



POLICY BRIEF

IMPACTS OF CLIMATE CHANGE ON LIVESTOCK SYSTEMS IN BHUTAN - STRATEGIES FOR ACHIEVING FARMING SYSTEM RESILIENCE



EU Technical Assistance Complementary Support Project – Bhutan



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POLICY MESSAGE

While Bhutan's livestock sector has growth potential, and their animals are essential for the majority of rural householder livelihoods, herds of all animal breeds, are highly-vulnerable to numerous impacts of climate change. More than 51% of the Bhutanese population lives in rural areas, relying mainly on agriculture and livestock farming for their livelihoods. Poverty analyses show that 80% of the poorest Bhutanese households are engaged in agriculture and that their livestock animals play a crucial role in strengthening their livelihoods. Collectively, the **RNR sector – comprised of agriculture, livestock and forestry – contributed around 16.5% of Bhutan's Gross Domestic Product** in 2016 (NSB, 2017). In 2018 the contribution of the livestock sector to national GDP was 4.3% (NSB, 2018), and this figure is still broadly applicable. Bhutan's agriculture and RNR sectors offer **substantial growth potential**, but also face **significant challenges**: (1) increasing food demand; (2) climate change trends and impacts; (3) the fact that farms and livestock herds are widely dispersed across Bhutan's complex terrain, **impeding coherent actions, and leading to inequities and pockets of poverty.**

The **Royal Government of Bhutan and MoAF/DoL have ambitious plans** to develop the agricultural sector through **land-use consolidation, the conversion of fallow lands back to agriculture, the development of numerous value chains, support for agro-processing industries, and the promotion of agro-forestry systems.** These measures will increase the livestock sector's health, output, and productivity; however, poorly-planned adaptation to rapidly growing climate change impacts may also undermine these objectives.

The **highly-diverse variety of Bhutan's agro-ecological zones** within which many farming systems are found, and the locations of communities on the periphery of the Tibetan plateau, form the context for highly-complex patterns of climate change impacts upon livestock, in all agro-ecological zones, and for all livestock types and farming systems.

In Bhutan's dominant farming systems, **livestock-raising is firmly integrated into systems for growing vegetables and arable crops, both of which yield crop residues that are essential as animal fodder.** The typical Bhutanese small-farmer has a largely rain-fed integrated system with a few heads of livestock, a few hectares of arable land, access to forests, and, where possible, some vegetable production. Trees and hedgerow grasses exist in complex agro-forestry systems that can provide fodder.



Figure 1. Goats are key livestock

Bhutan's farmers depend significantly on fodder from on-farm sources, and from forested areas where leaf litter and fodder are collected. These **extensive areas of primary and secondary forests, and fallow lands** provide crucial sources of fodder. The **linkages of Bhutan's livestock communities to other RNR sectors**, indicate that changing climate patterns have significant potential to alter the production of animal meat, wool, hides and dairy products. These impacts have not yet been fully studied. Much further research is needed, led by the DoL.

The need to increase the capabilities for climate change adaptation. This Policy Brief is based on an assessment carried out in 2020-21 titled “*Study on the Impact of Climate Change on Livestock Farming Systems in Bhutan.*” The impetus for this assessment was the urgent need for integrated responses to climate concerns, from institutions and value chain actors in the livestock sector. MoAF and the Department of Livestock have signaled their intention to significantly increase the capabilities for climate change adaptation across the livestock sector and provide support for the dominant mid-elevation agro-ecological zones within which livestock are dominant. The 12th FYP specifies that **capacity-building that includes adaptation measures, must become a significant component of improved livestock management across Bhutan.** This emphasis should be developed further in the emerging 13th FYP. As the Ministry of Agriculture and Forestry (MoAF) drafts the RNR Vision 2040, a comprehensive analysis - **plus a set of directions for addressing the impacts of climate change on livestock farming and the associated production systems - are urgently needed. A range of measures must be applied through well-designed, large-scale livestock support programs** to ensure that livestock-based livelihoods will become more sustainable.

Climate change is now a reality in Bhutan. The global nature of GHG-generated climate forcing means that no country can escape the effects of climate change. Bhutan is among those countries that are the most vulnerable to such impacts. Recent information on its climate vulnerabilities is detailed in the *Third National Communication (TNC) of the Kingdom of Bhutan to the UNFCCC* (NEC, 2020). This shows that the country has been experiencing more **frequent climate-related events, with significant loss and damage to lives, properties, and infrastructure** as a consequence. The TNC of 2020 identified numerous changes that are increasing the exposure of the country’s livestock to climate hazards. The potential impacts of climate change make it imperative to adjust or adapt to hazards and risks.

Climate change can impact forage availability, **alter animal feeding habits, lead to heat stress, and catalyze the spread of infectious diseases.** In particular, the increasing number of disease outbreaks in Bhutan (National Centre for Animal Health, 2017) and subsequent economic losses may partly be due to climate change. A specific issue raised is the reduction in the **proportion of livestock populations composed of native livestock breeds** relative to the increase in exotic animal genotypes. Many of the introduced breeds may be less robust in the face of disease outbreaks and the increased variability in extreme hot and cold temperatures. **The condition of forested areas is also vital as woodlands serve as crucial resources for grazing cattle** and pasturing all other types of livestock.

The practice of transhumance among communities that move livestock from lowland wintering grounds to upland summer pastures is also uniquely vulnerable. For these groups, autonomous adaptation has involved the dissemination of yak-cattle hybrids that are more heat-resistant and better able to adapt to lower altitudes, and rising temperatures.

The altering Bhutanese climate directly impacts **the livestock sector, affecting animal health, mortality and productivity,** and indirectly affecting



Figure 2. Yak in alpine Himalayas

pasture quality, feed resources and livestock product supply chains. These impacts will have significant economic, social, and environmental consequences in the coming years. These effects must be anticipated through efficient and cost-effective adaptation strategies to minimize the cost to those most vulnerable to identified hazards.

As one component feeding into national-level planning, the EU-TACS **Livestock and Climate Study** supplies strategic insights for developing a proposed **National Program and Action Plan for Climate Change Adaptation and Resilience in Bhutan's Livestock Sector**. The Study observes that the **national policy imperative should be placed firmly on adaptation** and on increasing the resilience of communities, farming systems, value chains and watersheds. Given Bhutan's low greenhouse gas emissions, mitigation policies are far less relevant.

DRIVERS OF CHANGE

Better understanding the impacts of climate change on livestock. Climate-related hazards can impact livestock directly and indirectly by affecting animal ambient conditions, animal health, welfare, and productivity and the availability of feed stocks, water, and other inputs, including human labor.

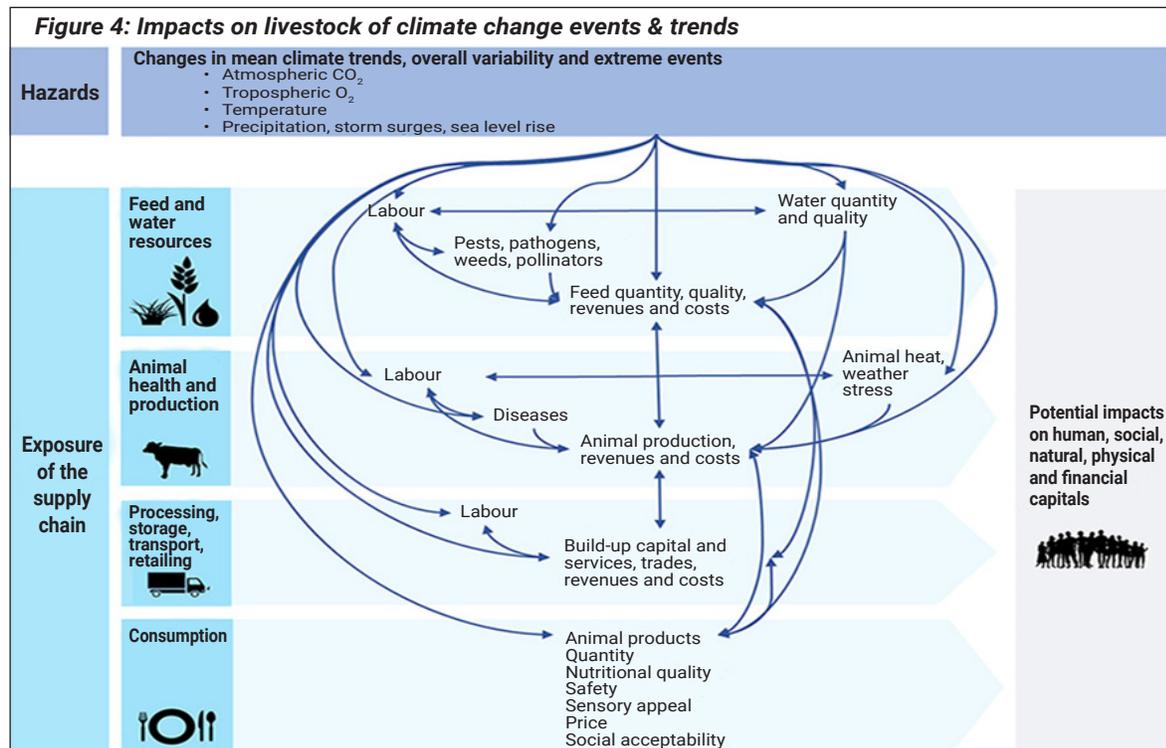
The Study identified the impacts observed by farmers and supply chain actors that provide inputs to them and the impacts observed by value-chain actors that process livestock products and serve Bhutanese consumers. Some of the **driving factors that make livestock and crops vulnerable to such change-related hazards and their increasing impacts** include:

Figure 3. Key climate-change hazards in Bhutan & the identified impacts on livestock

1. Due to **changing monsoon patterns, retreating glaciers, and the altered hydrology of watersheds, livestock-farming and other agricultural systems face enormous threats.** The drying-up of spring-water sources has been reported from multiple locations across Bhutan, as have complex changes across entire watersheds, involving the dropping of water tables, increased seasonal water shortages, reduced river flows, flash floods, and greater soil and vegetation evapotranspiration.
2. At higher altitudes, retreating glaciers increase the risk of glacial lake outburst floods (GLOFs). At lower elevations, hydro meteorological disasters of all kinds occur with greater intensity and frequency, with **erratic and unseasonable rainfall events causing landslides, river flooding and flash floods.** The climate has become significantly more unpredictable, affecting both livelihoods and infrastructure. Extreme events are considerably reducing the **yields of pastures and crops.**
3. Shifting **vegetation patterns** due to increasing temperatures affect **plant phenology in all agro-ecological zones.** **Heat stress** is causing crops and animal species to shift towards more favorable climatic zones. Species of animals, insects, and natural vegetation are shifting at measurable paces to higher elevations, an **increasingly severe issue for sub alpine and alpine regions** with limited altitudinal space. Studies have observed shifts in the tree-line. **Threats to biodiversity** are heightening due to more prevalent forest fires, and alterations in the composition of critical agro-ecosystems. High altitude zones are significant for **pastoralist communities that move their flocks to cooler elevations** during the summer. The warming climate impacts **pollination patterns and forest productivity, especially as trees are essential sources of hand-cut fodder, while livestock is frequently pastured in Bhutan's patchworks of woodlands and pasture openings.**

4. **Crop, pasture and forest** productivity are being affected by drier winter periods, resulting in increased risk and incidence of damaging forest fires. More probability of damage to pastures and crops arises from sudden and unexpected frost events, either late in the spring season or early in the autumn, damaging crops and livestock. **Fodder production has declined.**
5. Encroaching **pests, diseases and wildlife**, whose occurrence has expanded beyond their prior boundaries, leads to increased prevalence and severity of **animal disease outbreaks**, such as has been observed in leech infestations. Several **human and vector-borne livestock pests and diseases** are moving upwards into new zones. Loss of habitat and food supplies and declining water sources increase the incidence of **wild animals migrating into farming and pasture areas**, leading to wildlife conflict.

Understanding the components of vulnerability. A driver of the adaptation responses are the **different levels of vulnerability** that characterize **particular groups of livestock herders, with the owners of the smallest flocks of sheep, goats and cattle being amongst the most exposed to hazards.** Clearly, the potential impacts are not evenly distributed across all regions and types of producers, with many small farmers not even able to provide minimal walled shelter for their animals.



Livestock owners, who specialize in animal herding, are **characterized by differing sensitivity, adaptive capacities and exposure**, and resulting vulnerabilities are differentiated. **Owners of large flocks of animals**, with established access to large pasture areas, crop residues and forest fodder, are amongst the least vulnerable. **Owners of herds practicing transhumance**, who move their animals over large distances between seasons to use pastures in alpine areas during the summer, are also very vulnerable. All livestock owners are exposed to summer droughts and intense winter cold, as many house their livestock within inadequate shelters.

Any assessment of vulnerability must take three crucial elements into account:

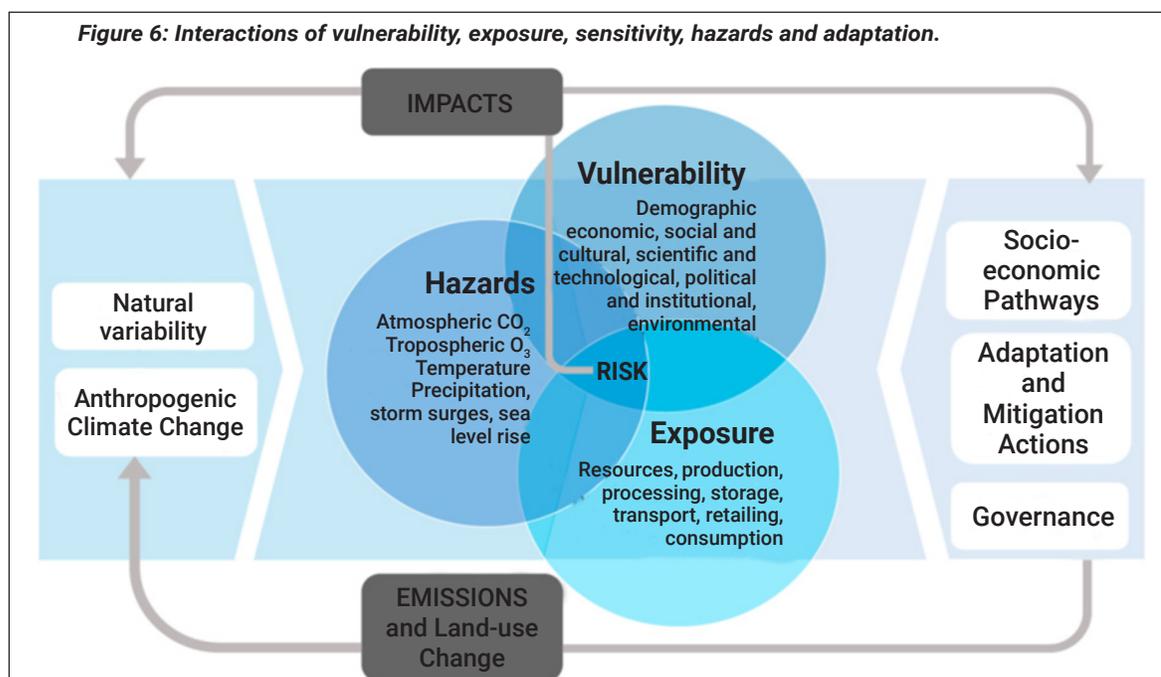
Vulnerabilities arise primarily from variable levels of “livelihood capital” of households, communities or other risk receptors. There are five types of capital: **human, social, natural, physical, and financial**. These elements influence livelihood strategies and resilience, particularly a household’s **adaptive capacity**.

- (1) Robust **information on anticipated or projected changes to local climates**, and the impacts of these changes in **levels of exposure to hazards**, needs to be collected at a local level. This is due to the different levels of exposure to hazards of livestock value chains, e.g., particularly isolated locations (unique watershed areas) and production practices (such as various breeds of livestock, the existence of winter shelters),



Figure 5: Buffaloes and bullocks are key to Bhutanese subsistence farming operations

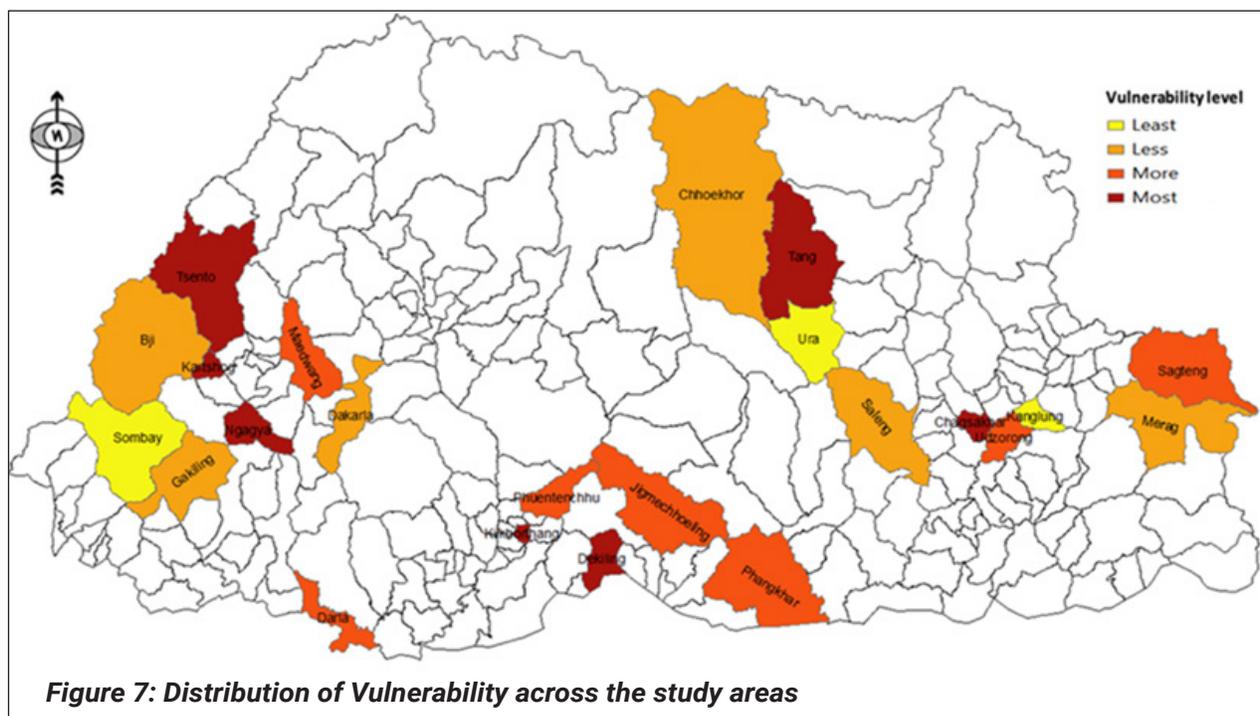
supply chains (feed source dependencies), and the local institutions supporting the sector (such as the variable capabilities and availability of livestock extension services);



- (2) Assessments to determine *what kinds of households or locations are most likely to be impacted* in terms of the **sensitivities of social groups, agro-ecosystems and geographic locations**. The wide distribution of livestock-owning communities across Bhutan’s terrain, and their socio-economic differences, causes the mal distribution of the impacts of climate change;

- (3) The reduction of levels of exposure, the protection of livelihoods assets, and measures to increase resilience to climate shocks. This is termed “adaptation capacity.” This can be achieved by conducting Community-Based Adaptation (CBA) research into the resilience of livestock-based systems, and by **disseminating adaptive measures and strategies. Building the capacity of livestock keepers, to better understand the nature of their increased exposure to the impacts of climate change, can help them reduce their vulnerabilities.**

Responding to climate change through a focused assessment. With timely hazard and impact information, **private producers and public institutions can target vulnerability and exposure and build resilience by planning cost-effective adaptation responses for critical sectors and types of livelihoods.** This was the purpose of the “*Study on The Impact of Climate Change on Livestock Farming Systems in Bhutan,*” which aimed to improve the understanding of the likely range of impacts to facilitate the choice of suitable adaptation policies and measures that public and private sector decision-makers should implement. The Study used the framework, shown in Figure 6 above, as a basis for constructing a vulnerability index based on data from a survey conducted in 10 Dzongkhags and 23 Gewogs located in three agro-ecological zones. The survey of 743 households enquired about livestock ownership, climate impacts, adaptation expenditures, and likely barriers to adaptation options. Observations measuring exposure, sensitivity, and adaptation capacity were generated from the collected data **for 23 Gewogs.** A vulnerability index value for each Gewog was calculated by **adding the exposure and sensitivity indices and subtracting the adaptation indices from the total.** A vulnerability map for the sample Gewogs portrays the Assessment’s results. An index ranking overall vulnerability was generated which assessed each Gewog’s exposure levels, sensitivity, and adaptive capacity. The Vulnerability Index identifies Tsento as the most vulnerable Gewog, while Ura is the least vulnerable.



The Study identifies specific farm-level and value-chain adaptation measures capable of addressing climate hazards. **These hazards and measures to combat them are listed in Figure 8 below.** Each was considered in terms of the implementation costs and the benefits that arise from reducing the associated risks. Most households could not spontaneously identify adaptation options relevant to the changes they perceived, and could be used in their livestock management. **Many families continue to invest in their livestock herds,** demonstrating their eventual needs to take adaptation measures to respond to climate change, even when these actions were not identified as being specific “measures”. **This reflects the fact that many households have few viable alternative livelihoods to fall back on, apart from the limited diversification away from arable-only farming, that even a small herd of livestock can provide.**

Planning efficient adaptation policies and measures. “Adaptation” is the term given to how vulnerable communities, farming systems and households can be supported in responding to climate change in a manner that better protects them from anticipated and unanticipated climate change impacts, whether these take the form of extreme events or longer-term trends in climate variables. “Adaptation” refers to the ecological, social, or economic adjustments in response to the actual or expected climatic stimuli, their initial effects and their later consequences. It encompasses changes in processes, practices, and institutional responses that moderate the potential damage from altering climates and the benefits of any opportunities. The long-standing debate on the **Conservation Rules for goat farming** (where households are only allowed to keep a few animals in stall-fed conditions) is a constraint facing goat rearing, which potentially now could be dealt with through technological solutions. Goat farmers are resource-poor, and the stringent conservation rule on only rearing up to four goats per household is a major hurdle to farmers earning higher incomes. Livestock-owning households and dairy producers are actively seeking to minimize the potential livestock productivity losses from the altering climate. For their part, government decision-makers in **MoAF and the Department of Livestock must continue to vigorously identify relevant policies and actions, e.g., by minimizing livestock diseases, increasing the resilience of domestic livestock-based value chains, and ensuring that food security programming takes account of the emerging climate change impacts on livestock-raising, and the general health of the livestock component of farming systems.**

Adaptation measures should also be assessed by broader criteria, such as their potential to deliver ecosystem conservation benefits; their alignment with national policy priorities, such as greenhouse gas emission reductions; and social and economic development goals. The Study finds that many of the adaptation needs in the livestock sector can be delivered by an integrated approach to the development of local resilience, which is a goal shared by several Ministries, their individual Departments, and numerous research institutions.

Figure 8: Options for adaptation policies and measures

ADAPTATION AREAS	ADAPTATION MEASURES	HAZARDS ADDRESSED
BREED CONSERVATION & IMPROVEMENT	<ul style="list-style-type: none"> • Maintain adaptive breeding programs with appropriate germplasm mixes of local and exotic cattle. • Invest in research centers capable of managing animal genetic resources maintained for animal breeding, and type preservation. • Conserve indigenous breeds and intensify breed improvement by bringing stock from neighboring Dzongkhag and countries. 	Extreme temperatures / changing ecological zones

IMPROVED ANIMAL HEALTH SERVICES AND BIOSECURITY	<ul style="list-style-type: none"> • Laboratories set up for the analysis of primary feed, germplasm, management of vaccines, and assessment of animal blood and fecal samples. Disease control and prevention measures; timely de-worming and routine vaccination; routine spraying for ectoparasites • Surveillance of different diseases; bio-security systems including fences and biological pits; timely disease screening by the RLDC. • Introduction of climate-resilient livestock fish species to diversify farming systems. • Ethno-veterinary practices – e.g., the use of herbal drugs that have been proven to be efficacious for parasite control. 	Livestock pest and diseases
IMPROVED LIVESTOCK HOUSING	<ul style="list-style-type: none"> • Design and demonstrate climate-resilient livestock walled housing/shelter for different livestock types that are relevant to changed agro-ecological conditions • Implement housing designs that need less water for cleaning purposes. They are more energy-efficient, enable the reuse of wastes, are cost-effective, and require less maintenance 	Extreme temperatures
CLIMATE-SMART FODDER AND PASTURE MANAGEMENT	<ul style="list-style-type: none"> • Develop improved pasture with drought-resilient fodder and pasture mixes of species. • Promote efficient feeding technologies within barns and animal housing to ensure animals are fed correspondingly to their needs. Apply cross-season fodder conservation methods, such as silage production. • Build the capabilities of agro-processing industries to produce pelleted fodder, using waste from food processing, crop residues & protein/carbohydrate-containing materials. 	Drought and water shortages Excessive rainfall
LIVESTOCK VALUE CHAIN IMPROVEMENT	<ul style="list-style-type: none"> • Livestock product diversification: (1) establish dairy processing units at the community level (2) support labor-saving and hygienic dairy product equipment at the household level • Facilities for proper product packaging & value addition • Improve storage and distribution of livestock products, such as community-level storage and warehousing facilities (freezers, milk collection centers, and sale counters) • Standardize and improve livestock product pricing; support marketing to create scale through farmer groups and cooperatives (e.g., by investing in refrigerated vehicles) 	Improve Adaptive Capacity
DISASTER RESPONSE	<ul style="list-style-type: none"> • Introduce a livestock insurance scheme against the loss of livestock from climate-related events and disasters. • Form Community-Disaster Response groups provided with resources to combat critical hazards (fire-fighting equipment; machinery to divert mudflow channels; emergency animal pelleted feedstocks) and have clear plans that advise households on responses during the eventual occurrence of any disaster. 	Climate-related disasters
APPROPRIATE CLIMATE-SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Invest in clean and energy efficiency technologies, such as out-scaled biogas programs • Construct large-scale reservoir water tanks for irrigation, human use, and livestock drinking water. • Construct water troughs to reduce drought risk & apply rainwater harvesting methods (tanks, ponds & so on). Integrate agricultural pasture-irrigation and animal drinking-water systems. • Diversify livelihoods into aquaculture 	Drought and water shortages

SUSTAINABLE AND RESILIENT LAND MANAGEMENT	<ul style="list-style-type: none"> Plant fodder trees that address the fodder shortages, and diversify the types of fodder available. This vegetation would protect the land from erosion in landslide- and flood-prone areas. Promoting the planting of deep-rooted, resilient pasture and fodder species, including contour strip grasses, would contribute to the rehabilitation of degraded grassland. Convert fallow land to silvi-pastoral systems, including planting fodder grasses/tree species for erosion control and fodder Drain pasture wetlands; terrace land for agro-forestry systems for fodder; build physical land protection structures Plant trees as windbreaks to protect farms; use structural designs that protect against windstorms 	<p>Drought, water shortages</p> <p>Excessive rainfall</p> <p>Landslides and floods</p> <p>Hailstorms & windstorms</p>
CLIMATE-RESILIENT INTEGRATED WATER AND WATERSHED MANAGEMENT (WATER RECLAMATION)	<ul style="list-style-type: none"> Construct larger reservoirs with dam-wall retention to recharge watersheds; and check-dams along the course of creeks, increasing water infiltration into the water table. Protect water sources and catchment recharge areas to increase water volume/quality; protect river banks and wet lands Recover the soil's water-holding capacity by planting appropriate tree species at landscape and farm levels Organize waste water recycling systems at the farm level to increase animal water portability in peri-urban areas. Manage the risk of notifiable water-borne diseases arising from wild and domestic cattle sharing the same water. 	<p>Drought and water shortages</p>
CAPACITY-BUILDING	<ul style="list-style-type: none"> Deliver training on climate impacts and adaptation technologies to communities and extension officials Provide weather information via early warning systems Strengthen the capacity of laboratories to diagnose diseases Promote R&D and capacity development relating to adaptation, vulnerability, and risk assessment 	<p>Cross-cutting across vulnerabilities</p>

IMPLICATIONS FOR POLICY AND INSTITUTIONS

The following implications for policy and the lead agencies have been identified:

POLICIES & LEGAL FRAMEWORKS

1. The **draft RNR Strategy 2040** establishes MoAF/DoL as the key agencies responsible for national-level livestock-related actions. MoAF should use the strategic insights contained in the EU-TACs Assessment to develop a proposed approach (tentatively titled the **National Program and Action Plan for Climate Change Adaptation and Resilience**) which should be implemented from the national level to Dzongkhag, Gewog and community levels, to build climate-resilient livestock development pathways.

2. For policy, **it is crucial to specify the adaptation responsibilities, decide on the appropriate scale of the adaptation ambitions, and identify efficient adaptations.** It is possible to distinguish between the **private and public roles** and responsibilities of adaptation. Policy needs to determine a clear line between **private or so-called autonomous adaptation** that private actors undertake; and – on the contrary – those interventions required where there is an **apparent market failure, and therefore a need to intervene to prevent a loss of collective action, such as at watershed level.** The DoL should lead the collective adaptation measures, such as pasture management, watershed/spring-shed management, control of genetic resources/breeding programs, and disease surveillance. These need collective action coordinated by the government.

ORGANIZATIONAL STRUCTURES

3. **Improved coordination and cooperation between MoAF, the Department of Livestock, the Department of Agriculture, the DoFPS and DLG** are needed to implement adaptation initiatives in the livestock sector. Several agencies are working to pilot adaptation measures; however, a lack of coordination stems from a “silo mentality.”

4. Via the proposed **National Program,** MoAF should identify how to support **adaptation needs that apply across the value chain.** The production of **fodder pellets via agro-processing units** should have priority. While most exposure is faced by animals themselves (i.e., primary livestock production), other supply chain issues concern **feed inputs, Disaster Responses, cold storage of products, veterinary surveillance, and the role of retailers in delivering product quality and safety.**

VISIONS, MANDATES & ROLES

5. The **visions, mandates and roles** for a new multi-agency Framework for implementing the **National Program and Action Plan for Climate Change Adaptation and Resilience in Bhutan's Livestock Sector** will depend on the scale of the adaptations being implemented. Adaptations can be understood from three viewing angles: (1) they can be **marginal**, or else **incremental**; (2) they can be **gradual** or **transformational**; (3) and they can be applied **just locally**, or else can be **out-scaled on regional, country levels** depending on the severity of the anticipated hazards.

The fundamental difference is between **small changes to adapt existing production systems versus more radical decisions**, regarding the feasibility or otherwise of particular livestock production methods and value chains. If the **adaptations are large-scale, then agencies working within a multi-agency framework should determine the direction of socio-economic transformation of the sector**, including its reinforcement by further measures.

6. Other efficiency criteria can involve identifying and prioritizing **private and public actors' low- or no-regrets investments**. Such investments offer economic, social or environmental benefits whether or not any uncertain damaging climate scenarios are realized.

STRATEGIES & PROGRAMMING

7. The Department of Livestock and MoAF will need to **map out the geographical areas** of each Gewog that are likely to see the highest demand for the specific adaptation measures in terms of the greatest vulnerability, and the most significant potential for the adoption of livestock adaptation measures.

8. A significant gap that needs filling is the **development of a planning process** at the level of the Dzongkhag administrations to **support the diversity of livestock owners and facilitate their access to the highest-priority measures** listed above.

PROCESSES, PROCEDURES & GUIDELINES

9. MoAF, DoL and DoA should review the processes, procedures, and guidelines for guiding the implementation of the proposed **National Program and Action Plan for Climate Change Adaptation and Resilience in Bhutan's Livestock Sector**, with particular emphasis on the coherence between policy proposals, and respective matching action measures.

10. **Guidelines for increasing resilience of livestock-herding should be integrated with the recommendations made under other studies**, such as the EU-TACS studies A2.17 on Conversion of Fallow Lands, and A2.10 on Agro-forestry Systems.

11. After further technical research, the Department of Livestock should develop guidance incorporated in the **Local Economic Development Plans in the Dzongkhags**, where adaptation policies and measures should be streamlined to support local communities. All programs and actions should be discussed with relevant Departments at Dzongkhag-level to ensure that local staff is aware of efforts to support livestock health, capacity-building, and foster adaptation measures.

HUMAN RESOURCES & TRAINING

12. A key measure is to **strengthen the capacity of the Department of Livestock** for demonstrating adaptation actions and enabling MOAF and partners to facilitate access to training, financing and service delivery for community-based adaptation (CBA) strategies, targeted on both livestock owners dedicated to livestock as a business; and at typical farming systems, that only include a small livestock component.

13. A **Human Resources development approach will be needed within the Department of Livestock** to ensure that its staff in relevant units have a pertinent mixture of skills, equipment and a solid understanding of the vulnerabilities of livestock to the impending climate change impacts.

MONITORING & EVALUATION

14. Once formulated by MoAF and the Department of Livestock, the **National Program and Action Plan for Climate Change Adaptation and Resilience** will contain a logical framework or similar long-term planning tool such as "theory of change chart." This requires an M & E Unit to collect information on each indicator, analyze the necessary data, and report back to the institutions involved.

15. **Activities for climate change adaptation should be included within the MoAF/DoL National Programs. The targets for establishing them should be included in the Annual Work Plans of concerned government departments, agencies, programs, and Dzongkhags** and reflected in Annual Performance Agreements.

COORDINATION, COLLABORATION & LINKAGES

16. A multi-agency framework for the **National Program and Action Plan for Climate Change Adaptation and Resilience in Bhutan's Livestock Sector** needs to be developed for livestock owners. This requires coordination between the DoL, the Department of Local Government, MoAF's Policy and Planning Division, and individual Dzongkhags.

Policy Briefs

Policy Briefs provide highlights on development issues in the renewable natural resources sector in Bhutan. The Policy Briefs provide information on topics such as governance, livelihoods, natural resources and sustainability in an accessible way for decision makers and donors.

Many of the Policy Briefs are based on evidence-based statistics available at the Ministry of Agriculture and Forests together with Research Studies carried out by the Policy and Planning Division at MoAF, and are often a synthesis of study reports prepared by international experts on behalf of donor agencies assisting the MoAF in Bhutan.

The **EU Technical Assistance Complementary Support Project (EU-TACS)** has the aim of contributing to the sound implementation of the EU-Bhutan bilateral development cooperation strategy. Since its inception in March 2019, the EU-TACS project has provided technical assistance focusing on rural development, climate change response, and local government plus fiscal decentralization. EU-TACS has also supported the implementation of two EU sector reform budget support contracts for the MoAF and the DLG. The assistance has included consulting services, studies and communication-related inputs, to provide stakeholders with direction for capacity-building, dialogue and policy change in key development themes and subject areas.

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