



## DETAILED PROJECT REPORT

### Conservation and management of indigenous varieties of livestock (Cattle and Sheep) in the wake of climate change in Karnataka



Submitted by:  
Department of Animal Husbandry and Veterinary Services  
Government of Karnataka

Technical support:  
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## PROJECT SUMMARY

Title of Project/Programme:	Conservation and management of indigenous varieties of livestock (Cattle and Sheep) in the wake of climate change in Karnataka
Project/Programme Objective/s:	The proposed project aims to sustain the income of small and marginal farmers, dairymen and sheep rears through conservation and revitalization of indigenous livestock varieties of in the State as an adaptation strategy, which are more resilient to climate change.
Project/ Programme Sector:	Animal Husbandry
Name of Executing Entity/ies/Department:	Department of Animal Husbandry and Veterinary Services (AH&VS), Government of Karnataka
Beneficiaries:	Farmers, Dairymen and Sheep rears (The project proposes to benefit approximately 140 drought affected taluks of the state covering at least 33% women as target beneficiary)
Project Duration: Start Date: End Date:	5 years 1 <sup>st</sup> May, 2016 (tentative) 30 <sup>th</sup> April, 2020 (tentative)
Amount of Financing Requested (Rs.):	24.92 crores
<u>Project Location</u> State: District:	Karnataka 1. <u>Cattle</u> : Dakshina Kannada ( <i>Malnad gidda</i> ), Bidar ( <i>Deoni</i> ) and Tumakuru ( <i>Hallikar</i> ) 2. <u>Sheep</u> : Mandya ( <i>Bandur</i> ), Belagavi ( <i>Deccani</i> ), Haveri ( <i>Bellary</i> ) 3. <u>Fodder development</u> : Bellary and Tumakuru
Contact Details of Nodal Officer of the Executing Entity/ies:	Dr. T. Shivaram Bhat Additional Director (Development) O/o The Commissioner, AH&VS, 3 <sup>rd</sup> Floor, Vishveshwarayya Mini Tower, Dr. Ambedkar Veedhi, Bengaluru-560001 Email: <a href="mailto:jddahvs@gmail.com">jddahvs@gmail.com</a> Mobile: +91-94815-28147



northern drought-prone districts have, in general, more years of moderate and severe drought (absence of rainfall for more than 40 consecutive days) than blocks in southern districts.

Karnataka has 30 districts, and all are endowed to varying extent with land, water, and forest resources. Climate change is likely to impact all the districts. The districts of interior northern Karnataka are assessed to be most vulnerable. Low per-capita income, high population density, low literacy rate, and fewer livestock units per 1,00,000 population are some of the causes of high vulnerability.

Possible effects of climate change are not just limited to agricultural sector affecting food production. Climate change is projected to negatively affect livestock mainly arising from impact of climate change on availability of fodder & feed; potable water; heat distress suffered by animals; increased incidences of vector borne and parasitic diseases and loss of resources. Frequent droughts and in-sufficient availability of fodder often lead to distress selling of livestock by farmers. Unfortunately, IPCC Fifth Assessment Report (AR5) contains limited information on the projected impacts of climate change on livestock and livestock systems, compared to agriculture. Most of the assessments rather have focused on emissions from livestock.

In Karnataka where a large rural population depends on food production systems and natural resource base for livelihood, climate change poses a serious threat. Reducing their vulnerability would require incorporating adaptation measures in State development planning as well as taking up standalone adaptation measures to strengthen resilience of communities to the impact of climate change by improving the natural resource base, diversifying cropping systems, adapting the farming-systems approach, and strengthening the extension system and institutional support.

Livestock ownership in Karnataka is characterized by diverse types of livestock such as dairy cows, sheep and goats, and poultry. The livestock development has primarily focused on introduction of exotic as well as crossbreeding of local breed with exotic ones with the goal to boost milk production. With climate change, these are the exotic breeds of livestock (cattle and sheep) which are more prone to impact of climate change impacts like heat distress and parasitic infection etc. Research studies have shown that rising temperature is likely to lower the productivity of exotic and crossbred cattle. The average annual temperature in most parts of the State is already above the thermal-comfort zone (27°C) of cattle for maximum milk yield. With climate change, it is project that temperatures in Karnataka may rise in the range of 1.0–3.0 °C by the 2030s compared to pre-industrial period (1880). Highest warming is projected for districts of Chitradurga, Koppal, Raichur, and Tumkur (2.0 °C and above) by the 2030s. Besides the direct effects of climate change on livestock, there are profound indirect effects which include climatic influences on quantity and quality of potable water, feed and fodder resources. Climate change also has a bearing on livestock diseases. Previously studies in India have found climatic factors like temperature, humidity and rainfall affecting variations in spread and seasonality of diseases like foot and mouth disease in cattle. Such changes would plausibly aggravate the heat stress in animals and further adversely affect their productive and reproductive performance.

While climate change is projected to impact livestock sector, livestock development focusing indigenous breed also forms an important coping strategy and an alternative source of livelihood for rural households. Native breeds are more resilient to fluctuations in temperature and other climatic conditions.

Therefore, the project titled 'Conservation and management of indigenous varieties of livestock (Cattle and Sheep) in the wake of climate change in Karnataka,' is proposed to conserve and popularise indigenous varieties of livestock (Cattle and Sheep), as they yield more milk in distress comparison to cross-bred and more tolerant to climatic changes. Crossbreds, though yield more milk as compared to local breeds, are less resistant to diseases, poorly tolerate to inclement weather conditions and perform poorly under feed & fodder scarcity. Further, local sheep breeds are also drought resistant, less prone to diseases, parasitic infestations and mutton from local breeds is more tender and palatable, which is relished by local population.

*b) Outline 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 proposed activity is highlighted under the Animal Husbandry section of Agriculture and Allied sector chapter of Karnataka State Action Plan on Climate Change, which suggests expanding the breeding of indigenous cattle breeds and enhancing the production of drought resistant fodder.

Drought proofing of livestock for overall economic development and improvement of the socio-economic conditions of the resource poor farmers is also one of the prioritized activities highlighted in the National Mission on Sustainable Agriculture under National Action Plan on Climate Change.

The project aims to popularize indigenous varieties of cattle and sheep by adopting breeding of indigenous cattle breed practices. Project also proposes to enhance fodder production and management, so that it could be available during lean period of water availability. This would enhance the milk and meat production and increase the life span of cattle and sheep.

*c) Include climate analysis and vulnerability analysis*

### **Current Climate Variability and Future Climate Change Projections**

Due to high dependency on agriculture on rain-fed farming and limited water available for irrigated agriculture, agriculture is highly susceptible to any changes in climatic conditions. Analysis of current climate variability and future projections by Indian Institute of Sciences Bengaluru (2014) further adds to this uncertainty. As per the study titled "Transitioning towards Climate Resilient Development in Karnataka, led by IISc (Dec 2014),

temperature trends in Karnataka observed over the last century suggest warming by about 0.4 °C. Highest increase in minimum temperature was recorded in northern Karnataka (districts of Bidar, Bijapur, Gulbarga, Raichur and Yadgir distt) where temperatures increased by more than 0.6 °C.

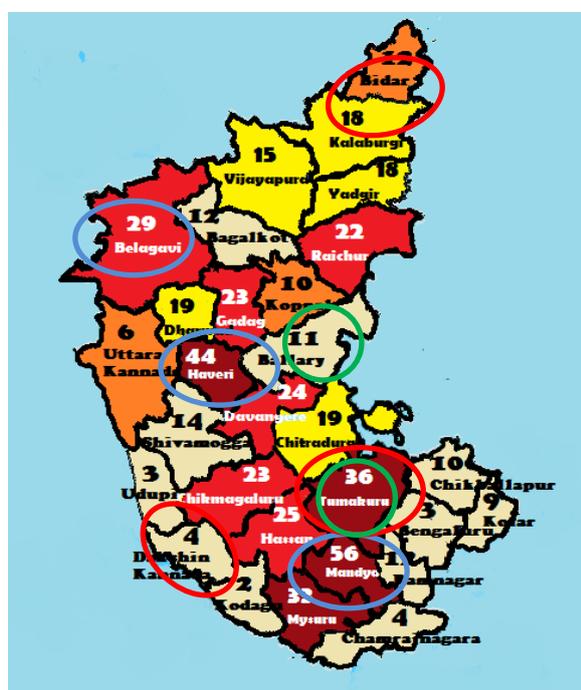
Further climate projections for Karnataka suggest increase in temperature in the range of 1.0–3.0 °C by the 2030s compared to pre-industrial period (1880). Highest warming is projected for districts of Chitradurga, Koppal, Raichur, and Tumkur (2.0 °C and above) by the 2030s under high emission scenario. In the long term (by 2080s), the mean temperature increase for Karnataka could be as high as 5.0 °C under the high-emissions scenario. Even in the moderate emission scenario, annual average temperature is projected to increase by 2.0–3.0 °C by 2080.

Trends in the rainfall over the last century indicate decrease in annual rainfall in Karnataka up to by 10%. Districts of Chikmagalur, Dakshina Kannada, Kodagu, Shimoga, Uttara Kannada, and Udupi witnessed more than 10% decrease in rainfall. Rainfall also declined significantly in northern districts of Bidar, Bijapur, Gulbarga, and Yadgir.

At the same time, models-based projections for rainfall show a wide variation within Karnataka. Rainfall is projected to be marginally higher (4%–8%) by 2030 in Bidar, Bijapur, Gulbarga, Kolar, and Yadgir districts under the moderate-emissions scenario. A similar increase in rainfall is likely in these districts under high emission scenario as well. In the long term (2080s), an increase of 8%–12% is likely in almost all the northern districts under moderate-emissions scenario and up to 16% in south-eastern districts such as Bangalore, Chikballapur, and Kolar under the high-emissions scenario.

While projections show moderate increase in rainfall; rainfall pattern in the future is likely to be more variable-- rainfall is projected to be more intense with fewer rainy days. This means water will be available for fewer number of days increasing the possibility of drought period. Karnataka ranks second in India after Rajasthan based on its vulnerability to drought. The north interior of State's annual rainfall ranges between 500–600 mm. Approximately, 54% of the geographical area of the state is drought prone, affecting 88 of 176 taluks and 18 of the 30 districts. Taluks that have had droughts in 25% or more years are Chitradurga, Hosadurga, Sira, Madhugiri, Shorapur, Athani and Bagepalli. Taluks with the greatest percentage of drought years are Sira, Madhugiri, Korategere, Kadur, Kushtagi, Shorapur, Shahapur, Yadgir, Bangarpet, Mulbagal, Srinivasapur, Gudibanda, Bagepalli, Athani, Raibag, Saundatti and Gokak. The taluks of the northern drought-prone districts have in general, more years of moderate and severe drought than the taluks in the southern districts. There are some taluks in which drought occurred in three or more consecutive years. The largest continuous period of drought was eight years at Gubbi (Tumkur district) from 1920-27, at Athani (Belgaum district) from 1965-1972, at Chincholi (Gulbarga district) from 1965-72 and at Nargund (Dharwad district) from 1920-27. An increase in drought was projected for the period 2021 to 2050 for the two growing seasons Kharif and Rabi.

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



Project activities are spread across various locations in the state. In regard to component 1 on conservation of indigenous cattle, cattle would be collected from various native locations and upon collection; breed will be housed in a single Governmental farm. Native tract and farm location of each breed are as follows:

Cattle:

Sheep:

Fodder development:



Figure 3: Project locale

Name of cattle breed	Native tracts	Farm Location
Malnad gidda	Chikkamagaluru, Shivamogga, Dakshina Kannada, Uttara Kannada, Udupi and Kodagu	Dakshina Kannada
Deoni	Bidar, Yadgir and Kalaburgi	Bidar
Hallikar	Bengaluru, Kolar, Tumakuru, Mysuru, Mandya, Hassan, Shivamogga, Davanagere, Chitradurga	Tumakuru

Locations of indigenous sheep varieties have already been identified. Those varieties would be procured and placed in Governmental farms. The location of farm for each sheep breed is as follows:

Name of sheep	Location of farm
Bandur	Sheep breeding Farm, Dhangur, Mandya dist.
Bellary	Sheep breeding Farm, Guttal, Haveri Dist.
Deccani	Sheep breeding Farm, Suttatti, Belagavi Dist.

These farms would be equipped with various water and conservation practices such as rain water harvesting structure, farm ponds, solar panels etc. Waste generated from the livestock is also proposed to be treated using bio-gas plants, vermicomposting etc. Details of the farms are at **Annexure-II**.

It is also proposed to develop adequate fodder for the livestock. This activity is proposed to be done on areas where rainfall is adequate. Fodder densification units would therefore be established in 2 governmental farms i.e. Kurikuppe in Bellary district and Kunikenahalli in Tumakuru district. Subsequent to increase of fodder into fodder blocks, it will be transferred to approximately 140 drought prone locations of the state. Project location for each component is shown in **Fig 3**.

### 1.2 Project Objectives:

Overall objective of the project is to sustain the income of small and marginal farmers, dairymen and sheep rearers through adopting climate resilient pathway by conserving and revitalizing indigenous livestock (cattle and sheep) varieties of the state. This objective is proposed to be achieved through following activities:

- Conservation & revitalization of indigenous cattle breeds (Malnad gidda, Deoni, Hallikar) and sheep breeds (Bandur, Bellary and Deccani) through propagation of pure semen from true to the breed animals and by Natural service.
- Enhancing and managing the production of feed and fodder which will be available to livestock during lean period of water availability
- Adoption of water conservation practices such as rain water harvesting tanks, farm ponds, check dams etc.; renewable energy measures such as setting up solar panels etc.; waste management practices such as establishing bio-gas plants, vermicomposting units
- Mainstreaming livestock adaptation strategies into policies and programmes through knowledge management and sharing

### 1.3 Details of Project/ Programme Executing Entity:

a) Name, Registration No. & Date, Registered Address, Project Office Address

Name and address (Registered and Project office):

Dr. T. Shivaram Bhat

Additional Director (Development)

O/o The Commissioner, DoAH&VS,

3<sup>rd</sup> Floor, Vishveshwarayya Mini Tower,

Dr. Ambedkar Beedhi, Bengaluru

Mobile: +91 9481528147

Email: [jddahvs@gmail.com](mailto:jddahvs@gmail.com), [addahvs@gmail.com](mailto:addahvs@gmail.com)

Registration No. and Date:-AH&VS was established in 1945

b) Available technical manpower for the proposed project implementation:

I. Department of Animal Husbandry and Veterinary Services (AH&VS)

S. No.	Name & Designation	Address	Specialization
i.	Dr. T. Shivaram Bhat, Additional Director, (Development) (Lead)	O/o The Commissioner, AH&VS, 3 <sup>rd</sup> Floor, Vishveshwarayya Mini Tower, Dr. Ambedkar Beedhi, Bengaluru	Livestock management, Veterinary services and Project implementation Qualified Veterinarian
ii.	Dr. Janaki H.P., Assistant Director	-do-	Livestock management, and Veterinary services Qualified Veterinarian
iii.	Supported by approximately 1526 qualified veterinarians of the department in the target districts		

II. Environmental Management and Policy Research Institute(EMPRI)

S. No.	Name & Designation	Address	Specialization
i.	Smt. Ritu Kakkar, IFS, Director General (Lead)	EMPRI, Hasiru Bhavana, Doresanipalya Forest Campus, Vinayakanagara Circle, J.P Nagar 5th Phase, Bangalore- 560078	Forestry
ii.	Smt. Saswati Mishra, IFS, Director	-do-	Forestry

III. National Dairy Research Institute (NDRI)

S. No.	Name & Designation	Address	Specialization
i.	Dr.K.P. Ramesha	Principal Scientist (AGB), SRS of NDRI, Bangalore	Animal Genetics & Breeding
ii.	Dr. Mukund A. Kataktalware	Senior Scientist (LPM), SRS of NDRI, Bangalore	Livestock Production and Management
iii.	Dr. S. Jeyakumar	Senior Scientist (Anim. Reproduction), SRS of NDRI, Bangalore	Animal Reproduction
iv.	Dr. D. N. Das	Principal Scientist (AGB), SRS of NDRI, Bangalore	Animal Genetics & Breeding
v.	A. Manimaran,	Scientist (Vet Pharmacology),SRS of NDRI, Bangalore	Vet Pharmacology

IV. Karnataka Veterinary, Animal and Fisheries Sciences University (KAVFSU)

S. No.	Name & Designation	Address	Specialization
i.	Dr.Vivek M Patil Associate Professor & Head	Livestock Research and Information Centre (Deoni) Katti Tugaon, Hallikhed (SF)PO, Bidar Dst., Karnataka	Ph.D.in Livestock production and management with studies on Deoni cattle
ii.	Supported by Assistant Professors –2 in number	-do-	One gynaecologist and one soil science specialist

V. Karnataka Livestock Development Agency (KLDA)

S. No.	Name & Designation	Address	Specialization
i.	Dr. R. Nagendra I/C Project Director	KLDA, Podium block, Vishveshwarayya Tower, Dr. Ambedkar Beedhi, Bengaluru 560001	Livestock management, Veterinary services and Project implementation Qualified Veterinarian
ii.	Dr.Dwarakanath N.K, Deputy Director,KVS	As above	Livestock management, and Veterinary services Qualified Veterinarian
iii.	Supported by approximately 1526 qualified veterinarians (minimum qualification BVSc) of the department in the target districts		

VI. Karnataka Sheep & Wool Development Corporation (KSWDC)

S. No.	Name & Designation	Address	Specialization
i.	Dr.K.M. Mohammad Zaffrulla Khan Managing Director	Karnataka Sheep & Wool Development Corporation, Veterinary college campus, Hebbal Bangalore-24	Livestock management, Veterinary services and Project implementation Qualified Veterinarian
ii.	Dr.C.Veerabhadrayya, Deputy Director	Bandur Sheep Breeding and Training Centre, Dhangur ,Malavalli Tq.Mandya Dst	Livestock management, and Veterinary services Qualified Veterinarian
iii.	Dr.SudhakaraReddy, Assistant Director	Sheep Breeding and Training Centre, Guttala ,Haveri Dst	Livestock management, and Veterinary services Qualified Veterinarian
iv.	Dr.B.N.Nandigowdar Assistant Director	Sheep Breeding and Training Centre, Suttatti, Belagaum Dst	Livestock management, and Veterinary services Qualified Veterinarian

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

Project	Objectives	Amount Sanctioned (lakhs)	Funding Agency	Geographical Coverage	Implementation Period & Outcome
None					

d) Three largest community based NRM based projects handled

AH&VS is implementing various projects on livestock health. In NRM sector, department is implementing agricultural related aspects of livestock under Rashtriya Krishi Vikas Yojane. This activity mainly promotes Sheep and Wool development, Dairy development, Piggery and Livestock Health program. This has a total budget of 8613 lakh during 2015-16 .

Further, fodder development is also being taken up in 114 backward taluks by the AH&VS which has a budget of Rs. 50 lakh.

e) Three largest Climate Change Adaptation / NRM projects of State / Central Government  
None

f) Comment of availability of suitable infrastructure for implementation proposed projects (vehicles, computers, required software/ tools, etc.)

Technical Officers and staff of Dept of AH&VS and allied agencies will be utilized for programme implementation. The department has got approximately 1526 qualified veterinarians (36 Deputy Directors, 250 Assistant Directors and 1240 veterinary officers) and supporting staff like para veterinary personnel, support staff in the proposed districts. Other agencies also have enough technical manpower to undertake the project.

At the same time, it is proposed to undertake capacity building programme for Department officials at various levels on evidence based adaptation planning and implementation. The capacity building activities will be undertaken with technical support from GIZ.

g) 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): No

#### 1.4 Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets.

No.	Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (Rs.)
1.	Conservation & revitalization of local cattle breeds (Malnad gidda, Deoni and Hallikar) through propagation of pure breed semen	Increase in the population of indigenous cattle breeds and hence increasing milk yield throughout the year	<ul style="list-style-type: none"> <li>• Improved health of cattle breeds as they will be provided with adequate fodder/feed and potable water</li> <li>• Reduction in the disease outbreaks as department would provide the requisite vaccination, Health coverage.</li> <li>• Preservation of valuable native germplasm</li> </ul>	12,67,10,000
2.	Conservation & revitalization of local sheep breeds (Bandur, Bellary, and Deccani) through propagation by natural service by true to the breed animals	Increase in the population of indigenous sheep breeds and hence increasing meat yield which will sustain the income of small and marginal farmers	<ul style="list-style-type: none"> <li>• Preservation of valuable native germplasm</li> <li>• Improved health and meat yield from sheep breeds</li> </ul>	1,32,22,080
3.	Enhancing and managing the production of feed and fodder for livestock	Sustainable production of feed and fodder for farmers and sheep rears	Adoption of appropriate and efficient post-harvest management through increased fodder production and its efficient utilization	8,83,20,000
4.	Mainstreaming livestock adaptation strategies into policies and programmes through better Knowledge Management and Sharing	<ul style="list-style-type: none"> <li>• Development of knowledge products such as films, research paper, posters etc. for wider dissemination</li> <li>• 10 Training cum exposure visits for farmers and sheep rears on agronomic, Natural Resource Management and economic livestock adaptation measures</li> <li>• Central knowledge repository on climate change adaptation to enable evidence based</li> </ul>	<ul style="list-style-type: none"> <li>• Farmer and sheep rears will be capacitated for the sustainability of the implementation of project activities</li> <li>• Learning and experience of project implementation can be useful for replication of project activities within state and other states.</li> <li>• Convergence of policies in programs that influence adaptation behaviour of</li> </ul>	24,50,000

	policy and program formulation in livestock	farmers	
	<ul style="list-style-type: none"> <li>• Open access for knowledge-sharing platforms (portals, repository)</li> </ul>		
	Project Execution Cost		23,07,02,080
	Total Project Cost (Including 5%management cost of Rs.1,15,35,104)		24,22,37,184
	Project Cycle Management Fee (3%)charged by the Implementing Entity		69,21,062
	<b>Amount of Financing Requested</b>		<b>24,91,58,246</b>

### 1.5 Projected Calendar:

Indicate the dates of the following 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).

Milestones	Expected Dates
Start of Project/Programme Implementation	1 <sup>st</sup> May, 2016
Mid-term Review	1 <sup>st</sup> May, 2018
Project/Programme Closing	31 <sup>st</sup> January, 2020
Terminal Evaluation	30 <sup>th</sup> April, 2020

## 2.0 PROJECT / PROGRAMME DESCRIPTION AND JUSTIFICATION

*i. What is the business-as-usual development for the targeted sector?*

### a) Component-wise details and justification of the project components

Dept. of AH&VS is at present implementing fodder conservation and breed improvement activities. However, the activities lack specific efforts for increasing the milk productivity of indigenous breeds through appropriate genetic selection. The regular on-going programme in the state focuses only on conservation of livestock. Further, there are insufficient programmes for field milk performance recording and selection of bull mothers for propagation of elite germ plasm of the targeted breeds. This project aims to fill the gaps in regular programmes. Therefore, the current proposed proposal focuses on productivity enhancement of indigenous breeds in addition to preservation of local tolerant breeds. If activities are undertaken to enhance production potential of the native cattle breeds in such a way that it becomes economically viable, farmers will be motivated to take up rearing of local breeds that are climate change resilient as against the crossbreds that are climate change susceptible.

Hence, the programme aims to propagate indigenous cattle with superior production characteristics, which are highly adaptable to climate change scenario. In order to improve the productivity, selective breeding is essential. Pure elite animals will be identified based on performance recording and modern genomics approach. Therefore, the proposed project will

involve research work on gene sequencing for identification of elite animals and elucidating unique genes responsible for higher heat tolerance and adaptability to existing local environment.

The state is experiencing drought situations repeatedly and the farmers find it hard to support their livestock during lean periods of water and fodder shortage .During this period they resort to distress sale of their livestock because they are unable to feed them enough. In this regard the local variety of sheep are beneficial as they require less of management ,thrive in low input conditions and are well adjusted with the poor grazing fields available. They convert poor quality of roughage into mutton more efficiently than crossbred sheep that require either lush green grazing or needs to be stall fed.

The project would also include integrating climate smart practices in the existing livestock government farms such as water conservation practices eg. setting up rain water harvesting, farm ponds etc. which will conserve both surface and ground water resources of the selected areas in the state. Further, practices for harnessing solar energy; waste management practices such as establishing vermicomposting in farms and bio-gas plants would also be undertaken.

*ii. What are the specific adaptation activities to be implemented to reduce the climate change vulnerability compared to the business-as-usual situation?*

### **Component 1: Conservation & revitalization of local cattle breeds (Malnad giddda, Deoni, Hallikar) through propagation of pure breed semen**

This component aims at conserving and revitalising the native cattle breeds of the state through propagating pure semen and their selective breeding. The native breeds which are proposed to be conserved are Malnad giddda, Deoni and Hallikar.

Malnad Giddda is a dwarf breed of cattle native to hilly, rainy and densely forested Malenadu region of the Western Ghats in the state of Karnataka. They are of short stature, known for their adaptability and disease resistance. Milk and Urine of Malnad giddda is considered to be of medicinal value. These cattle can also be sustained solely on grazing the forests and rural terrains. Deoni is another native breed of cattle in India originated from Bidar district in Karnataka. Deoni is known both for good milk yielders and draft animals. Deoni cattle are hardy and well adapted to their breeding tract and constitute an important cattle genetic resource of India. Hallikar is a very common breed of cattle native to Hallikar belt of Mysore, Mandya, Hassan and Tumkur districts of South Karnataka. The bulls of this breed of cattle are known for their strength and endurance, are mainly used for draft purposes, and the breed is classified as a draught breed in India. It is one of the breeds, which have received the royal patronage and care from the erstwhile sultans and princely state of Mysore through conservation and development. Activities proposed to be implemented under this component are:

### Activity 1.1-Baseline survey and Genomics study

Baseline survey would be conducted for identifying the elite varieties of cattle. Approximately, 1000 cattle would be surveyed and monitored closely for recording milk yield with respect to quantity and quality of milk produced. Further, Genomic study would be conducted to identify productive, reproductive performance and heat tolerance of cattle. Based on the survey, 200 best cows per breed would be selected and procured from the farmers.

### Activity 1.2: Selective breeding and Provision of adequate facilities to cattle

Breeding would be done amongst the best cows. These cows would be maintained in Government farms and provided adequate fodder/feed, potable water and vaccination for maintaining the health and nutritional status of cattle.

### Activity 1.3: Integration of climate smart elements into existing cattle farm facilities

Climate smart practices such as water conservation practices eg. rain water harvesting structures, farm ponds etc.; renewable energy practices such as setting up solar panels; waste management practices such as bio-gas, vermicomposting units etc. would be installed within the existing Governmental farms.

## **Component 2: Conservation & revitalization of local sheep breeds (Bandur, Bellary and Deccani) through distribution of pure breed ram lambs for breeding purpose**

Bannur, Bellary and Deccani Sheep are native to various districts of Karnataka. These are medium sized sheep and are mainly reared for flesh and skin. The project aims at enhancing meat production which is relished by the state population.

### Activity 2.1-Identification and procurement of sheep breed

Local sheep varieties (Bandur, Bellary and Deccani) having good health conditions and breed characteristics would be identified and procured from the native locations. Approximately, 200 female and 8 male sheep per breed would be procured from the farmers.

### Activity 2.2-Selective breeding and distribution to sheep rears

Existing breeding units would be strengthened/expanded in the farms so that breeding rams could be produced comfortably. After selective breeding, breeding ram lambs produced in the farm would be distributed to sheep rearers to encourage propagation and conservation of respective indigenous breed. It is proposed that in the year 2018, 30 rams lambs per breed would be distributed, whereas in 2019 and 2020, 60 rams lambs per breed respectively would be distributed.

### Activity 2.3: Integration of climate smart elements into existing sheep farm facilities

Climate smart practices such as water conservation practices eg. rain water harvesting structures, farm ponds etc.; renewable energy practices such as setting up solar panels, solar fences; waste management practices such as vermicomposting units etc. would be installed within the existing Government farms.

### **Component 3: Enhancing and managing the production of feed and fodder for livestock**

#### *Activity 3.1: Distribution of Power Chaff cutters to the farmers*

This project proposes to facilitate farmers in efficient utilization of fodder. In order to reduce the wastage of the fodder/feed power Chaff cutters will be distributed to 2080 farmers i.e. 20 farmers per 104 taluks. It is proposed that the project will provide Rs. 15,000/chaff cutter or 50% of the cost of cutter, whichever is less. Rest of the cost (approximately 50%) would be borne by the farmers.

#### *Activity 3.2: Establishing silage units for silage making*

Silage units i.e. 1 silage unit per taluk in 104 taluks having capacity of 1-5 tonnes would also be established for production of silage. It is proposed that the project will provide Rs. 30,000 per silage unit. Rest of the cost (approximately 50%) would be borne by the farmers.

#### *Activity 3.3: Establishment of fodder block making/densification units*

Fodder block making/densification units would be established in 2 government farms i.e. Kurikuppe in Bellary district and Kunikenahalli in Tumakuru district. This activity will help in reducing the volume of fodder, efficient usage of fodder by reducing the wastage, and enriching the available crop residues. Fodder densification will help in packaging into smaller units which in turn facilitate efficient preservation, storage, transportation and distribution to the farmers.

### **Component 4: Mainstreaming livestock adaptation strategies into policies and programmes through better Knowledge Management and Sharing**

#### *Activity 4.1: Organising Workshops*

Workshops would be organised for large number of stakeholders such as line departments, farmers, village councils etc. at the start of the project. Further, mid-term workshop would be organised around May, 2018 for reviewing the project activities. Final workshop would be organised during the end of project period to disseminate the result of final outcome/outputs of the project, challenges faced and highlighting the success.

#### *Activity 4.2: Organising Training cum exposure visits for farmers*

Training programme cum exposure visits will be organised for the farmers so that experience/lesson learnt could be disseminated to large stakeholders. This would be helpful for the farmers to learn and implement the project activities effectively.

#### *Activity 4.3: Development of Knowledge products*

Knowledge products such as films (bilingual), manuals for various project activities, posters and research papers will be developed for dissemination of the project implementation success stories to wider population.

## **b) Details on Economic, social and environmental benefits of the project**

### Economic benefits

- Farmers will be helped in becoming economically sustainable as indigenous livestock will have better resistance towards challenges of climate change and therefore there will not be any financial tension in the families or within the communities
- Propagating indigenous breeds stabilises the livestock yield such as, milk, meat, even under adverse weather conditions, ensuring continued income for the farmers
- Prevents loss incurred in `Distress sale` of livestock which is a common occurrence during droughts as the maintenance cost of local breed animals is less when compared to exotic ones

### Social benefits

- Small and marginal farmers targeted in this project will be protected from heavy loss in livestock production due to increasing weather variabilities
- Increased propagation of blood levels of indigenous breeds having resistance to increasing temperature, stressful conditions improves the survival rate
- This activity will also assist the state in reviving the traditional breeds for future multiplication.

### Environmental benefits

- Indigenous livestock are less emitter of Methane as feed requirement is less compared to the crossbred livestock
- Water use efficiency for growing fodder increases due to propagation of water efficient technologies
- Waste generated from livestock would be put to effective use by converting it to bio-gas energy and manure.

## **c) Sustainability of intervention**

*i. How will the project assure that the benefits achieved through its investments are sustained beyond the lifetime of the project?*

This project has an innovative concept for implementing sustainable livestock productivity for the conservation of indigenous livestock (cattle and sheep) varieties. Indigenous varieties of cattle and sheep are more adaptable to changing climatic conditions. Therefore, farmer's livelihood would also be sustained through increasing yield of milk and meat. The project also proposes to provide requisite amount of feed/fodder to the cattle and sheep, which will be available during less or no water conditions. Therefore, this will ensure its availability during lean periods of water and improve the health and nutritional status of the livestock. Fodder availability would be enhanced through distributing the equipment to farmers, setting up silage units and fodder densification units, which will enhance the efficient usage of available fodder.

Drought situation of the area is also proposed to be managed through implementing various water conservation practices such as setting up of rain water harvesting, farm ponds etc., which will conserve both surface and ground water resources of the selected areas in the state. Further, options for harnessing solar energy; waste management practices such as establishing vermicomposting in farms and bio-gas plants would also be established.

The project also has mitigation co-benefits of reducing the methane emission through measures such as propagation of indigenous livestock breed; setting up waste management units such as bio-gas plants, vermi composting units etc.

It is proposed to undertake capacity building programme for Department officials at various levels on evidence based adaptation planning and implementation for mainstreaming climate change into departmental planning process. The capacity building activities will be undertaken with technical support from GIZ and EMPRI.

d) Analysis of the cost-effectiveness of the proposed project / programme:

*i. Cost effectiveness will compare alternative options available and how the proposed components/ intervention are best for the given climatic conditions. It will also project how the community has preferred the selected interventions and their views / concerns are addressed while designing the project/ programme. The proposal should compare to other possible interventions that could have taken place to help adapt and build resilience in the same sector, geographic region, and/or community.*

A comparison of the chosen option vis-a-vis alternative options may be provided as per the table given below:

<b>Activities under Objectives</b>	<b>Proposed Alternatives</b>	<b>Benefits</b>
Conservation & revitalization of indigenous cattle breeds (Malnad gidda, Deoni, Hallikar) and sheep breeds (Bandur, Bellary, and Deccani) through propagation of pure breed semen	Continued introduction of crossbred which are less tolerant to changing climatic conditions with continued loss of yield	<ul style="list-style-type: none"> <li>• Increase in population of indigenous varieties of livestock which are adaptable to changing climate conditions</li> <li>• Reduction in methane emissions through adoption of indigenous livestock</li> </ul>
Enhancing and managing the production of feed and fodder	Inadequate provision of feed and fodder to livestock	<ul style="list-style-type: none"> <li>• Provision of feed and fodder and potable water to livestock though-out the year</li> </ul>
Adoption of water conservation practices such as rain water harvesting tanks, farm ponds, check dams etc; energy conservation	Lack of provision of potable water and energy to the livestock. Further, large amount of waste generated from livestock will remain untreated.	<ul style="list-style-type: none"> <li>• Implementation of water conservation practices will ensure its availability during drought conditions</li> <li>• Waste generated from livestock would also be treated properly and provided to farmers as</li> </ul>

measures such as bio-gas plants, solar panel; waste management practices such as establishing vermi-compositing in farms		manures at subsidized rates
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ii. Weighting of project activities:

*How much funding will be allocated to 'investment activities', 'capacity building activities' and 'project management activities' respectively?*

Type of Activity	List of Activities	Funding Requirement
Investment activities	<ul style="list-style-type: none"> <li>• Conservation &amp; revitalization of indigenous cattle and sheep breeds through propagation of pure breed semen</li> <li>• Enhancing and managing the production of feed and fodder for livestock which will be available to livestock during lean period of water</li> <li>• Adoption of water conservation practices such as rain water harvesting tanks, farm ponds, check dams etc.; energy conservation practices such as setting up solar panels; waste management practices such as vermi-compositing practices, Bio-gas plant.</li> </ul>	214902080
Capacity building activities	<ul style="list-style-type: none"> <li>• Conducting trainings/workshop cum exposure visit for farmers</li> <li>• Developing knowledge products</li> </ul>	24,50,000
Project management activities	<ul style="list-style-type: none"> <li>• Hiring project personnel</li> <li>• NIE and coordination charges</li> </ul>	31806166

e) *Alignment with the National and State Action Plans and other Policies / Programmes: (Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist)*

The proposed activity is highlighted under the Animal Husbandry section of Agriculture and Allied sector chapter of Karnataka State Action Plan on Climate Change, which suggests expanding the breeding of indigenous cattle breeds and enhancing the production and availability of feed, fodder and potable water.

Drought proofing of livestock for overall economic development and improvement of the socio-economic conditions of the resource poor farmers is also one of the prioritized

activities highlighted in the National Mission on Sustainable Agriculture under National Action Plan on Climate Change.

The project aims to popularize indigenous varieties of cattle and sheep by enhancing the population of indigenous varieties of Cattle and Sheep breeds, which are adaptable to changing climate scenarios. Cattle and Sheep would also be provided with adequate feed/fodder and potable water for increasing the milk and meat yield of livestock and hence increasing the livelihood options of farmer community. Project also proposes to enhance the production of the fodder varieties through distributing the equipment to farmers, setting up silage units and setting up fodder densification units which will enhance the efficient use of fodder.

*f) Component wise technical standards:*

*(Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, standards related to pollution control, etc. The details need to be provided for each of the interventions proposed)*

The overall objective of the project is in line with the National Mission on Sustainable Agriculture and highlighted under Karnataka SAPCC. The project is governed as per the policy and preference of State Governments in adherence to all the specific local criteria. Apart from that, project would also adhere to the national scientific criteria with regard to adaption such as economic, social and environmental benefit etc. The involvement of the key stakeholders in the project formulation and the Project Management/ Implementation Mechanisms ensures compliance with the policy of participatory implementation of the project.

<b>Activity</b>	<b>Applicable Standard</b>	<b>Application to project</b>
Component 1: Conservation & revitalization of indigenous cattle breeds ( <i>Malnad gidda, Deoni, Hallikar</i> ) through propagation of pure breed semen	Standard guidelines provided by department of AH&VS on sustainable cattle practices  MGNREGA guidelines and designs will be followed for construction of water conservation practices  Karnataka Electricity Regulatory Commission guidelines will be followed for construction of energy conservation practices	Enhance the production of indigenous varieties of cattle for sustainable income of small and marginal farmers
Component 2: Conservation	Standard guidelines	Enhance the production of

&revitalization of local sheep breeds (Bandur, Bellary and Deccani) through propagation of pure breed ram lambs for breeding purpose	provided by department of AH&VS on sustainable sheep practices MGNREGA guidelines and designs will be followed for construction of water conservation practices  Karnataka Electricity Regulatory Commission guidelines will be followed for construction of energy conservation practices	indigenous varieties of sheep for sustainable income of small and marginal farmers
Component 3: Enhancing and managing the production of feed and fodder for livestock	Standard guidelines provided by department of AH&VS for providing feed/fodder to livestock	Provision of feed and fodder to livestock during lean period of water availability
Component 4: Knowledge management and mainstreaming of livestock adaptation strategies	Standard guidelines and procedures of department of AH&VS and EMPRI	Mainstreaming of livestock management activities and its integration to state government policies

g) Duplication Check:

(Describe if there is duplication of project / programme with other funding sources, if any)

<b>Project</b>	<b>Objectives</b>	<b>Complementarities</b>	<b>Geographical Coverage/Agency</b>
Rashtriya Gokul Mission for indigenous cattle	To conserve and develop indigenous bovine breeds  To develop dairy infrastructure for improved procurement, processing and marketing of indigenous bovine breeds	Governmental infrastructure would be used for conducting the project activities . Rashtriya Gokul Mission programme will be used in development of infrastructure and used in convergence with climate change proposal; thus eliminating the duplication in implementation.	Entire state
Renewable energy	To support renewable	Subsidy for setting	Karnataka Electricity

subsidy programmes	energy measures	up renewable energy efficient measures	Regulatory Commission
Health Coverage of sheep	Vaccination and deworming of sheep	Support under this state sponsored scheme will be used for providing vaccination and deworming support	KSWDC
Kendriya Bhed Palak Vima Yojana	Financial support for loss of sheep	Beneficiaries will be encouraged to be part of this scheme to take benefit in case of loss of sheep as per the guidelines	KSWDC

*h) Details on Stake-holder consultation:*

*(Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations).*

<b>Consultation</b>	<b>Date/ Place</b>	<b>Participation</b>	<b>Objective</b>	<b>Outcome</b>
Inception meeting	September 8, 2015 in Office of EMPRI, Bengaluru	Key departments /institutions of Govt. of Karnataka (List of participants is at <b>Annex-I</b> )	To identify the priority projects under Karnataka SAPCC	25 project ideas from 9 sectors were emerged and accordingly, one project idea was prioritized for preparing a detailed proposal for consideration of NAFCC

*i) Learning and knowledge management component to capture and disseminate lessons learned from the proposed project.*

Proposed project will have an integral component of knowledge management and mainstreaming of adaptation strategies. This component describes both the cross-cutting and specific knowledge management functions that will be undertaken in this project. The project is expected to generate crucial learnings in terms of promoting indigenous varieties of livestock (cattle and sheep); generating feed and fodder varieties to be made available for livestock during lean period of water availability; creation of sustainable water and energy conservation practices in livestock farms; institutional capacity to sustain community based efforts to adapt to challenges of climate change and other policy recommendations and technical guidelines produced by the project. The

project also proposes to organise training cum exposure visits for the farmers so that they could be guided about the best practices for livestock management.

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

<b>Expected outcomes</b>	<b>Expected concrete outputs</b>	<b>Sustainability mechanism</b>	<b>Responsible party/ies</b>
Propagating indigenous pure livestock (cattle and sheep) breeds	Enhance the pool of pure blooded indigenous livestock (cattle and sheep) through conservation of pure breed and its breeding	<p>The project proposes for sustained livestock productivity throughout the year through conservation of pure breed and selective breeding</p> <p>These activities would be conducted in existing Governmental farms. Once the project duration is over, project activities would be continued by state government</p>	DoAH&VS
Provision of equipment for silage preparation, post harvest techniques of fodder.	<p>Distribution of Power Chaff cutters to the farmers</p> <p>Establishing silage units for silage making</p> <p>Establishment of fodder block making/densification units</p>	<p>Power chaff cutters and silage making units would be provided to farmers, wherein an equal contribution would also be made by the farmers, so that ownership and responsibility for implementing project activity would be created</p> <p>Further, fodder block making/densification units would be established in governmental farms, for increasing the efficient use of fodder. Once the project duration is over, the equipment would be used by the state department for future application</p>	AH&VS

Provision of sustainable feed/fodder to livestock	Feed and fodder varieties made available to livestock during less or no water conditions by way of efficient post harvest technology.	Livestock would be provided with feed and fodder in the form of blocks ,so that they could sustain drought conditions of the state, which is a very common phenomenon occurring in the state	AH&VS
Adoption of sustainable water and energy conservation practices	Adoption of water conservation practices such as farm ponds, rain water harvesting structure etc. and energy conservation practices such as bio-gas plants, solar panel in the farms	In order to maintain the livestock population under state's drought conditions, it is necessary to adopt water conservation practices. Further, energy efficient measures would also be adopted to fulfil to energy demand of farms through renewable energy measures or energy from waste.  Water and energy conservation practices would be set up in existing Govt. farms, which can further be utilised by state govt. for future breeding activities.	AH&VS
Capacity building and Knowledge Management	Development of knowledge products, organisation of trainings, exposure visits etc.	Knowledge products can be used for replicating the project activities in other districts. Trained people can be used to train other people leading to information dissemination to wider population.	EMPRI and Do AH&VS

k) Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for

		<b>compliance</b>
Compliance with the Law	<ul style="list-style-type: none"> <li>• Project activities are in line with the state priorities on climate change. The activities find convergence with National documents such as National Action Plan on Climate Change and State Action Plan on Climate Change.</li> <li>• Activities will not hamper access to any of the other requirements like health, clean water, sanitation, energy, education, housing, safety and land rights. Therefore, the project activities are in convergence with the Environment Protection Act, 1986; Air (prevention and control of pollution) Act, 1981 and Water Pollution Control Act, 1984.</li> </ul>	No risk
Access and Equity	<ul style="list-style-type: none"> <li>• Project provides fair and equitable access to the project beneficiaries and is based on vulnerability aspects linked to livestock productivity.</li> <li>• During the project implementation at the community level interventions, special focus will be given to women and disadvantaged groups in building their capacities and enabling their access to community level assets (knowledge and natural resources)</li> </ul>	<p><u>Risk:</u> Despite the best efforts to promote equity in the benefits of the project by selecting beneficiaries, in some cases, there may be a risk of diluting the principles of beneficiary selection.</p> <p><u>Mitigation option:</u> Due care will be given so that the selected beneficiaries are proportionately selected from different household typologies and represent their actual proportion and as per the guidelines of the government.</p>
Marginalized and Vulnerable	<ul style="list-style-type: none"> <li>• Beneficiaries of the project will be small and</li> </ul>	Adaptation and

Groups	marginalised farmers at both household and community levels.	capacity building measures are designed based on adaptive capacities of Marginalized and Vulnerable population. Therefore, there is no risk for the community.
Human Rights	Proposed project does not foresee any violation of human rights	No risk
Gender Equity and Women's Empowerment	Project would ensure participation by women fully and equitably, receive comparable socio-economic benefits and that they do not suffer adverse effect. It is proposed that amongst the total beneficiary, minimum 33% would be women. Women would be involved in livestock rearing, water management, training and capacity building activities etc.	<u>Risk:</u> As per climate change studies, women are more prone to climate change compared to men's population.  <u>Mitigation:</u> During the project implementation, gender differentiated impact of climate change will be assessed and technologies and capacity development measures targeted at empowering women will be designed and implemented
Core Labour Rights	Payments to labour under the project will be made as per Government approved norms duly following minimum wage rate and hence ensuring core labour rights.	No risk
Indigenous Peoples	Not applicable to this project	No risk
Involuntary Resettlement	Not applicable to this project	No risk
Protection of Natural Habitats	Project does not affect any of the natural habitats	No risk
Conservation of Biological	Project would not cause any impact on	No risk

Diversity	biodiversity values.	
Climate Change	Project aims to sustain the income of small and marginal farmers, dairymen and sheep rears through conservation and revitalization of indigenous livestock varieties of the state, which are more adaptable to challenges of climate change than cross-bred varieties. Project additionally has a co-benefit on reducing the Greenhouse Gas emissions through propagating indigenous varieties of livestock and adopting water and energy conservation practices, which will contribute in mitigating the challenges of climate change	No risk
Pollution Prevention and Resource Efficiency	Project activities are in convergence with the Air (prevention and control of pollution) Act, 1981 and Water Pollution Control Act, 1984 and Noise Pollution (Regulation and Control) Rules, 2000	No risk
Public Health	No adverse impact on public health related issues is envisaged	No risk
Physical and Cultural Heritage	No adverse impact on cultural heritage related issues is identified	No risk
Lands and Soil Conservation	The project envisages conserving the soil water, effectively utilising water, plantation of high yielding drought varieties etc. which will help in conserving the land resources.	No risk

### 3.0 IMPLEMENTATION ARRANGEMENTS

- a) Describe the arrangements for project / programme implementation.
- i. Who will implement the project and what are their comparative Advantages and capacity compared to other potential implementing institutions?

The implementation of the project will be through Department of Animal Husbandry and Veterinary Services (AH&VS), Government of Karnataka. Following are the responsibilities of the various agency/committee involved in the project:

Agency/committee	Responsibility
State Level Steering Committee (SLSC)	SLSC headed by the Chief Secretary will advise the project in financial and technical implementation, ensuring full implementation of project actions and review progress of the project against the agreed timelines.
Technical Advisory Committee (TAC)	TAC comprises of representatives from DoAH&VS, EMPRI, National Dairy Research Institute (NDRI)-Karnataka, National

Agency/committee	Responsibility
	<p>Bank for Agriculture and Rural Development (NABARD)-Bengaluru Regional office, Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU), Karnataka Livestock Development Agency (KLDA), Karnataka Sheep &amp; Wool Development Corporation (KSWDC) {Further, experts may be invited based on the specific needs}, which will be responsible for the following:</p> <ul style="list-style-type: none"> <li>• Preparing the implementation plan</li> <li>• Reviewing the progress of the implementation of the project</li> <li>• Overseeing execution of project activities, fund administration of the project and procurement of goods and services</li> </ul>
Environmental Management and Policy Research Institute (EMPRI)	Capacity building activities in association with AH&VS
NABARD	<ul style="list-style-type: none"> <li>• NABARD being the NIE for NAFCC, would be responsible for reviewing the progress of the project activities and accordingly, disburse funds to state department.</li> <li>• Advice SLSC and TAC on implementation aspects of the project activities</li> </ul>
Department of Animal Husbandry and Veterinary Services (AH&VS)	<ul style="list-style-type: none"> <li>• Implementing the project activities in target villages in consultation with farming community and as per TAC recommendations</li> <li>• Procurement of cows from farmers</li> <li>• Arranging training cum exposure visits to target villages/farms where adaptation measures are implemented</li> <li>• Development of knowledge products in consultation with EMPRI</li> <li>• Enhancing capacities of stakeholders for developing and implementing project activities</li> <li>• Preparing/ submitting report and Utilisation Certificates to the NABARD</li> <li>• Preparing progress report of the project with the help of project partners for the steering committee meetings that will happen annually</li> <li>• Prepare contractual documents/Memorandum of Understanding with concerned departments/ institutions/ agencies</li> <li>• AH&amp;VS will also be responsible for reviewing the progress of the activity proposed to be implemented by concerned departments/institutions</li> <li>• AH&amp;VS will be responsible for receiving the funds from</li> </ul>

Agency/committee	Responsibility
	NABARD and further disbursing to concerned departments/institutions
NDRI-Bengaluru	<ul style="list-style-type: none"> <li>• Baseline survey for recording the milk yield</li> <li>• Genomic study for measuring the reproductive/ productive and heat tolerance traits.</li> </ul>
KSWDC	<ul style="list-style-type: none"> <li>• Procurement of indigenous varieties of sheep from farmers</li> <li>• Conservation and management of indigenous varieties of sheep</li> <li>• Selective breeding of sheep</li> <li>• Distribution of ram lambs</li> </ul>
KLDA	<ul style="list-style-type: none"> <li>• Conservation of cattle and sheep breed</li> <li>• Farm management where fodder densification units would be installed</li> <li>• Distribution of chaff cutters and silage units</li> </ul>
KVAFSU	Conservation& revitalization of Deoni cattle breed
Village Councils (VCs)	<ul style="list-style-type: none"> <li>• Identification of beneficiaries</li> <li>• Distribution of chaff cutters/sheep ram lambs/breeding bulls</li> </ul>

- ii. How will the project be coordinated with (and/or mainstreamed into) related development activities of the targeted sector?

EMPRI being the nodal agency for climate change in Karnataka state will be responsible for the overall coordination of implementing agencies and department of AH&VS would be responsible for executing the project activities. Project will have a SLSC and TAC, for supervising the project activities; monitoring its implementation and taking policy decisions. Implementation plan of the project is as follows (**Fig 4**).

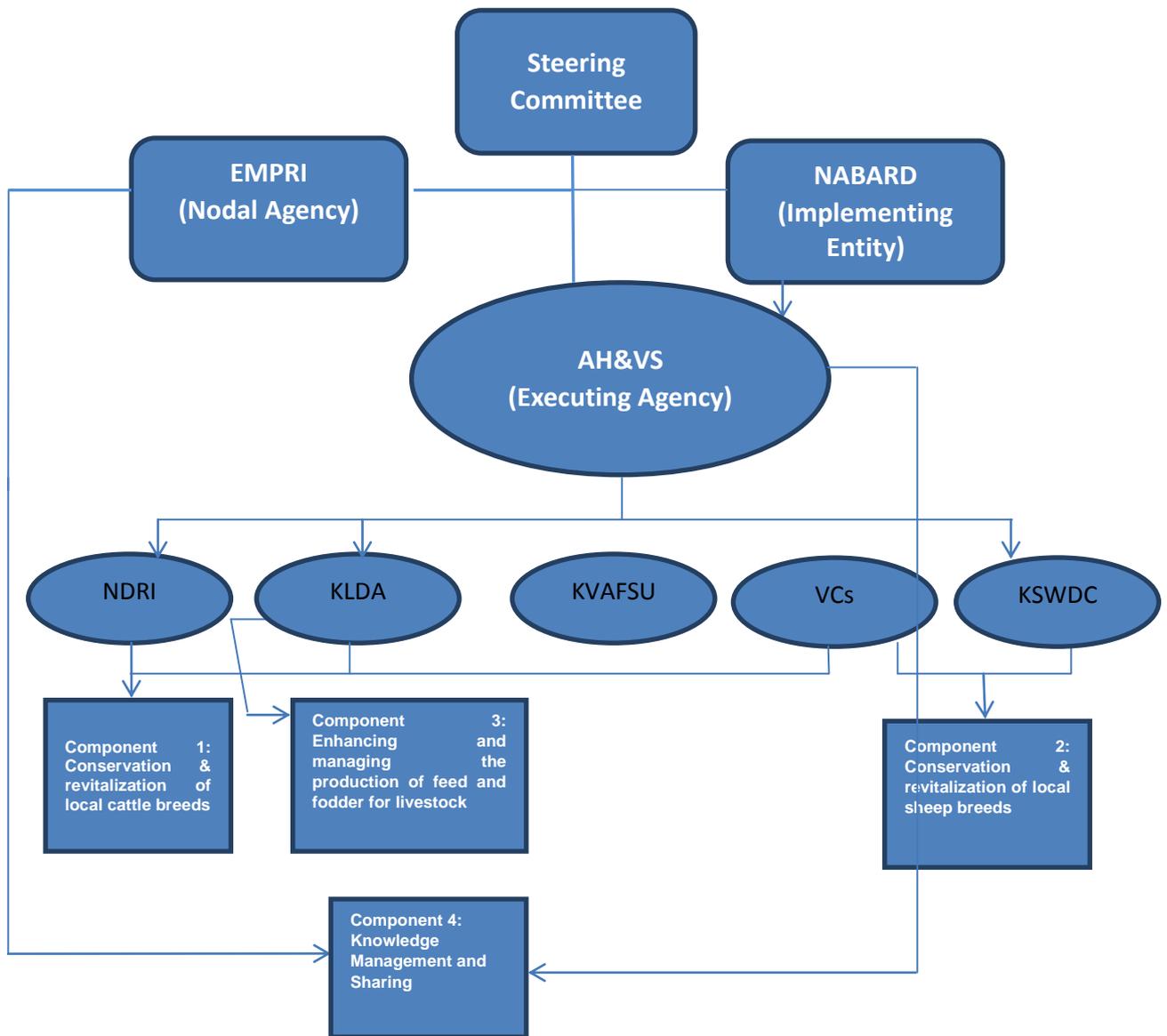


Figure 4: Project Implementation Plan

b) Describe the measures for financial and project / programme risk management (also include environmental and social risk, if any).

<b>Risk</b>	<b>Rating (High / Medium / Low, etc.)</b>	<b>Mitigation Measure</b>
Farmers might not agree to provide indigenous livestock varieties for project implementation	Medium	<ul style="list-style-type: none"> <li>• Farmers will be sensitized about the possible benefits they would get after implementation of activities</li> <li>• Farmers would also be trained providing details of the project implementation</li> </ul>
Bureaucratic hassles may delay in initiating the project activities and sanctioning of funds	Low	<ul style="list-style-type: none"> <li>• Bureaucrats dealing with the concerned subject will be special invitees for the SLSC. This would enable the policy makers to be well versed with the progress of the project activities and thus ease in sanctioning of funds.</li> <li>• Project preliminary activities will be initiated on time like conducting baseline survey, capacity building of the community etc. and the information of initiation of project activities may be informed to the sanctioning authority for ease in its sanctioning.</li> </ul>
Selection of target beneficiaries	Medium	A comprehensive criteria list for selecting target beneficiaries has been developed. Farmers, who would meet the criteria, would be selected as target beneficiaries under the project.
All activities suggested may not come to fruition as planned	Low	Each proposed project activity will be implemented under the direct supervision of experts having high level of competence and experience. Therefore, outcome of all activities will be ensured through continuous monitoring to ensure the same.

c) Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan. (Monitoring and evaluation cost need to be included in executing entity management cost).

The progress of activities will be monitored by NABARD and third party evaluation at MoEFCC based on the agreed upon outputs, indicators and timelines. Monitoring will be a continuous process where each component (partner in-charge) will submit a report to the commissioner, department of AH&VS as per following schedule. Subsequently, it will be forwarded to NABARD and third party evaluation at MoEFCC.

AH&VS will be responsible for the internal monitoring and evaluating the progress of project activities and submitting the progress under each component to NABARD. Internal monitoring and evaluating and fund flow mechanism are as follows:

No.	Project/Programme Components	Lead department	Partner departments/ institutions	Monitoring and evaluating schedule	Fund flow
1.	Conservation & revitalization of local cattle breeds (Malnad gidda, Deoni and Hallikar) through propagation of pure breed semen	AH&VS	NDRI, KLDA, KVAFSU and VCs	Partner agencies would be responsible for providing a progress report monthly	-Initial instalment of 30%, would be provided to partner agencies -50% of the next payment would be disbursed after completing 70% of the agreed tasks (details would be included in MoUs with each institution) -20% of the payment would be provided after completion of agreed tasks.
2.	Conservation & revitalization of local sheep breeds (Bandur, Bellary, and Deccani) through propagation by natural service by true to the breed animals	AH&VS	KSWDC and VCs	-do-	-do-
3.	Enhancing and managing the production of feed and fodder for livestock	AH&VS	KLDA	Not applicable since KLDA and AH&VS will work together on the agreed tasks	Not applicable since KLDA and AH&VS will work together on the agreed tasks
4.	Mainstreaming livestock adaptation strategies into policies and programmes through better Knowledge	AH&VS	EMPRI, NDRI, KVAFSU, KSWDC, KLDA VCs	Not applicable since AH&VS and	Not applicable since AH&VS and all other agencies will work together

	Management and Sharing			all other agencies will work together on the agreed tasks	on the agreed tasks
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At the central level, the progress of the project activities is proposed to be monitored as per following schedule:

Monitoring and evaluation plan	Responsibility	Year				Total	Time frame
		2016- 17	2017-18	2018-19	2019-20		
Monitoring of outputs	NABARD and third party evaluation by MoEFCC	2	2	2	2	8	2016-2020
Mid-term Evaluation	-do-			1		1	June, 2018
Final Evaluation	-do-				1	1	December, 2020

Evaluation of the project with respect to the outputs and outcomes will be conducted twice during the entire project period. Impact evaluation report based on the indicators developed on the gender differentiated outcomes of the adaptation measures will be published and shared with the policy decision makers. This will also be widely disseminated among science, policy and civil society audiences.

*d) Include a results framework for the project proposal, including milestones, targets and indicators with gender disaggregated data (as per the format in annexure1).*

<b>Component 1: Conservation &amp; revitalization of local cattle breeds (Malnad gidda, Deoni, Hallikar) through propagation of pure breed semen</b>					
<b>Activity 1.1</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Conduct baseline survey and Genomics study to identify elite cattle where project interventions will be conducted	About 1000 cattle per breed (Malnad gidda, Deoni and Hallikar) will be surveyed in 3 native tracts for each breed.  Parameters such as seasonal variation in milk production, reproductive efficiency of each animal, quantity and type of fodder and feed, disease profile, etc. to be recorded.	Currently, district level cattle atlas has not yet been compiled by AH&VS.	About 1000 cattle per breed (Malnad gidda, Deoni and Hallikar) will be surveyed in 3 native tracts for each breed. Subsequent to survey, 200 cattle per breed will be selected.	Baseline survey and Genomics study reports will be documented	No risk
<b>Activity 1.2</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Selective breeding and provision of adequate facilities to cattle	About 600 cattle will be provided adequate facilities of housing, vaccination, feed/fodder and potable water. Etc.	Collection of Indigenous cattle has not yet been done in the state	About 600 cattle will be provided adequate facilities of housing vaccination, feed/fodder and potable water, so that cattle will have improved nutrition and health conditions.	Improved health and nutrition levels of the cattle that are maintained in the government farms, will be recorded and documented by AH&VS regularly.	<u>Risk:</u> Adequate feed/fodder, potable water will not be available  <u>Assumption:</u> AH&VS will ensure the availability of feed/fodder, potable water to cattle.

<b>Activity 1.3</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Integration of climate smart elements into existing cattle farm facilities	Climate smart elements such as rain water harvesting tanks, bio-gas plants, solar panels and vermicomposting units will be installed into existing cattle farm facilities	Farms do not have any of the climate smart elements.	All the three farms would be provided rain water harvesting tanks, solar panels and vermicomposting units, whereas only one selected farm would be provided with bio-gas plants facilities.	Adequate water and energy efficient practices would be provided to farms.	No Risk
<b>Component 2: Conservation &amp; revitalization of local sheep breeds (Bandur, Bellary and Deccani) through distribution of pure breed ram lambs for breeding purpose</b>					
<b>Activity 2.1</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Identification and procurement of indigenous breed sheep	624 sheep of 3 indigenous breed (200 females and 8 males per breed) will be identified and procured	Baseline survey of indigenous sheep breed has already been done by the department	624 indigenous breed sheep will be procured from the farmers	Government data on indigenous breed sheep maintained in the farms under this project	No Risk
<b>Activity 2.2</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Selective breeding and distribution to sheep rears	Breeding of selected 600 female and 24 male sheep  Distribution of sheep rams lambs to sheep rearers	Breeding units in Government farms have been developed. Breeding of sheep is experimented at a small scale level.	Strengthening the capacity of farms, since capacity of the farmers is less.  In the year 2018, 30	KSWDC will record and document the data distribution of indigenous sheep.	<u>Risk:</u> Farmers might not agree to buy the indigenous varieties of the sheep  <u>Assumption:</u> Farmers would be appraised regarding the

			rams lambs per breed would be distributed, whereas in 2019 and 2020, 60 rams lambs per breed respectively would be distributed.		benefits of increased yield of indigenous sheep and its adaptability to challenges of climate change
<b>Activity 2.3</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Integration of climate smart elements into existing sheep farm facilities	Climate smart elements such as rain water harvesting tanks, solar panels and vermicomposting units will be installed into existing sheep farm facilities	Farms do not have any of the climate smart elements.	All the three farms would be provided rain water harvesting tanks, solar panels and vermicomposting units.	Adequate water and energy efficient practices would be provided to farms.	No Risk
<b>Component 3: Enhancing and managing the production of feed and fodder for livestock</b>					
<b>Activity 3.1</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Distribution of Power Chaff cutters to the farmers	Farmers would be provided with Power Chaff cutters for reducing the size of fodder.	Due to high price of Power Chaff cutters, farmers cannot afford to buy.	20 farmers per taluks in selected 104 taluks would be provided with Power Chaff cutters	AH&VS and Village Communities will record and document the distribution of power chaff cutters.	No risk
<b>Activity 3.2</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>

Establishing silage units for silage making	Silage units would be established to prepare silage	A few silage units are available at a community level	1 silage unit per taluk in 104 taluks having capacity of 1-5 tonnes would be established	AH&VS will record and document the silage making units establishment and utilization	No risk
<b>Activity 3.3</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Establishment of fodder block making/densification units	Fodder block making/densification units will help in reducing the wastage and will enrich the feed/fodder, packing into small units(blocks) and distributing it to the farmers	Densification units are not available in the selected districts	Fodder would be provided to farmers of 140 drought prone taluks	AH&VS will record and document the fodder supplied to farmers per month.	No risk
<b>Component 4: Mainstreaming livestock adaptation strategies into policies and programmes through better Knowledge Management and Sharing</b>					
<b>Activity 4.1</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Organising Workshops	One Inception workshop conducted  Interim workshop  One final workshop to disseminate the results	Project is a new concept floated to assess steps towards climate change adaptation in livestock sector	Workshops would be organised involving central ministries, state line departments, farmers and insurance agencies	3 workshop proceedings	No Risk
<b>Activity 4.2</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Organising Trainings cum	Organise 10 trainings cum	Project is a new concept	Organise 10 trainings	10 training	No risk

exposure visits for farmers	exposure visits on the project interventions	floated to assess steps towards climate change adaptation in livestock sector	cum exposure visits for farmers	proceedings/manual	
<b>Activity 4.3</b>	<b>Indicator</b>	<b>Baseline</b>	<b>Target</b>	<b>Means of Verification</b>	<b>Risks and Assumptions</b>
Development of Knowledge products	At least 2 films (bilingual), 4-5 manuals for various activities, posters and 6 research papers will be developed	Some papers available on indigenous varieties of livestock. However, field level data will add value to the pool of papers available on this subject.	Knowledge products would be helpful for central ministries, state line departments, farmers and insurance agencies	Films, brochures, papers	No risk

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.

Financial requirement and other details of the project are as follows:

S.No.	ACTIVITY/MONTHS	Units	Unit cost (INR)	Total (INR)	Note	Institution responsible
<b>1.</b>	<b>Conservation &amp; revitalization of local cattle breeds (Malnad gidda, Deoni, Hallikar) through propagation of pure semen</b>	<b>Detailed below</b>	<b>Detailed below</b>	<b>12,67,10,000</b>	<b>Detailed below</b>	<b>AH&amp;VS (Lead)</b>
<b>1.1</b>	Baseline survey for identifying the elite varieties of cattle (Deoni, Hallikar and Malnad Gidda cows) and its characterisation	--	<u>Manpower:</u> 1,33,50,000 <u>Survey travel:</u> 1,26,00,000 <u>Survey equipment:</u> 37,00,000	2,96,50,000	Cost of survey of 3 breeds in 3 different regions <u>Manpower</u> <ul style="list-style-type: none"> <li>• 4 Sr. research fellow @ Rs. 32,000,</li> <li>• 4 para veterinary officers @ Rs. 15,000</li> <li>• 12 skilled labour @ Rs. 10,000</li> </ul>	NDRI
<b>1.2</b>	Procurement of selected best cows (200 per breeds) as bull mothers based on productive and reproductive performance and their procurement and insurance	600	75,000	4,50,00,000	200 pure breed cattle per breed will be procured from farmers at the cost of Rs. 75,000	AH&VS,
<b>1.3</b>	Development of sheds, breeding and maintenance of cattle	3	1,00,00,000	3,00,00,000	Cost towards sheds, feed, fodder and vaccination is Rs. 1,00,00,000	AH&VS, KLDA, KVAFSU
<b>1.4</b>	Genomics study for determining the productive and	--	--	1,91,00,000	<u>Chemicals, reagents, stationeries:</u> Rs. 43,00,000	NDRI

S.No.	ACTIVITY/MONTHS	Units	Unit cost (INR)	Total (INR)	Note	Institution responsible
	reproductive characteristics of cattle				<u>Glassware/ Plastic wares, pipettes, g etc.:</u> Rs. 27,00,000 <u>Screening of animals for diseases:</u> Rs. 10,00,000 <u>Transcriptomics work including bioinformatics work:</u> Rs. 25,00,000 <u>Miscellaneous including expenditure towards Monitoring committee meetings, communication charges, etc.:</u> Rs. 10,00,000 <u>Institutional charges:</u> Rs. 26,00,000 <u>Gene Sequencing:</u> Rs. 5,00,000 <u>SNP identification, Transcriptomics, Sequencing work including analysis work at IOB:</u> Rs. 45,00,000	
1.5	Setting up bio-gas plant in one farm	1	5,00,000	5,00,000	1 digester and bottling unit would be set up in one selected farm @ Rs. 5,00,000	AH&VS
1.6	Setting up water conservation practices such as rain water harvesting structures, farm ponds etc.	3	2,00,000	6,00,000	1 RWH plant/farm having capacity of 10,000 litre each would be established	AH&VS
1.7	Setting up vermi-compositing units	3	20,000	60,000	1 Vermi-compositing unit would be set up @Rs. 20,000	AH&VS
1.8	Establishing solar panels	3	6,00,000/10K W	18,00,000	3 solar units (1 solar unit in each farm of 10 KW each) would be established	AH&VS

S.No.	ACTIVITY/MONTHS	Units	Unit cost (INR)	Total (INR)	Note	Institution responsible
2.	Conservation & revitalization of local sheep breeds (Bandur, Bellary and Deccani) through propagation of pure breed ram lambs for breeding purpose	Detailed below	Detailed below	1,32,22,080	Detailed below	AH&VS (Lead)
2.1	Identification and procurement of sheep	624 including 200 females/farm and 8 males/farm	Rs. 7,000 (females procurement) Rs. 14,000 (males procurement) Rs. 1,50,000 (transport) +insurance (3% of cost of sheep procurement )	48,22,080	Sheep procurement- Females @Rs. 7,000, males@ Rs. 14,000, transport- Rs. 1,50,000 and insurance	KSWDC
2.2	Strengthening/expansion of breeding units (for each sheep breed) within the existing farms for production of breeding rams- development of new sheds	3	10,40,000	31,20,000	10 sq. feet per animal * Rs. 500 per sq. feet	KSWDC
2.3	Distribution of breeding ram lambs to sheep farmers for			Borne by AH&VS		AH&VS

S.No.	ACTIVITY/MONTHS	Units	Unit cost (INR)	Total (INR)	Note	Institution responsible
	breeding to encourage propagation and conservation of respective indigenous breed					
2.4	Management of sheep in sheep farms	3	Fodder cost- Rs. 9,60,000 Vaccination cost- borne by dept.	28,80,000	Fodder @ Rs. 9,60,000/sheep farm would be provided. Vaccination cost would be borne by the dept. in the farms	KSWDC, AH&VS
2.5	Setting up water conservation practices such as rain water harvesting structures, farm ponds etc.	3	2,00,000	6,00,000	1 RWH plant/farm having capacity of 10,000 litre each would be established	AH&VS
2.6	Establishing solar panels	3	6,00,000/10K W	18,00,000	3 solar units (1 solar unit in each farm of 10 KW each) would be established	AH&VS
3.	<b>Enhancing and managing the production of feed and fodder for livestock</b>	<b>Detailed below</b>	<b>Detailed below</b>	<b>8,83,20,000</b>	<b>Detailed below</b>	<b>AH&amp;VS (Lead)</b>
3.1	Distribution of Power Chaff cutters to the farmers	2080	15,000 (50% of the amount will be provided by TB)	3,12,00,000	Power Chaff cutters are to be distributed to 20 farmers in 104 taluk @ Rs.15,000 per unit.	AH&VS, KLDA, VCs
3.2	Establishing silage units for silage making	104	30,000 (50% of the amount will be provided by	31,20,000	Establishing one silage unit of 1-5 tonnes capacity in 104 taluk @ Rs.30,000 lakhs per unit	AH&VS, KLDA

S.No.	ACTIVITY/MONTHS	Units	Unit cost (INR)	Total (INR)	Note	Institution responsible
			TB)			
3.3	Establishment and operationalisation of fodder block making/densification units	2	2,70,00,000	5,40,00,000	Establishment of 2 fodder block making units of 5 tonnes ( a. Machine-70,00,000, b. operation- and infrastructure-50,00,000 c. 1.5 crores for production and distribution of blocks for a duration of one year.Subsequently it will be carried out from department funds)	AH&VS, KLDA
4.	<b>Mainstreaming livestock adaptation strategies into policies and programmes through better Knowledge Management and Sharing</b>	<b>Detailed below</b>	<b>Detailed below</b>	<b>24,50,000</b>	<b>Detailed below</b>	<b>AH&amp;VS (Lead)</b>
4.1	Conducting Project Workshops (Inception, mid-term and final)	3	1,50,000	4,50,000	3 workshops would be conducted for the project involving large number of stakeholders	AH&VS, KLDA, KSWDC, KVAFSU, VCs, NDRI
4.2	Development of knowledge products	--	--	15,00,000	Atleast 2 films (bilingual), 4-5 manuals for various activities, posters for workshops and 6 research papers will be developed	AH&VS, KLDA, KSWDC, KVAFSU, VCs, NDRI
4.3	Training programme cum exposure visits	10	50,000	5,00,000	2 Training programme cum exposure visitsper year can be organised for the	AH&VS, KLDA,

S.No.	ACTIVITY/MONTHS	Units	Unit cost (INR)	Total (INR)	Note	Institution responsible
					nearby farmers so that they could learn about the project	KSWDC, KVAFSU, VCs, NDRI
	TOTAL			23,07,02,080		
5.0	Cost for management of the project including monitoring and evaluation			18456166	8% of the total cost	
5.1	NIE fee	-		6921062	3 % of the project cost	
5.2	Charges for Coordination, facilitation, visits/meetings, man power etc. during project implementation	-		1,15,35,104	5 % of the project cost	
	<b>GRAND TOTAL</b>			<b>24,91,58,246</b>		

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

Project is proposed to be implemented for 5 years involving mainly four components namely, 1) Conservation & revitalization of local cattle breeds (Malnad gidda, Deoni, Hallikar) through propagation of pure semen; 2) Conservation & revitalization of local sheep breeds (Bandur, Bellary and Deccani) through propagation of pure semen; 3) Enhancing and managing the production of feed and fodder for livestock and 4) Mainstreaming livestock adaptation strategies into policies and programmes through knowledge management and sharing. Based on the success and demand of the project, it will be replicated to entire state. Timeline of each activity under the project components are as follows:

S. No.	ACTIVITY	Year 1				Year 2				Year 3				Year 4				Year 5			
		3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
<b>1.</b>	<b>Conservation &amp; revitalization of local cattle breeds (Malnad gidda, Deoni, Hallikar) through propagation of pure semen</b>																				
1.1	Baseline survey for identifying the elite varieties of cattle																				
1.2	Genomics study to identify the productive, reproductive performance and heat tolerance																				
1.3	Selection and procurement of best cows based on productive and reproductive performance																				
1.4	Maintenance of cows and calves in government farms																				
1.5	Setting up water conservation (rain water harvesting structures, farm ponds etc.) and energy conservation units (solar panels, bio-gas plants)																				
1.6	Setting up waste management units eg: vermi-compositing units																				
<b>2.</b>	<b>Conservation &amp; revitalization of local sheep breeds (Bandur, Bellary and Deccani) through propagation of pure breed ram lambs for breeding purpose</b>																				
2.1	Identification and procurement of sheep																				
2.2	Maintenance of sheep in government farms																				
2.3	Strengthening/expansion of 3 breeding units within the existing farms for production of breeding rams																				
2.4	Distribution of breeding ram lambs to sheep farmers to encourage breeding of indigenous varieties																				
2.5	Fodder development in sheep farms																				

S. No.	ACTIVITY	Year 1				Year 2				Year 3				Year 4				Year 5			
		3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
2.6	Setting up water conservation (rain water harvesting structures, farm ponds etc.) and energy efficient units practices (solar panels)																				
<b>3.</b>	<b>Enhancing and managing the production of feed and fodder for livestock</b>																				
3.1	Distribution of power chaff cutters to the farmers																				
3.2	Establishment of units for silage production																				
3.3	Establishment of 2 fodder block making/densification units																				
3.4	Operationalising the unit ,production and distribution of blocks( initially one year under this project)																				
<b>4.</b>	<b>Mainstreaming livestock adaptation strategies into policies and programmes through better Knowledge Management and Sharing</b>																				
4.1	Organising 3 workshops (Inception, mid-term and final) for the project																				
4.2	Organising training cum exposure visits for farmers																				
4.3	Development of knowledge/outreach products																				

**Minutes of the Meeting****Preparation of project proposal under Karnataka State Action Plan on Climate Change (SAPCC) for accessing finance from the National Adaptation Fund for Climate Change****September 8, 2015 in Bengaluru, Karnataka**

An interactive meeting for formulating project on climate change adaptation activities for accessing finance from the National Adaptation Fund for Climate Change (NAFCC) with nodal and key departments of Govt. of Karnataka was held on September 8, 2015, in Office of Environmental Management & Policy Research Institute (EMPRI), Govt. of Karnataka, Bengaluru. List of the participants is

at **Annex-I**.

2. GIZ apprised the representatives of the Government of Karnataka regarding the various National & International sources of climate finance and modalities of NAFCC. Subsequently, a brainstorming was moderated by GIZ to discuss the key issues of the Karnataka due to climate change and priority projects for implementation through the NAFCC funding. While doing the brainstorming, it was informed by the representatives of Govt. of Karnataka that sufficient funds are available for implementing the activities proposed under Karnataka SAPCC. However, NAFCC can be used for co-financing some of the proposed activities or replenish the existing activities being implemented.

3. Based on the discussion, following sectors/ areas of interventions were emerged as the key priorities for the state. The areas of interventions along with their proposed implementing departments are as follows:

<b>S. No.</b>	<b>Sector</b>	<b>Areas of interventions</b>	<b>Implementing department</b>
i.	Agriculture	Addressing vulnerability of sugarcane in the wake of inadequate precipitation	Department of Agriculture, Govt. of Karnataka
		Adoption of practices to avert shift from Ragi to Maize/ re-vitalization of minor millets	
		Development of forecasting system for weather linked crop yield	
		Protection of geographical indications for selected indigenous crop species	
		Adoption of practices to adopt saline resistant paddy	
ii.	Horticulture	Developing a mechanism for promoting and marketing indigenous horticulture crops	Department of Horticulture, Govt. of Karnataka

iii.	Animal Husbandry	Adoption of practices to conserve and re-vitalize local hardy varieties e.g. Malnad Gidda	Department of Animal Husbandry, Govt. of Karnataka
		Adaptation practices to manage the fodder development	
		Development of practices to manage risk on livestock due to climate change	
iv.	Forestry	Development of sustainable climate change resilient value chains for Non-Timber Forest Products (NTFPs)	Department of Forest, Govt. of Karnataka
		Management of population of Bee, pollinated dependent crops and forest species due to climate induced factors	
		Identification of carrying capacity of Western Ghats	
		Promoting the plantation of native tree species using Krishi Aranya Protsaha Yojane (KAPY) as a model	
		Develop strategies to arrest/ reverse the fragmentation of wildlife corridors	
v.	Fisheries	Studies on tolerance/ vulnerability of fish species due to climate change- This proposal can be developed for <b>Climate Change Action Programme</b>	Department of Fisheries, Govt. of Karnataka
		Adopting strategies relating to mangrove plantations and saline aquaculture using Integrated Mangrove Fishery Farming System (IMFFS) as a model	
		Adoption/promotion of practices pertaining to climate resilient fisheries	
vi.	Coastal zone management	Development of early warning systems based on tide gauges	Department of Water resources and State Disaster Management Authority, Govt. of Karnataka
		Promotion/development of disaster resilient housing for the coastal communities	State Disaster Management Authority and Department of Housing, Govt. of Karnataka
vii.	Water resources	Development of adaptation strategies to prevent urban flooding	Department of Water resources and State Disaster Management Authority, Govt. of Karnataka
		Development of a drought forecasting model	
		Implementing Sujala watershed projects in the un-covered districts of Karnataka	Watershed Development Department, Govt. of Karnataka
		Integrate additional activities to participatory watershed development programme being supported by NABARD's Watershed	Watershed Development Department, Govt. of Karnataka and NABARD

		Development Fund (WDF)	
viii.	Wildlife and Energy	Promoting energy efficiency and renewable energy measures in wildlife corridors- This proposal can be developed for <b>Green Climate Fund</b>	Department of Forest and Department of Energy, Govt. of Karnataka
ix.	Health	Enhancing disease monitoring and surveillance for climate linked diseases (Malaria, heat cramps, dengue etc.)	Department of Health, Govt. of Karnataka

4. Subsequent to the deliberation, it was decided that a concept note will be prepared by each concerned department highlighting the problem statement, activities, duration, location, budget etc. A copy of the template of concept note is at **Annex-II**.

5. In order that the above project proposal to be prepared and submitted as per the timeline given by MoEFCC, following decisions were taken:

- Concept note on the project ideas emerged during the meeting will be prepared by concerned department and forwarded to EMPRI by September 18, 2015. The same will be shared with GIZ by EMPRI.
- GIZ after securitization will prioritize one of the proposals jointly with the nodal officer- climate change, Govt. of Karnataka and prepare a detailed concept note based on the NAFCC guidelines provided by MoEFCC by September 28, 2015, after carrying out stakeholder consultations and field visits with Govt. of Karnataka.
- Draft concept note will be shared with EMPRI by September 28, 2015, for comments/suggestions of Govt. of Karnataka.
- GIZ will submit revised concept note to EMPRI after incorporating the comments of the Government of Karnataka, if any, by first week of October, 2015 for submission to the MoEF&CC.

## Annex-I

### List of the Participants

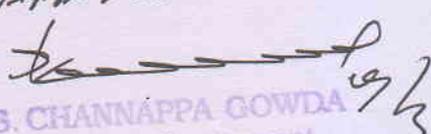
1. Ms. Ritu Kakkar, Director General, Environmental Management & Policy Research Institute (EMPRI)-Bengaluru
2. Sri.K.H.Vinaya Kumar, Director(Research), EMPRI
3. Dr.T.Shivarama Bhat, Additional Director, Dept. of Animal Husbandry
4. Sri.O.P.Dhoundiyal, DGM, NABARD
5. Sri.R.Ganapathy , AGM, NABARD
6. Dr. C.N.Prabhu, Scientist, Karnataka State Natural Disaster Monitoring Centre
7. Dr.B.G.Prakash Kumar, JD(NVBCP), Dept.of Health & Family Welfare
8. Dr. Geetha Nayak, State Coordinator-ABS Programme, Karnataka Biodiversity Board
9. Mr Nagappa.H.Javalli, Deputy Director, Dept. of Agriculture
10. Mr B.Shivaraju, Joint Director, Dept. of Agriculture
11. Mr Madhava, Superintending, Dept.of Water Resource
12. Dr. C. S. Nagarajaiah, Deputy Director, Directorate of Fisheries
13. Ms. H. N. Hema, Deputy Director, Department of Horticulture
14. Mr. Unnikrishnan, Senior Advisor, GIZ
15. Ms. Nidhi Madan, Junior Project Officer, GIZ
16. Mr. Swapan Mehra, CEO, Iora Consultancy
17. Dr. O. K. Remadevi, Consultant, EMPRI
18. Dr.Papiya Roy, Research Scientist, EMPRI
19. Dr. Manjunatha. M, Research Scientist, EMPRI
20. Smt.Chitra P, Research Associate, EMPRI
21. Mr. Nithin, Training Associate, EMPRI
22. Smt.Latha, Training Associate, EMPRI
23. Smt. Jennifer Vincent, System Administrator, EMPRI

**Outline of Project Concept Note for the National Adaptation Fund on Climate Change**

- I. Project Name**
- II. Problem Statement**
  - Existing climate change problem for the region
  - Climate change/variability the project is mitigating- climate and economic additionality
  - Non climatic issues
- III. Activities and its linkage to problem statement**
- IV. Location of project**
- V. Potential executing entity**
- VI. Expected Results**
- VII. Project Duration**
- VIII. Potential for co-financing**
- IX. Tentative budget**

**Annexure-II: Details of the Government farms where project activities are proposed to be implemented**

Farm Name	Location	Area in acres	Existing Facility	Available man power	Proposed breed
Livestock breeding and Training Centre, Koila	Puttur Tq, Dakshina Kannada Dst	715	Electricity, fencing, fodder plots, farm buildings (6 animal sheds) training hall, 7 bore wells Farm equipment like Tractor trailer, water tanker etc. presently 173 animals being reared	12 technical officers and 46 non technical staff	Malnad Gidda Cattle
Livestock Research and Information Centre (Deoni) Katti Tugaon	Hallikhed (SF) PO, Bidar Dst. Karnataka	57	Irrigation, Electricity, fencing, fodder plots, farm buildings -5, farmers hostel laboratory training hall, Farm equipment like Tractor trailer, water tanker etc	4 technical officers and 12 non technical staff	Deoni Cattle
Hallikar Breeding Centre Kunikenahalli	Tumakur District	927	6 cattle sheds 9 bore wells 49 acre irrigated area 376 cattle being reared presently	4 technical officers and 5 non technical staff	Hallikar Cattle
Bandur Sheep Breeding and Training Centre, Dhangur	,Malavalli Tq. Mandya Dst	336	Irrigation, Electricity, fencing, fodder plots, sheep shed 12 (1000 capacity) -5, office, vet hospital training hall, farmers hostel, store room 2 laboratory training hall, Farm equipment like Tractor trailer etc	4 technical officers and 5 non technical staff	Bandur breed sheep
Sheep Breeding and Training Centre, Guttala	Haveri tq. Haveri Dst	294.31	Irrigation, 4 borewells Electricity fodder plots -20 acre sheep shed 2 (500 capacity) office, vet hospital, Farm equipment like Tractor trailer, etc	3 technical officers and 4 non technical staff	Bellary breed sheep
Sheep Breeding and Training Centre, Suttatti	Athani Tq, Belagaum Dst	185	Irrigation 2 open wells, Electricity, fodder plots 20 acres, sheep shed (300 capacity) - office, store room 2, Farm equipment like Tractor 178 sheep being reared presently	3 technical officers and 3 non technical staff	Deccani breed sheep

Approved  
  
**N.S. CHANNAPPA GOWDA**  
 Secretary to Government  
 Animal Husbandry & Fisheries Dept.