

Newsletter

CLIMATE ACTION IN MIZORAM

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Climate Change Impacts on Livestock and Its Mitigation Strategies

- Animal Husbandry & Veterinary Department, Govt. of Mizoram

Climate change is one of the major threats to the sustainability of livestock production systems. Climatic variables—including ambient temperature, relative humidity, solar radiation (*both direct and diffuse*) and rainfall—collectively regulate feed and water availability, determine fodder quality and exert profound effects on heat stress, productivity, animal growth, reproduction and the incidence of diseases in livestock. The effects of climate change on animal health may be considered into two categories:

Direct Effects of Climate Change

➤ **Heat stress:** When the internal body temperature rises by just 3–4 °C, animals experience heat stress. At ambient temperatures above 30 °C, feed intake decreases by 3–5%, leading to reduced reproductive performance, lower overall productivity in livestock, and diminished egg production in poultry.

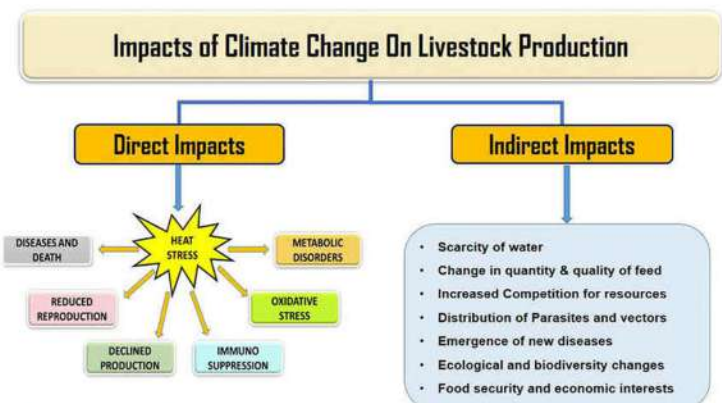
➤ **Production:** Fluctuations in ambient temperature have the most pronounced effects on livestock productivity and welfare. It has been observed that significant monetary losses—amounting to nearly 2% of the total milk production in India—occur as a result. Production disorders such as ketosis, milk fever, fat cow syndrome, and various deficiency-related conditions may arise from changing climatic conditions and inadequate nutrition.

➤ **Reproductive disorders:** Reproduction efficiency of both male and female are also affected by climate change. Lower sperm concentration and quality in bulls, pigs and poultry have been associated with heat stress. In female, silent heat, poor fertility, impairment of embryo development and pregnancy are adverse effect of heat stress

Indirect Effects of Climate Change

➤ **Disease outbreak:** Climate change could change how diseases travel, outbreaks of serious illnesses or even the introduction of new diseases that could affect livestock that isn't typically exposed to these kinds of illnesses. It was believed that due to climate change and porous border, Mizoram has experienced several severe outbreaks of diseases like *African Swine fever*, *Foot and Mouth Disease*, *Peste des petits ruminants (PPR)* etc.

➤ **Feed and forage availability:** The quality and quantity of feed are declining due to changes in rainfall and temperature patterns, affecting the growth of forage crops. As a result, the cost of feeding livestock may increase, and the nutritional content of available feed may be compromised. As a result, there is a deficit of 3.7 Lakh MT of green fodder and 2.6 Lakhs MT of dry fodder.



Mitigation Strategies

➤ **Climate-resilient animal breeding:** Promote local, climate and disease resilient breeds that are naturally adapted to local climate and disease condition. These climate-resilient breeds not only ensure sustainable livestock production but also promote genetic diversity within animal populations, enhancing their overall resilience to environmental stressors.

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➤ **Improve housing:** Better ventilation, shading, and cooling systems can significantly reduce heat stress and improve animal welfare and mitigate the effects of extreme temperatures.

➤ **Robust surveillance:** Improved veterinary surveillance systems are essential for tracking the diseases that are impacted by climate change. Prompt reaction actions, including vaccination campaigns, treatment regimens and quarantines, are made possible by early discovery and contribute to the prevention of large-scale epidemics in animal populations.

➤ **Management modification:** This involves diversification of livestock animals and crops, integration of livestock systems with forestry and crop production and changing the timing and locations of farm operations. Diversification of livestock and crop varieties can increase drought and heat wave tolerance and may increase livestock production when animals are exposed to temperature and precipitation stresses.

Government Initiatives/ Programs:

➤ **Feed and Fodder Production:** To ensure year-round availability of fodder, the A.H & Vety Department has undertaken several initiatives to enhance fodder production in both government and private farms. Moreover, to address fodder scarcity during the lean period, hay production has been carried out at the A.H & Vety Farm in Thenzawl to meet farmers' needs at an affordable price.

➤ **National Livestock Mission (NLM):** A scheme for entrepreneurship development in piggery, hatchery, goatery and fodder production has been introduced. The scheme provides a **50% capital subsidy** through SIDBI.

➤ **National Animal Disease Control Programme (NADCP):** This programme was launched in 2019 to control Foot-and-Mouth Disease and Brucellosis, given their significant impact on milk production and reproductive efficiency.

➤ **Assistance to States for Control of Animal Diseases (ASCAD):** This scheme covers the vaccination of animals for diseases not included under the NADCP, such as *Classical Swine Fever, Ranikhet Disease, Infectious Bursal Disease, Fowl Pox, Canine Distemper, and Rabies* (Anti-Rabies Vaccine).

➤ **Rashtriya Gokul Mission (RGM):** This mission aims at the conservation of indigenous breeds and genetic upgradation through artificial insemination. Indigenous, non-descript, and crossbred cows are inseminated with superior-quality semen to improve herd genetics, enhance productivity and reduce disease susceptibility.

Conclusion

It is evident that climate change leads to reduced productivity and economic losses for farmers. Although animals can adapt to changing conditions to some extent, effective mitigation strategies must be implemented to minimize the adverse effects of thermal stress and enhance the economic well-being of farmers.



Fodder & Hay Production, A.H & Vety Farm Complex, Thenzawl



Vaccination of Animals



National Livestock Mission



Mobile Veterinary Unit with Staff

Implementation of Green India Mission(GIM) in Mizoram

- Environment, Forests & Climate Change Department

The **Green India Mission** is one of the eight missions under the **National Action Plan on Climate Change (NAPCC)**. It aims to protect, restore, and enhance India's forest and tree cover while responding to climate change through a combination of adaptation and mitigation measures.

The primary objectives of the Green India Mission (GIM) include increasing forest and tree cover on 5 million hectares of forest and non-forest land, improving the quality of forest cover on another 5 million hectares and enhancing ecosystem services such as biodiversity conservation, hydrological regulation and carbon sequestration. The Mission also aims to increase **forest-based livelihood income** for approximately **3 million households**.

The Green India Mission (GIM) was launched in India in **February 2014** and was subsequently implemented during the *financial year 2016–2017* in the State of Mizoram. In Mizoram, the Mission is being implemented across **five Forest Divisions**, covering eight landscapes: Aizawl Forest Division; Champhai Forest Division (including Kawkulh and Khawzawl); Darlawn Forest Division; Kolasib Forest Division (covering Kawnpui & Bukpui and Kolasib & Bairabi); and Thenzawl Forest Division (including Thenzawl and Serchhip).

This comprehensive implementation spans a significant area and encompasses plantation and restoration activities under various sub-missions such as the restoration of degraded forests, rehabilitation of shifting cultivation areas, agroforestry on farmers' lands, roadside plantations, and urban and peri-urban forestry. Notably, a substantial portion of these activities has been undertaken on community-owned and privately-owned lands, reflecting the active participation of local communities in the Mission's implementation efforts.

The Green India Mission has significantly advanced forest restoration and carbon sequestration efforts across the country. In Mizoram, the Mission has successfully **established 19,643 hectares of plantations**, reflecting strong and sustained community participation. These initiatives have promoted biodiversity conservation, soil stability and improved livelihood opportunities for local communities.



How One Tiny Village's Ordinary Measures Created Extraordinary Water Security

- Dr. F. Lalbiakmawia

Public Health Engineering Department

"Success often does not require doing the extraordinary, but rather doing ordinary things extraordinarily well". A striking illustration of this proverb is provided by the village of **Khualen in Mizoram**—a small settlement of just 285 inhabitants located along the Khawzawl–Sinzawl Thanlawn road in Khawzawl District. The village stands out as an exemplar in effectively harnessing the technical expertise of the Public Health Engineering Department of Mizoram to ensure an adequate and reliable water supply for its residents.

Originally, Khualen relied on two sources of water supply—*Khangte Kawr* and *Zawngatui*. Over time, the discharge from these sources declined sharply, to the point that they were nearly abandoned. In around 2000, the village introduced a new source, *Daikawn Kawr* (also known as *Khangte-II*), but that too did not result in substantial improvement in water supply. With the implementation of the **Jal Jeevan Mission (JJM)**, all three sources were integrated so as to provide every household with a **Functional Household Tap Connection (FHTC)**. But the story is not over yet.

Problem in Sources and Strategic Response

Even after combining sources, a decline in discharge continued, which may be attributed to deforestation and the effects of climate change.

Taking this issue to heart, the Village Council convened a consultation meeting to address the problem. The landowners came to understand that *without preserving and protecting the catchment*, source depletion would worsen. In an unprecedented move, all fourteen landowners surrendered their land in the catchment in 2024; two additional parcels were surrendered in 2025.

The **Green Catchment Area Project (GCAP)** was formally initiated by the Village Council, under which robust protection measures are now in effect. Specific interventions include:

- **Soil and hydrogeological conservation structures:** Absorption trenches and ground water recharge pits have been constructed.
- **Construction of check dams:** Through FOCUS, two reliable check dams were constructed.



Planting trees in catchment area

- **Tree plantation:** In 2024, with assistance from the Young Mizo Association (YMA), 300 saplings were planted. In 2025, via MNREGA, an additional 550 saplings were planted primarily in fallow and barren land.

Community Participation and Funding:

The community played an active role in both labour and decision-making. Funding came from MNREGA and local institutions like YMA joined hands. The Village WATSAN committee also took responsibility for planning and oversight.

Outcomes:

These combined efforts have yielded observable improvements, including:

- Khualen was awarded *first prize* among villages in Khawzawl District in a water conservation competition.
- On World Water Day, 2024 (22nd March), the *Village WATSAN Committee* received an award in recognition of their work. Arguably, more important than the formal award is the everyday benefit to the villagers: a sufficient and reliable water supply.

Quantitative Evidence of Improvement:

Before the implementation of the **Jal Jeevan Mission (JJM)** and the local project called **Green Catchment Area Project (GCAP)**, the village received only minimal water supply. This inadequate supply adversely affected the economy and the overall well-being of the people. Rural hardships are particularly severe when communities face persistent shortages of clean water.

After the implementation of JJM and GCAP, the volume of water received increased dramatically. Improvements in water quality have also been very encouraging.

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Changing Climatic Variables : Mizoram Context

Climate change is a complex and global phenomenon that influences various aspects of biology, the environment, politics and the economy. Climate-related extremes—such as heatwaves, droughts, erratic rainfall patterns, storms, floods and the proliferation of insects and pests—have significantly affected all sectors of livelihood. Future climate projections indicate increasing variability in key climatic parameters, including rainfall, temperature and humidity, with varying degrees of intensity and regional impact.

Over the past three decades, Mizoram has experienced a drastic change in rainfall patterns accompanied by increased irregularity in rainfall distribution and greater frequency of extreme events such as intense downpours and prolonged dry spells and significant fluctuations in temperature, directly impacting local livelihoods. In the Indian context, the observed global surface temperature increase of approximately 0.6°C has contributed to a rise in the mean annual temperature across the country. This warming trend has resulted in an increase in the maximum temperature, ranging from 0.5°C to 1.2°C, across various climatic zones of India.

➤ The atmospheric concentration of carbon dioxide (CO₂) is projected to increase from 368 ppm (in 2000) to 540–970 ppm by 2100, compared to approximately 280 ppm in 1750.

➤ Temperature is estimated to rise by 1.5°C to 3.5-4.04.0°C by the end of the 21st century, with minimum temperatures expected to increase by 1.0°C to 2.5°C and maximum temperatures by 1.0°C to 3.5°C.

➤ Summer maximum temperatures could rise by 1°C to 2°C under severe climate scenarios, while winter minimum temperatures are also expected to increase by 1°C to 1.5°C, or up to 2°C, depending on emission pathways.

- Mizoram State Climate Change Cell, MISTIC

➤ A temperature increase of 3°C, combined with a decrease in rainfall, could raise irrigation demand by 26%, with overall precipitation expected to reduce by about 12%, though some areas may experience a 0–25% increase.

➤ Crop yields, particularly of wheat, rice, and maize, are projected to decline with even a 1°C rise in temperature during the growing season and increased demand for irrigation.

➤ The intensity of rainfall in many regions is likely to increase by 1–6 mm/day, while the number of rainy days may decrease by 1–10 days annually.

➤ The mean annual rainfall is predicted to range between 940 ± 149 mm and 1330 ± 174.5 mm, with the possibility of up to a 25% increase in total rainfall and a 26% rise in extreme rainfall events.

➤ Monsoon period is expected to become shorter but more intense, resulting in higher risks of soil erosion, landslides, and flash floods while dry season is projected to lengthen, increasing the likelihood of water stress and forest fires.

➤ Changes in climatic variables will influence the emergence, extinction, and prevalence of various vector-borne diseases and pests, leading to a higher incidence of *Fall armyworm (FAW)*, *Scrub Typhus*, *Malaria*, and *Dengue*, due to extended transmission windows.

➤ Awareness campaigns, climate-resilient agriculture, ecosystem-based adaptation, capacity-building initiatives and education on mitigation and adaptation strategies are essential to combat changing climatic conditions. These efforts are crucial for building resilience and flexibility among stakeholders who are most vulnerable to the impacts of climate change, fostering sustainable practices and empowering communities to respond and recover from environmental challenges.



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