular among communities and fodder storage is individual's activity	To meet address fodder crisis through community mobilization	Fodder Bank design list of farmers	Assumption: Good Group norms developed to run fodder bank Risks: Farmers response may be poor

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
Component 3 Ensure steady incomes of small and marginal farmers by enhancing their Bovine Stock to atleast five per household					
Outcome 3.1 FIGs strengthened to <ul style="list-style-type: none"> - Choose small and marginal households for interventions, - Choose indigenous variety suitable and available for undertaking artificially inseminating bovine stock existing with farmer households - Undertake artificial insemination 	12 FIGs formed from six Mandals and strengthened on managing indigenous cattle and implementing AI activity	Currently no FIG is working for strengthening indigenous breed	Popularise three important breeds in the project area	FIG reports and AI reports	Assumptions: Groups show interest to rear indigenous cattle Risk – Farmers may sell away healthy animals
OUTPUT 3.1.1 Pure indigenous variety (Sahiwal/Ongole/ Gir) chosen for artificial insemination <ul style="list-style-type: none"> -Small and marginal households identified which are ready to give one of its ND/crossbred/indigenous stock for insemination with 100% indigenous Sahiwal/Ongole -Semen of Sahiwal/Ongole procured 	100 % Sahiwal, Gir and Ongole semen available with AI workers in 33 Vet. Institutes in the Project area	Pure indigenous breed semen is not available	Cover the project area within 5 years with 100% indigenous bull semen	AI report	Assumption: Adequate number of Semen doses available with the inseminators Risks: Farmer preference may be for pure exotic breeds

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
-Artificial insemination undertaken of at least 3000 cattle, 1000 each in the 3 districts chosen					
Outcome 3.2 Indigenous pure strained heifer cattle procured one per family for small and marginal farmers	2400 Good quality Sahiwal/Gir/Ongole heifers are available with farmers for rearing in the project area	Very few pure indigenous breeds animals available as more than 70% are nondescript	Increase indigenous cattle population in the project area which are adapted to local conditions initially purchasing from outside	Farmers wise list of animals purchased	Assumptions: farmers contribute 50% to purchase heifers Risks: Farmers may cross them with crossbred or ND bulls
OUTPUT 3.2.1 1200 families in total project area (400 each in 3 of the identified districts) have two each of Sahiwal/Ongole through cost sharing amongst farmer, animal husbandry department and project	2400 Good quality Sahiwal/Gir/Ongole heifers are available with farmers for rearing in the project area	very few pure indigenous breeds animals available as more than 70% are nondescript	Increase indigenous cattle population in the project area which are adapted to local conditions initially purchasing from outside	Farmers wise list of animals purchased	Assumptions: farmers contribute 25% to purchase heifers Risks: Farmers may cross them with crossbred or ND bulls
OUTCOME 3.3 Indigenous cattle milk collection centers and link to niche market established	Farmer have access to 30 milk collection centres in the project area, to market indigenous milk	Such system does not exist. Milk collection centres collect all types of milk as mixed milk	Develop market for indigenous cow milk	Farmer wise milk sales report	Assumption: Milk collection centres open during all seasons Risks: collection of sufficient volumes may not be possible

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
OUTPUT 3.3.1 -Establish milk collection centres where heifers are supplied -Identify market and sell milk	30 milk collection centres supply Milk to niche market	There is no niche market	Entire milk produced from indigenous cattle is collected and marketed as niche product with higher price	Milk Bill Reports	Assumptions: There is a market for indigenous milk Risk: Production may not be uniform
Component 4: Ensure Social Safety Net for small and marginalised Households dependent on Climate Resilient Indigenous Cattle Breeds within project boundary					
OUTCOME 4.1 Risk of loss of income due to mortality amongst heifers averted	100% farmers follow timely vaccination and deworming	No proven practise with regard to indigenous cattle	All indigenous heifers purchased from outside to be included in regular government schemes	Animal health card available with farmer	Assumption: sufficient preventive medicines available with the department Risks: Sudden outbreak of diseases
Output 4.1.1 All Heifers procured in this project are covered under intensive health and breeding services	100 % Sahiwal, Gir and Ongole heifers protected	Non descript and indigenous cow draw less attention, compared to crossbreds	Ensuring 100% health coverage to indigenous cattle	Veterinary Hospital records	Assumptions All Farmers demand for timely vaccination Risk: Timely vaccine may not be available
Output 4.2 Risk of loss of income due to mortality amongst bovine stock admitted in hostels averted	100% animals kept in hostel follow timely vaccination and deworming	No proven practise with regard to indigenous cattle	The concept to be popularized in similar contexts	Animal health card available with farmer	Assumption: No new diseases are observed Risks: Sudden outbreak of diseases
Output: 4.2.1 All Bovine stock kept in hostels	100 % animals kept in hostels are protected	The hostel concept is new	Standard Health care Protocols	Animal wise records	Assumptions: All farmers interested in

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
receive timely health care.	with health coverage		are compulsory for animals kept in hostel	available in the hostel	wellbeing of animals Risk: Emergence of new diseases
Outcome 4.3 Risk of loss of income due to mortality amongst Artificial inseminated progeny and mother averted	All calves born from AI and their mothers are protected by timely vaccination and deworming	No proven practise with regard to indigenous cattle	The concept to be popularized in similar contexts	Animal health card available with farmer	Assumption: No new diseases are observed Risks: Sudden outbreak of diseases
Component 5. Create knowledge management and skill development opportunities for managing cattle sustainably in a changing climate scenario					
Outcome 5.1 Best practices documented for managing cattle hostels and distributed to all districts amongst milk related FIGs and policy makers	2 Best practice highlighted	No such initiative	Produce one document so that GoAP can use it for replication	manual	Assumptions: All farmers attend the workshop RISK: farmers may not share some critical issues
Output 5.1.1 Workshops held, one in each district of project area with all key stakeholders. Manual developed on design of heat resistant cattle sheds and best practices for managing bovines design, distributed and put up on animal	3 Workshops held in project area and 2 Best practices highlighted	No such initiative	Produce one document so that GoAP can use it for replication	manual	Assumptions: All farmers attend the workshop RISK: farmers may not share some critical issues

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
husbandry website					
Outcome 5.2 Preparedness of farmers to increase indigenous cattle breed in their livestock mix is documented	2 Best practices highlighted	No such initiative	Produce one document so that GoAP can use it for replication	Vaccination and deworming particulars available in cow card	Assumptions: All times preventive health medicines available RISK: Mortality of one or two may demotivate farmers from rearing cattle
Output 5.2.2 Workshops held, one in each district of AP and document on best practices and benefits in raising indigenous cattle varieties, design and distributed amongst farmers, FIGs and policy makers and put up on animal husbandry website	3 workshops held one each in each district	it is relatively new concept	Capture best information for documentation by involving farmers	Workshop reports	
Outcome 5.3 Officials of the animal husbandry, dairy development department and veterinary personnel trained on best practices for planning for dairy development in the state and	30 Training Programmes designed and approved by the department	There are no specific trainings for training on climate change concerns	All VASs in the department to have training material to train farmers	Copies of the training material	Assumption: Demand for more trainings Risks: by not monitoring the messages can go in wrong directions

Table 16: Results Framework					
Outcome/Output	Indicator	Baseline	Target	Source of Verification	Risks and Assumptions
managing livestock health in heat stressed conditions					
Output 5.3.1 About 1000 officials trained together at the district and state level	Trainings conducted for 1000 department officers			Training report	
Output 5.3.2 Awareness creation and sensitization of farmers on climate change impact on dairy sector	About 2500 farmers trained on climate change impact on dairy sector	Lack of awareness on environmental concerns	Dairy sector farmers	Training report	

- e. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Table 17: Detailed Budget in lakh Rs.										
Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total	
Managing heat stress	Create climate and cyclone resilient designs with roof top water harvesting systems									
	Identification of locations- Department									
		Field visits to districts	Trips		100	0.04			4.000	4.000
	Meeting with farmer and explaining the concept of hostels	Meetings with farmers and officers	Meetings		100	0.002			0.200	0.200
	Organising farmer groups who will participate in the hostel system		Meetings		100	0.002			0.200	0.200
		Identification	Meetings						0.000	0.000
		Training - 15 person batch 5 trainings of each five days	Person days		375	0.005			1.875	1.875
	Preparations of designs by architect	Architect fee	Lump sum						1.000	1.000
	Short listing and award of contractor for building of hostels -								0.000	
	Construction cost -6 hostels	Construction	Sheds		6	21.000		88.20	49.800	138.000
	Provision of breeding and health services	Services	Lump sum		6	0.250		1.50		1.500
	Running hostel	Revolving fund to entrepreneur	Lump sum		6	0.500			3.000	3.000
	Sub-Total							89.70	60.075	149.775
Arrange for saplings from the forestry department							0.10		0.100	

Table 17: Detailed Budget in lakh Rs.

Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total
	Undertake plantation with the help of farmers, one day wages provided by MGNREGA						0.10		0.100
	Sub-Total						0.20		0.200
	Adequate and potable quality water facility provided for 365 days								
	Identify the area for digging bore well	Hydrological study in six locations	Lump sum					1.500	1.500
		Bore well digging - Bore wells	Number	12	1.000			12.000	12.000
	Construction of storage tank	Under ground and overhead tanks	Number	12	2.000			24.000	24.000
	Water pumping mechanism of capacity 2 HP through solar water pumps								
		Pipelines to channelize water	Lump sum	6	1.000			6.000	6.000
	Sub-Total							43.500	43.500
	Design for generating 10 KVA of electricity from corresponding size of biogas units for cooling 1000 litres of milk for each site	Six bio gas units	Lump sum	6	0.500			3.000	3.000
		Chilling units and necessary equipment	Lump sum	6	12.000			72.000	72.000
	Award the contract for building biogas and generating electricity	Installation including civil works	Lump sum	6	0.300			1.800	1.800
	Training the entrepreneur on maintaining the chilling units, biogas etc.	Training -10 entrepreneurs - 5 trainings of 5 days each		250	0.005			1.250	1.250

Table 17: Detailed Budget in lakh Rs.

Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total
	Integrate within the hostel design system for collection of urine and slurry	Urine and slurry collection unit with for manure production	Lump sum	6	5.000			30.000	30.000
	Tie up with an entrepreneur who will collect the manure and sell	Market linkages	Meetings	12	0.200			2.400	2.400
	Support to entrepreneur to run gas units, chilling unit and manure production from urine and slurry	Revolving fund	Lump sum	6	0.500			3.000	3.000
	Sub-Total							113.450	113.450
	Data collection	Design the framework for data collection and synthesis	IC time						
		Mini weather stations	Number	6	1.000			6.000	6.000
		Infrastructure for data collection	computer	10	0.500			5.000	5.000
		Software development	Lump sum	1	2.000			2.000	2.000
		Data analysis	IC time					0.000	0.000
	Sub-Total							13.000	13.000
Develop business models to sustainably grow and supply fodder for the animal hostel and in areas where there is an identified fodder	Farmer meetings to identify tanks and potential private lands	Farmer meetings -5 per location	Meetings	30	0.020			0.600	0.600
		Formation of fodder producing groups	Meetings	30	0.020			0.600	0.600
		Plot allocation	Meetings						
		Seed supply	Kgs	1000	0.003			3.000	3.000
		Monitoring	IC and AHD time					0.000	0.000
	Sub- total							4.200	4.200
	Farmer meetings to disseminate technology crop residue technology	Farmer meetings -5 per location	Meetings	30	0.020			0.600	0.600

Table 17: Detailed Budget in lakh Rs.

Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total
deficiency in selected districts	Estimate demand for crop residue bales	Conduct survey- 6 locations	Person days	100	0.030			3.000	3.000
	Identify six entrepreneurs one each from each location	Training -10 entrepreneurs - 5 trainings of 5 days each	days	250	0.005			1.250	1.250
	Purchase of twelve crop residue bailing machinery on cost sharing basis (10: 25:65)	Cost sharing (EP+AHD+Pro)	Machine	12	5.000	6	15	39.000	60.000
	Support to entrepreneur to run units	Revolving fund	Lump sum	12	0.500			6.000	6.000
	Sub-Total					6	15	49.850	70.850
	Identification of severe fodder deficit areas	Field survey as row 50							
	Conduct farmer meetings to discuss fodder bank concept	Farmer meetings -5 per location	Meetings	30	0.020			0.600	0.600
	Estimate fodder requirement		IC Time						
	Design the fodder bank and develop its management system		IC and AHD time						
	Construction of fodder banks	Quotations							
	Short listing tenders								
	Work order	Number	6	50.000			150	150.000	300.000
Sub-Total							150	150.600	300.600
Ensure steady incomes of small and marginal farmers by	Farmer trainings on importance of indigenous breeds	Farmer meetings -5 per location	Meetings	30	0.020			0.600	0.600
	Conducting AI	Semen purchases : Sahiwal and Gir	Meetings	100000	0.00015			15.000	15.000
	Formation of groups	Groups formation	Meetings	100	0.002			0.200	0.200

Table 17: Detailed Budget in lakh Rs.

Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total	
enhancing their bovine stock to at least 5 per household	Popularization of indigenous breeds	Procurement of heifer	Number	2500	0.350	350		525.000	875.000	
	Interaction with organized dairy players to link the farmer collective		IC time							
	Establish milk collection centres and collect indigenous milk separately		IC time							
	Sub- total					350	0	540.800	890.800	
Ensure safety net for small and marginalized households dependent on climate resilient indigenous cattle breeds within project boundary	Develop climate change training modules	Module development	number							
		Printing	Number	4	2.000			8.000	8.000	
	Develop capacities in the department	ToT	Batch	2	2.000			4.000	4.000	
		International training	Number	10	6.000			60.000	60.000	
	Improve farmers knowledge on cc issues	Posters on CC affects			10000	0.001			10.000	10.000
		Posters on importance of indigenous cattle			10000	0.001			10.000	10.000
		Flip chart on CC affects for trainer			200	0.040			8.000	8.000
		Flip chart on importance of indigenous cattle			200	0.040			8.000	8.000
		Booklet on CC affect for farmers			10000	0.001			5.000	5.000
		Booklet on importance of indigenous cattle			10000	0.001			5.000	5.000
		farmer trainings	number		10000	0.002			20.000	20.000
Sub total							138.000	138.000		
All heifers protected from mortality	Vaccinations									

Table 17: Detailed Budget in lakh Rs.

Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total
		Deworming							
		Feed for 10 Months	Kg	750000	0.0001	42	42	21.000	105.000
		Mineral mixture @50 grams/cow/day/300 days	Kg	37500	0.001	17		11.250	28.125
		Strengthening of field institutions	Lump sum	6	2.000			12.000	12.000
		Sub- total				59	42	44.250	145.125
Create knowledge management and skill development opportunities for managing the cattle sustainably in a heat stress future scenario	Best practices documented for managing cattle hostels	Workshops	Number	6	0.100			0.600	0.600
		One to one interviews	Number	30				0.000	0.000
		Publication	Documents	2	0.250			0.500	0.500
	Documentation of indigenous cattle management practices	Workshops	Number	6	0.100			0.600	0.600
		One to one interviews	Number	30				0.000	0.000
		Publication	Documents	2	0.250			0.500	0.500
		Sub- total				0		2.200	2.200
		Field staff- (one ach at Division, district and state)=10 nos.	Months	600	0.200			120.000	120.000
		Field coordinator - One each at mandal level=6	Months	360	0.100			36.000	36.000
		AHD travel cost:							
	Head office to field	Years	5	1.000			5.000	5.000	
	JDs to field- 3	Years	15	0.250			3.750	3.750	
	ADs	Years	30	0.250			7.500	7.500	
	VASs	Years	30	0.100			3.000	3.000	
	Sub- total						175.250	175.250	

Table 17: Detailed Budget in lakh Rs.

Components	Activities	Budget heads	Units	No. o f units	Unit cost	Farmers	AHD	Project	Total
	M&E cost							13.500	13.500
M& E	Sub total							13.500	13.500
			Lump sum					0.000	
Pre phase	Project Execution cost					415	297	1348.675	2060.450
	Departmental Execution cost								206.045
	NABARD cost								61.814
	Project formulation cost for Intercooperation							10.000	10.000
	Total project cost								2338.309
								Fund Required	1626.309

- f. Include a disbursement schedule with time-bound milestones at the component level

Table 18: Time Line		
Sl.No	Major activity	Timeline
1	Community meetings	0-6 months
2	Identification of entrepreneurs	4-8 Months
3	Resource persons training	8-12 months
4	Trainers training on cc issues	12-18 Moths
5	Hostel construction	8-20 months
6	Farmers training on CC issues	16-35 months
7	Crop residue bale production and marketing	15- 55 moths
8	Fodder production in tank beds	15-55 months
9	Midterm evaluation	30 th month
10	Orientation on indigenous cattle and their popularization	15-55 months
11	Chilled Milk marketing	24-55 Months
12	Manure marketing	30- 55 months
13	Documentation experiences	50-55 months
14	Final evaluation	55 Months
15	Upscaling strategy development	55-59 th week
16	Program closure	60 th Month

Table 19: Disbursement Schedule							
	On signing the agreement	year 1	year 2	year 3	year 4	year 5	Total In lakhs (Rs.)
Scheduled date	April, 2016						
Year wise Project fund requirement		407.6025	407.6025	203.8013	203.8013	135.8675	1358.675
Executing entity fee-		51.511	51.511	51.511	51.511	51.511	206.045
NABARD		12.3627	12.3627	12.3627	12.3627	12.3627	61.8135
Total		473.5369	473.5369	269.73565	269.7357	201.8019	1626.309

Cost-Justification of the Project

- The project intervention would prevent opportunity losses incurring in business as usual scenario, in the form of delayed puberty, shorter lactation lengths, less number of lactations, higher financial inputs for water, fodder, health and other services
- Biogas-based chilling units would contribute to mitigation of GHG emissions on two fronts: First by avoiding emissions from conventional diesel-based chilling units, and secondly, avoiding Methane emissions that would have been emitted from cow-dung while composting
- Increased comfort makes animals to be less morbid and increase milk production by 3 liters per animal with an additional benefit of Rs.3456 lakh in five years
- About 16 acres of tank-bed/ village-commons in each Mandal involving a 20 member SHG, cumulating to about 100 acres in six Mandals of three selected districts, would be utilized for fodder production, generating a net annual income of Rs.32.66 lakhs
- Establishment of 6 biogas-based chilling units will provide assured market and farmers will receive Rs.6 per liter incentive towards value addition with overall benefit of Rs.1210 lakh.
- At least 25% of heifers procured from outside expected to produce milk accounting to a benefit Rs.1080 lakh.
- By linking to organized market, indigenous cow milk produced from heifers is expected to fetch additional Rs.2 per liter as incentive and benefit Rs.67.5 lakh
- Around Rs.1080 lakh worth of calf-assets will be built from heifers by timely inseminations and services
- Slurry from biogas units and urine from cattle hostels are collected by Farmer Interest Groups for agricultural manure purpose in entrepreneurship model
- Improved livestock health services would reduce the cost of treatment from Rs. 500/- per year per cow to Rs.100/- per year per cow

- 16 members would get employment opportunity. The project is also likely to benefit 30 entrepreneurs and increase natural resource base in the project area.

Overall benefit Rs.100 crores.

ADDENDUM**COST ECONOMICS OF GREEN FODDER CULTIVATION****1. Panchayat Land with Approval for Fodder Cultivation:****For Tank-bed Cultivation of Green Fodder****a) Cost of Fodder seed:** Rs. 60/- per kg

Requirement of seed per one acre = 8 kgs.

Seed cost per one acre = $60 \times 8 =$ **Rs.480/-****b) Preparation of land per Acre:**

i) Ploughing : Rs. 600=00

ii) Sowing : Rs. 500=00

iii)

Total Cost for Land Preparation per Acre = **Rs.1100/-****c) Fertilizers per Acre:**

Urea	+ Pottash	+ Superphosphate
50kgs	+ 50kgs	+ 50kgs
↓	↓	↓
Rs. 350/-	+ Rs.800/-	+ Rs. 500/- =

Total Fertilizer Cost per Acre = **Rs.1,650/-****d) Labour Charges:**

Watering	+ Inter cultivation	+ Weeding
↓	↓	↓
Monthly 3 times for 4 months	Rs. 750/-	Rs. 200/- X 5 = 1,000/-
↓		
Rs. 300 X 3 X 4		
Rs. 3,600/-		

Total Labour Charges per Acre = **Rs. 5,350/-**

e) Harvesting:

1. Maize seed purpose taking away the cobs Rs. 2,000/-
2. Machine Seed separation: Rs. 40/- X 10 = Rs. 400/-

Total Cost of Harvesting = **Rs. 2,400/-**

Total Annual Expenditure per Acre: Rs. 10,980/-

Green Fodder Yield per Acre: 15 MTs.

Unit Cost of Green Fodder per Kg. = Rs. 3/-

Green Fodder Income per Acre per Annum:

(15000 kgs X Rs.3) = **Rs.45,000/-**

Net Annual Income per acre = Income – Expenditure

Rs. 45000 – Rs. 10,980 = **Rs.34,020/-**

Total Land Area for Green Fodder Cultivation in each Mandal: **16 Acres**

Net Annual Income from 16 acres of land =

Rs. 34,020 X 16 = **Rs.5,44,320**

Number of Green Fodder Cultivation Facilities in all Three Districts of Project Area: **6**

Net annual Income from Green Fodder Cultivation in Project Area in three Districts:

Rs.5,44,320 X 6 = **Rs.32,65,920/- = Rs.32.66 lakhs per annum**

BROAD BENEFITS OF THE PROJECT

Major benefits and co-benefits in project locations would go beyond the project duration as community stakeholders would be given capacity building and skill development for all project maintenance and entrepreneurship activities. Thus established best practices could be scaled up across the state with community participation.

The proposed project would realize the following major benefits and co-benefits in the pilot locations:

ASSET CREATION:

Cattle Hostels

- Cattle Hostels offering physical comfort to animals against climate-extremities like high temperatures and heat waves, thus contributing to enhanced milk production and minimizing weather related morbidity and mortality.
- Six Cattle Hostels would be constructed with surrounding green cover – two hostels in each of the three districts.
- Each of the six Cattle Hostels will have 2 bore wells dug, as per groundwater experts' advice to supply water all throughout the year, and 2 underground water harvesting structures collecting roof-top rainwater with sufficient storage facility
- Each hostel to keep about 200 animals belonging to at least 100 members of the local community, with timely vaccination, deworming and other veterinary services by animal husbandry department.

Biogas Based Chiller Units

- Six Biogas based Chilling Units, each with a capacity of 1000 litres, to reduce milk spoilage.

Tank bed Cultivation Facilities for Green Fodder Production

- About 16 acres of tank-bed/ village-commons would be cultivated by a 20 member SHG in each Mandal for Green Fodder production, cumulating to about 100 acres in six Mandals of total project area,

Promotion of indigenous Sahiwal/Gir/Ongole Heifers

- Procuring about 2400 good quality indigenous heifers of Sahiwal/Gir/Ongole variety in three districts of project area, through cost sharing amongst farmer, animal husbandry department and project.

CO-BENEFITS OF THE PROJECT

- Cattle dung is diverted to biogas power for Milk Chilling Centres
- Slurry from biogas units and urine from cattle hostels are collected by Farmer Interest Groups for agricultural manure purpose in entrepreneurship model
- About 16 acres of tank-bed/ village-commons in each Mandal involving a 20 member SHG, cumulating to about 100 acres in six Mandals of three selected districts, would be utilized for fodder production, generating a net annual income of Rs.32.66 lakhs in total project area
- Regeneration of wastelands in village commons through Green Fodder Cultivation by Farmer Interest Groups.
- Six Entrepreneurs trained in the technology for producing Crop Residue Bales. This generates employment opportunities for young people in village by involving them in the crop residue bale production
- Establishing six community-based Fodder Banks in project area to address fodder crisis through community mobilization
- Knowledge Management, Capacity Building and Skill Development for department personnel and FIGs through Workshops and Training Programmes