

A Climate Adaptation Atlas to De-risk Nepalese Livestock Production System

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Problem statement

Livestock systems are disproportionately vulnerable to the impacts of extreme weather events, a challenge that outweighs their contribution to such phenomena. In Nepal, over 35 percent of livestock-dependent households are experiencing severe climate-induced hazards, including heat stress, reduced availability of fodder and forage and declining water resources (Pokharel and Adhikari, 2025). These findings highlight the urgent need for scientific, evidence-based decision-support tools tailored to livestock systems that can characterize climate-related risks and informing adaptation planning and policy development, particularly given the critical role of livestock in ensuring food security.

The solution/Innovation

Developing adaptation strategies to climate variability and change is increasingly urgent for Nepalese Agriculture. Effective adaptation planning requires spatially disaggregated information on climate hazards, exposure and vulnerability, and feasible adaptation option across key livestock production systems. Nepal Agricultural Research Council, in collaboration with Borlaug Institute for South Asia and Gates Foundation, developed Nepal first Climate Adaptation Atlas called as 'AANA'. This atlas is tailored to the country's diverse topography and socioeconomic setting. It supports evidence-based decision making, priority setting and targeted investments to strengthen the climate resilience of smallholder farming community in Nepal.

Key results/impacts

By **2080**, under a **High Emission Scenario**, livestock systems will face intensified climate hazards. While goats and poultry are particularly vulnerable to stressors such as the Temperature-Humidity Index (THI), cold stress, and excessive rainfall, the primary threat to over **one million farming families** is not the hazards themselves, but the **low investment** in reinforcing adaptation capacity. Strategic implementation of existing adaptation technologies can de-risk livestock production by more than 50%.

Climate Stressors & Vulnerabilities

- **Key Hazards:** Rising THI, extreme cold and flooding.
- **Most Affected:** Goat and poultry populations are projected to experience the highest intensity-frequency of these climate-related risks.

Priority Adaptation Options

- **Buffalo, Cattle, Goat & Pig:**
 - **Infrastructure:** Advanced shelter modifications to regulate environments.
 - **Nutrition:** Supplementation with **micronutrients** and **probiotics** to mitigate physiological stress.
- **Poultry:**
 - **Environmental Control:** Mechanical cooling, heating management and optimized shed housing.
 - **Operational Shifts:** **Flock thinning** and **fat-supplemented diets** to maintain output.



Figure: Female farmer holding goat kid. Background net is an indigenous technology protecting goat and sheep from cold stress in higher altitude regions of Nepal. Photo credit: Prasun

More on: <https://aana.narc.gov.np>

Scalability and regional relevance

This is a collaborative work of multiple research institutions in South Asia which emerged as regional climate adaptation atlas in the beginning. The broader picture offered by <https://acasa-bisa.org/> has been providing meaningful information on climate risk in South Asia. This work is scalable to other Asian regions where evidence-based planning is crucial to address climate change related issues, develop adaptation capacity and formulate climate-smart livestock production policy. The adaptation options provided in the atlas can be scalable from community to national level planning and project development.

Partners and donors involved

- NARC research centers, Nepal
- Borlaug Institute for South Asia, India
- Gates Foundation, USA

