

# STRATEGIC ACTION PLAN ON CLIMATE CHANGE MITIGATION AND ADAPTATION IN THE LIVESTOCK SECTOR: A GLOBAL, NATIONAL (INDIA), AND STATE (KERALA) PERSPECTIVE

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**Abstract**– The livestock sector plays a crucial role in global food security and rural livelihoods. However, it is increasingly vulnerable to the impacts of climate change. This comparative analysis delves into the strategies outlined in State Action Plans on Climate Change (SAPCC) within the livestock sector at three distinct levels: Global, National (India), and Regional (Kerala). Through an in-depth examination, this study seeks to identify commonalities, disparities, and the effectiveness of climate action measures in addressing the challenges faced by the livestock sector in the context of climate change. This article presents a comprehensive action plan on climate change in the livestock sector, examining global initiatives, national strategies in India, and state-specific measures in Kerala. The focus is on mitigating greenhouse gas emissions, enhancing resilience, and ensuring sustainable development in the face of climate challenge.

## INTRODUCTION

The livestock sector is a vital component of global agriculture, contributing to food security, livelihoods, and economic development. However, climate change poses unique challenges to this sector. This analysis compares the global frameworks, India's National Action Plan on Climate Change (NAPCC), and Kerala's State Action Plan on Climate Change (KSAPCC)(DoECC, 2022) to assess the alignment and efficacy of strategies within the livestock sector.

### Global Perspective

The global perspective on action plans for climate change in the livestock sector is primarily framed within international agreements, research initiatives, and best practices aimed at addressing the environmental challenges associated with livestock farming (FAO. 2022. FAO Strategy on Climate Change 2022–2031). Several key elements characterize the global perspective in this context:

### International Agreements

**Paris Agreement:** The Paris Agreement, adopted in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC, 2015), is a landmark international treaty that aims to limit global warming to well below 2 degrees Celsius. It recognizes the contribution of the livestock sector to greenhouse gas emissions and encourages countries to develop and implement strategies to reduce emissions from agriculture, including the livestock industry.

### Sustainable Development Goals (SDGs)

The United Nations' Sustainable Development Goals, particularly Goal 13 (Climate Action) and Goal 2 (Zero Hunger), (UN, SDG- Climate Action) emphasize the need to address climate change while ensuring food security. Livestock management is a critical component of achieving these goals, as it intersects with environmental sustainability, food production, and rural livelihoods.

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### **Intergovernmental Panel on Climate Change (IPCC)**

The IPCC (IPCC Reports) provides scientific assessments related to climate change, including the impacts of livestock farming on greenhouse gas emissions. Its reports contribute to global understanding and policy development regarding the mitigation and adaptation strategies required in the livestock sector.

### **Global Research Initiatives**

Various global initiatives and research projects focus on understanding and mitigating the environmental impact of livestock farming. These efforts explore innovations in feed efficiency, manure management, and sustainable animal husbandry practices to reduce the carbon footprint of the livestock sector.

### **Best Practices and Guidelines**

International organizations, such as the Food and Agriculture Organization of the United Nations (FAO), provide guidelines and best practices for sustainable livestock management. These include recommendations for improved feeding practices, waste management, and the adoption of climate-smart agriculture in the livestock sector.

### **Public-Private Partnerships**

Collaboration between governments, private sector stakeholders, and non-governmental organizations is essential for implementing effective climate action in the livestock sector. Partnerships often focus on developing and disseminating sustainable practices, promoting research, and investing in technologies that reduce emissions.

### **Technology Transfer**

The global perspective recognizes the importance of technology transfer to support developing nations in adopting more sustainable and climate-friendly livestock practices. This includes the dissemination of efficient breeding techniques, improved animal health management, and precision agriculture technologies.

### **Financial Mechanisms**

Climate finance mechanisms, such as the Green Climate Fund, aim to mobilize financial resources to support developing countries in their climate mitigation and adaptation efforts, including sustainable practices in the livestock sector.

### **Awareness and Capacity Building**

Global initiatives emphasize the importance of raising awareness and building the capacity of stakeholders involved in the livestock sector. This includes farmers, policymakers, and local communities, to enhance their understanding of climate-friendly practices and facilitate their implementation.

### **One Health Approach**

Recognizing the interconnectedness of human health, animal health, and the environment, a holistic “One Health” approach is increasingly promoted at the global level. This approach emphasizes integrated strategies for sustainable livestock management that consider ecological, economic, and social dimensions.

In summary, the global perspective on action plans for climate change in the livestock sector involves a combination of international agreements, research initiatives, best practices, and collaborative efforts to address the environmental impact of livestock farming while ensuring food security and sustainable development.

**Framework:** Global efforts are primarily articulated in international agreements, such as the Paris Agreement, with a focus on reducing greenhouse gas emissions and promoting sustainability.

**Key Focus Areas:** Mitigation of methane emissions, sustainable intensification, and resilience-building practices within the livestock sector.

**Challenges:** Harmonizing diverse global priorities, ensuring accountability, and providing financial support to developing nations.

### **Global Initiatives in Livestock Sector**

**Carbon Footprint Reduction:** Collaborative efforts among nations to reduce the carbon footprint of livestock production through the adoption of sustainable practices and technologies, including improved feed efficiency, methane inhibitors, and manure management.

**Research and Innovation:** Global research partnerships aimed at developing climate-resilient livestock breeds, implementing precision farming techniques, and exploring alternative protein sources to reduce environmental impact.

**Policy Harmonization:** International agreements and policy frameworks that promote sustainable practices and facilitate knowledge exchange among

nations, fostering a coordinated response to climate change in the livestock sector.

### **National Perspective (India)**

Framework: India's NAPCC integrates the National Mission for Sustainable Agriculture (NMSA) and the National Mission on Sustainable Agriculture (NMSA) to address climate change within the broader agricultural context.

**Key Focus Areas:** Sustainable livestock production, breed improvement, and resource-efficient practices to enhance climate resilience.

**Challenges:** Bridging the gap between national policy and grassroots implementation, encouraging sustainable practices among diverse agricultural communities.

India's perspective on action plans for climate change in the livestock sector is shaped by the country's unique challenges, agricultural practices, and commitment to sustainable development. The initiatives and strategies implemented at the national level aim to address the environmental impact of livestock farming while ensuring food security and the well-being of rural communities. Here are key elements that characterize India's perspective:

### **National Action Plan on Climate Change (NAPCC)**

India's NAPCC includes specific missions that address climate change across various sectors, including agriculture. The National Mission for Sustainable Agriculture (NMSA) is a crucial component, focusing on promoting sustainable practices in agriculture, including livestock management.

### **Sustainable Livestock Production**

The Indian government emphasizes sustainable livestock production practices. This includes promoting climate-resilient breeds, improving feed efficiency, and adopting resource-efficient management practices to reduce the environmental footprint of the livestock sector.

### **National Livestock Mission and Rashtriya Gokul Mission**

The National Livestock Mission and Rashtriya Gokul Mission focuses on enhancing livestock productivity and overall animal health. These missions encourage the adoption of modern technologies and best practices in dairy farming.

### **Feed Efficiency and Ration Balancing**

Efforts are made to improve feed efficiency and ration balancing to reduce methane emissions from livestock. Research and extension services are employed to educate farmers on optimal feeding practices.

### **Promotion of Climate-Resilient Breeds**

The promotion of climate-resilient livestock breeds is a key strategy. These breeds are better adapted to local climatic conditions and are more resilient to the impacts of climate change.

### **Integrated Farming Systems**

Integrated Farming Systems (IFS) that integrate livestock with other agricultural activities are encouraged. This approach enhances resource use efficiency, minimizes waste, and provides additional income streams for farmers.

### **Waste Management**

Strategies for efficient waste management, including the treatment of animal waste, are implemented to reduce environmental pollution and harness the potential of waste for biogas production.

### **Capacity Building and Training**

Extensive capacity-building programs and training initiatives are conducted to educate farmers about sustainable livestock management practices. These programs cover aspects such as animal nutrition, health, and efficient farm management.

### **Financial Incentives**

Financial incentives, subsidies, and support schemes are provided to farmers adopting sustainable livestock practices. These incentives may include financial assistance for the purchase of climate-resilient breeds or the implementation of improved management practices.

### **Technology Adoption**

The adoption of technology, including precision farming techniques and digital tools, is encouraged to enhance productivity and reduce the environmental impact of livestock farming.

### **Research and Innovation**

India invests in research and innovation in collaboration with scientific institutions to develop and promote climate-smart technologies and practices in the livestock sector.

## Community Participation

Engaging local communities and promoting community participation in decision-making processes related to livestock management are integral aspects of India's approach. This ensures that strategies align with local needs and realities.

India's perspective on action plans for climate change in the livestock sector reflects a commitment to balancing agricultural productivity with environmental sustainability. The multifaceted approach encompasses policy frameworks, technological interventions, capacity building, and community involvement to address the challenges posed by climate change in the context of livestock farming.

## National Strategies in India

**Climate-Resilient Livestock Breeding Programs:** Initiatives to develop and promote breeds adapted to changing climatic conditions, led by organizations such as the National Dairy Development Board (NDDB) in collaboration with state governments.

**Renewable Energy Integration:** Promotion of renewable energy sources, such as solar and biogas, for decentralized energy production in the livestock sector, reducing dependence on conventional energy and mitigating emissions.

**Capacity Building and Extension Services:** Strengthening extension services to educate livestock farmers about climate-smart practices, including sustainable feeding, water management, and disease control measures.

**Insurance Schemes:** Introduction of climate-resilient livestock insurance schemes to protect farmers from economic losses due to climate-related events, incentivizing the adoption of sustainable practices.

## Regional Perspective (Kerala)

**Framework:** Kerala's livestock strategies, as articulated in the KSAPCC, contextualize national priorities to address the unique challenges faced by the state.

**Key Focus Areas:** Climate-resilient livestock management, sustainable feeding practices, and community involvement in climate adaptation.

**Challenges:** Aligning regional priorities with national guidelines, tailoring strategies to local conditions, and ensuring active participation from local communities.

## State-Specific Measures in Kerala

Kerala's perspective on action plans for climate change in the livestock sector is characterized by the state's unique geographical, ecological, and socio-economic conditions. The State Action Plan on Climate Change (SAPCC) of Kerala outlines strategies specific to the region, aiming to mitigate the impacts of climate change on agriculture, including livestock management. Here are key elements that define Kerala's perspective:

### Climate-Resilient Livestock Management

Kerala's SAPCC emphasizes the need for climate-resilient livestock management practices. This includes the promotion of local breeds adapted to the region's climatic conditions and the implementation of measures to enhance the overall resilience of the livestock sector.

### Sustainable Feeding Practices

The state focuses on sustainable feeding practices to improve feed efficiency and reduce the environmental impact of livestock farming. This involves promoting locally available and climate-appropriate feed resources.

### Community Involvement

Kerala places a strong emphasis on community involvement in climate change mitigation and adaptation efforts, including within the livestock sector. Engaging local communities ensures that strategies align with their needs and traditional knowledge.

### Waste Utilization and Management

The efficient utilization and management of livestock waste are key components of Kerala's climate action plans. This involves implementing practices such as biogas generation from animal waste and integrating waste into agricultural systems.

### Breed Conservation and Improvement

Kerala recognizes the importance of conserving and improving indigenous livestock breeds. The SAPCC likely includes measures to conserve and promote breeds that are well-adapted to the local environment and contribute to the state's cultural and economic fabric.

### Integration with Agriculture

The integration of livestock with other agricultural

activities, following an agroecological approach, is likely part of Kerala's perspective. This approach helps enhance resource use efficiency, reduce environmental impact, and provide diversified income sources for farmers.

### **Technology Adoption and Innovation**

Kerala's climate action plans may encourage the adoption of climate-smart technologies and innovative practices in livestock farming. This includes the use of precision farming techniques, digital tools, and other technologies to enhance efficiency.

### **Capacity Building and Farmer Training**

The state likely invests in capacity-building programs and farmer training initiatives to educate livestock farmers about sustainable practices. This includes training on improved animal husbandry, health management, and climate-resilient farming methods.

### **Ecosystem Conservation**

Recognizing the interconnectedness of ecosystems, Kerala's perspective likely involves measures for the conservation of natural habitats, biodiversity, and sustainable land use, which indirectly contribute to climate-resilient livestock management.

### **Local Adaptation Strategies**

Kerala's climate action plans are likely to incorporate local adaptation strategies, recognizing that solutions need to be tailored to the specific challenges posed by climate change in the region, including those affecting the livestock sector.

### **Research Collaboration**

Collaboration with research institutions and agricultural universities is likely part of Kerala's approach. This involves leveraging scientific expertise to develop and implement context-specific solutions for climate-resilient livestock management.

### **Monitoring and Evaluation**

The state is likely to have mechanisms for monitoring and evaluating the effectiveness of implemented strategies. Regular assessments help identify successful interventions and areas that may require further attention and refinement.

In summary, Kerala's perspective on action plans for climate change in the livestock sector is driven by

a holistic and region-specific approach. The state recognizes the importance of sustainable and climate-resilient practices, community involvement, and the conservation of local biodiversity in ensuring the resilience of its livestock sector in the face of changing climatic conditions.

**Integrated Livestock-Fish Farming:** Encouraging integrated farming systems that combine livestock rearing with fish farming, promoting resource use efficiency and enhancing resilience to climate-induced fluctuations.

**Waste-to-Energy Initiatives:** Implementation of waste-to-energy projects utilizing livestock manure for biogas production, reducing methane emissions and providing an alternative energy source for farmers.

**Community-Based Adaptation:** Community-driven initiatives focusing on climate-resilient livestock management practices, with an emphasis on traditional knowledge and local adaptation strategies.

**Biodiversity Conservation:** Conservation and promotion of indigenous livestock breeds that are well-adapted to local climatic conditions, contributing to biodiversity conservation and preserving valuable genetic resources.

### **Comparative Analysis**

#### **Commonalities**

Global, national, and regional perspectives emphasize the importance of sustainable livestock practices and climate-resilient breeds.

Mitigating methane emissions and improving resource efficiency are shared priorities across all levels.

Community participation is recognized as crucial for successful livestock climate strategies.

## **DISPARITIES**

Global frameworks provide broad guidelines applicable to diverse contexts, while national and regional plans must consider localized challenges.

National plans, including India's, offer more detailed strategies, addressing breed improvement, sustainable practices, and resource-efficient livestock management.

Regional plans, exemplified by KSAPCC, must align strategies with national priorities while addressing state-specific challenges.

## EFFECTIVENESS

Global frameworks set overarching goals, but their success depends on the commitment of nations and effective international collaboration.

National plans provide detailed strategies, but their effectiveness relies on state-level implementation and the adoption of sustainable livestock practices at the grassroots level.

Regional plans, such as KSAPCC, bridge the gap by tailoring strategies to local needs, promoting community involvement, but must align with both national and global priorities for comprehensive impact.

## CONCLUSION

The action plan outlined at the global, national, and state levels reflects the need for a multi-dimensional and collaborative approach to address the impacts of climate change on the livestock sector. Implementing these strategies will not only mitigate greenhouse gas emissions but also enhance the adaptive capacity of livestock farming communities. As climate change continues to pose challenges, sustained efforts, policy support, and technological innovations are essential to ensure the resilience and sustainability of the livestock sector on a global scale, in India, and specifically in states like Kerala.

This comparative analysis highlights the importance of recognizing commonalities and

disparities within global, national, and regional approaches to the livestock sector in the context of climate change. While alignment is crucial for collective impact, adapting strategies to specific contexts and fostering local ownership are equally imperative for effective climate action in the livestock sector across different governance levels.

**Conflict of Interest-** None

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