Agrifood Sector Roadmap For Implementing Bhutan's NAP

ADB TA-6971 BHU: Fiscal Sustainability and Green Recovery Program

DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE
MINISTRY OF ENERGY & NATURAL RESOURCES
THIMPHU; BHUTAN

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1 Introduction

The *Agrifood Sector Roadmap* has been developed to support the funding and implementation of sectoral National Adaptation Plan (NAP) priorities in Bhutan. It was prepared through support from the Asian Development Bank's (ADB) TA-6971 BHU: Fiscal Sustainability and Green Recovery Program (Subprogram 1).

Increasingly governments, research organizations and development partners have adopted the term "agrifood systems" over the more traditional term "agriculture" to recognize that a broader understanding is required of how we produce, process and distribute food (see Text Box 1). In the context of climate change and supply chain disruptions caused by COVID, there is an increased recognition that entire food systems should be resilient and adaptable to shocks. This involves considering the entire supply chain, from farm to fork, and how it can withstand and adapt to external pressures.

FAO Definition of Agrifood Systems

Agrifood systems comprise the entire range of actors and interlinked activities that add value in agricultural production and related off-farm activities such as food storage, aggregation, post-harvest handling, transportation, processing, distribution, marketing, disposal and consumption. Agricultural production refers to primary crop, livestock, fisheries and forestry production.[1]

Bhutan's first climate change national adaptation plan (NAP) was published September 2023, however its development coincided with several significant events:

- Enactment of Civil Service Reform Act of 2022: this resulted in a major reorganization of government agencies along with a shuffling of civil servants.
- Ongoing out migration of professionals from Bhutan. Many government agencies reported losing staff. This results in an institutional loss of knowledge that might take years to gain back.

Two further challenges were apparent from the initial review that were confirmed at the working session hosted in Paro:

- Up to 80% of the staff engaged in the NAP review had limited to no experience in developing logframes - a tool that was key in presenting sectoral NAP strategies.
- Many staff also stated that they had limited experience in climate change adaptation. As a result, they were unsure whether the proposed activities presented in the NAP were relevant.

The combined impact of these changes meant that, while Bhutan's NAP achieved a major milestone in the country's history, there were gaps in the resulting climate adaptation strategies presented at the sectoral level.

This Sectoral Roadmap presents:

- An updated list of agrifood sector adaptation priorities for climate financing

- A list of risks and mitigation measures by key activities
- Institutional arrangements for implementation
- A draft plan to raise the awareness of agrifood sector stakeholders to support implementation.

It was prepared with inputs provided by NAP sectoral focal points who attended a 5-day workshop held in Paro from December 4-8, 2023. There, staff from lead ministries received training over two days on how to develop logframes and resource mobilization strategies.[1] Based upon this training, a three-day working session was then held where NAP focal points provided inputs to an earlier version of this report.

As discussed with the Ministry of Energy and Natural Resources (MoENR) and ADB a second phase of reviews will be required to finalize this document before it receives final approval. Detailed steps are outlined for his process in the conclusion section of this report. Note that a separate resource mobilization strategy has been prepared to support proposed work.

2 Agrifood Sector Roadmap for Implementing Bhutan's NAP

2.1 Gap Analysis

Bhutan completed its first NAP in 2023. To support implementation, a review was undertaken of proposed strategic objectives, outcomes, actions and activities with a focus on three sectors: agrifood (Agriculture & Livestock), water and renewable energy (RE). This entailed:

- Revisiting sector adaptation priorities
- Clarifying proposed activities and their link to adaptation goals
- Establishing inter-sectoral linkages by identifying other ministries and stakeholder required for implementation.

As a result of this work several opportunities were identified for strengthening future appraisal of adaptation priorities for NAPs exercises. They include:

1. Providing definitions for terms like strategic outcomes, strategic objectives and strategic actions and activities to ensure consistent application across sectors.
2. Using a log framework approach (as applied in this report) to support coherent program development.
3. Making explicit links between proposed activities and other sectors.
4. Identifying institutional responsibilities and implementation partners with proposed activities based on restructuring of Ministries post December 2022, according to the Civil Service Reform Act, 2022.

[1] A separate capacity development report has been prepared that details training activities and impacts.

5. Identifying if proposed activities are new, or part of existing programs (this makes it difficult to ascertain funding needs).

Specifically, regarding the Agriculture & Livestock NAP - sectoral NAP outcomes, objectives, actions and activities would benefit from improved logical cohesion.

As presented in the NAP, they are not linked to a broader sectoral adaptation goal. Strategic outcomes do not "add-up" to achieving a broader adaptation goal. As a result, there are gaps that this NAP could have addressed but did not. For instance, there are no references made to:

- improving existing policy frameworks or governance capacities with regard to improved climate adaptation in agriculture

- addressing adaptation issues related to broader agrifood systems critical for ensuring food security in Bhutan. [2]

- mitigating impacts from agricultural activities on natural ecosystems through reduced application of pesticides, herbicides, and conservation of riparian zone ecosystems.

- co-management of water use issues with other sectors.

In addition to the above:

- References to improved natural resource management range from the very specific (cultivation of native poultry and pigeon breeds) to very broad goals (sustainable land management).

- References to early warning systems are also very specific and would benefit from a broader treatment.

Secondly, strategic outcomes, strategic objectives, strategic actions and activities were not necessarily aligned with adaptation outcomes. For example:

- Strategic Outcome 1"*Securing the natural resource base for livestock grazing feed and fodder sources*" could mean ensuring that livestock managers have access to enough land to graze their cattle – there is no reference to climate adaptation as stated in this outcome.

- Strategic Outcome 2, Strategic Action (c) "*Efficient utilisation of natural water bodies and land resources to boost fish production*". Using the term "efficiency" related to boosting fish production, but has nothing to do with adaptation, nor does it link to the water needs of other sectors.

[2] Note : Many countries have shifted from focusing on the agriculture sectoral to a broader consideration of agrifood systems. This better addresses the broader supply chains and businesses involved in the production of related products, services, inputs, and activities responsible for ensuring access to food.

As a result of these findings, the following approach and basic steps are proposed to develop a more comprehensive framework to secure climate financing:

Recommendations:

1. In order to address broader food security issues, it is recommended that the priorities of agriculture and livestock NAP be integrated with the *Agrifood Roadmap*. Doing so will recognize the importance of strategic inputs to agriculture as well as the many adaptation issues related to supply chains, food industries and retail associated with accessing food.

2. An overarching adaptation goal could be developed for this sector, under which all other objectives and activities are aligned. The following draft goal is proposed for discussion:

   Goal: To strengthen Bhutan's agrifood system to ensure national food and nutrition security while adapting to the impacts of climate change.

3. Use a logframework to build upon the proposed goal. Newly proposed objectives and activities will incorporate existing NAP strategic outcomes, strategic objectives and strategic actions. However, they position Bhutan to implement a broader set of adaptation activities. The resulting framework will support current and future resource mobilization efforts, and act as a checklist that DECC, MoENR and other ministries can use to ensure coherence in programming efforts.

The benefits of using this approach include:

1. The resulting program framework presents a more comprehensive checklist of objectives and activities that need to be undertaken to achieve sectoral resilience. Many governments fail to do this when developing their first NAP – focusing instead on favored, immediate projects rather than presenting a longer-term framework.

2. Not all objectives or activities have to be funded immediately, but understanding how they work together to achieve the broader goal will help prioritize what gets funded first.

3. Using this framework will help national counterparts identify additional activities and projects that may have been inadvertently omitted that are already being undertaken (or plan to be undertaken). Doing so will provide donors and stakeholders with a more comprehensive overview of adaptation activities taking place in Bhutan.

2.2 Proposed logframework for Agrifood Sector Roadmap

Table 2.1 on the following page presents the proposed log framework for the Agrifood Sector Roadmap. It has been developed to support both immediate and long-term implementation of Bhutan's climate adaptation priorities. NAP sector focal points were engaged to develop a modified set of objectives and activities that addresses the gaps identified, while incorporating the original activities presented in Bhutan's energy sector NAP. The table employs a simplified log framework that should facilitate development of future projects and funding. Attachment 1 provides guidance on how to develop a monitoring and evaluation strategy to support proposed activities and their implementation.

There benefits of using this approach include:

1. It provides a comprehensive framework objectives and activities required to achieve the sectoral climate adaptation goal. Many governments fail to do this when developing their first NAP – focusing instead on favored, immediate projects.

2. Not all objectives or activities have to be funded immediately, but understanding how they work together to achieve the broader goal will help prioritize what gets funded first.

It helped identify additional activities that were inadvertently omitted when developing the NAP. Some of these were under development at the time when the NAP was prepared.

This framework will require a second round of reviews to solicit inputs from (i) other departments within lead ministry, (ii) other sectoral government agencies, (iii) senior management.

Challenge: Food security is a national priority for Bhutan, however climate change will impact realizing this goal			
Goal: Establish an agrifood system in Bhutan capable of ensuring food and nutrition security while adapting to the impacts of climate change.			
Objectives	**Activities**	**KPIs**	**Risks**
1. Create an enabling policy environment and enhance governance capacities to adapt to climate change impacts.	1.1 Map Bhutan's agrifood system and its vulnerabilities and impacts upon climate change. ● Map agrifood supply chains including import and exports ● Identify consequential climate impacts and vulnerabilities to food systems ● Short Term Activity 6.2 e: Assessment of food/crop and livestock losses in the food value chain (production, harvest, processing, storage, transportation, consumption)	Agrifood system map complete detailing climate vulnerabilities	Inadequate data leading to an incomplete or incorrect vulnerability map. Limited technical capacity to conduct climate vulnerability assessments.
	1.2 Review supporting policies, legislation and regulations to identify opportunities for strengthening adaptation/mitigation at national and local levels.	Number of policies, legislations, and regulations reviewed and identified for strengthening.	Lack of capacity to undertake regulatory review.
	1.3 Develop strategy to address gaps in policies, legislation, regulations, guidelines, and decision support systems along with related governance capacities.	Institutional capacity assessment complete Institutional capacity development strategy completed	Lack of alignment between strategy recommendations and existing governance structures. Resistance or pushback from stakeholders due to perceived policy threats.
	1.4 Implement capacity building strategy targeting government at national and local levels ● Short Term Activity 1.4.1: Conduct capacity needs assessment (HR, infrastructure & equipment) of relevant government	Number of staff and relevant stakeholders trained. Number of decision support systems	Lack of resources to fund and support implementation of capacity building strategy

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Objectives	**Activities**	**KPIs**	**Risks**
	institutions, SOEs and communities for climate change adaptation. ● Short Term Activity 1.4.2: Capacity building of technical officials on climate change impact on agriculture and livestock productivity and food security	acquired or updated, guidelines developed, etc.	
	1.5 Develop and implement insurance schemes for climate related impacts. ● Strategic Action 1.5.1 Institute climate risk management for food production (including crop and livestock production) through insurance and compensation schemes covering climate change impacts ● Short Term Activity 1.5.2: Initiate and promote insurance of crop and livestock against wildlife depredation and extreme climate conditions ● Short Term Activity 1.5.3. Assessment of crop and livestock damage and loss by climate induced disasters	Number of individuals or entities enrolled in insurance schemes.	Lack of understanding or trust in insurance mechanisms. Lack of insurance companies in Bhutan adequately set up to provide this type of insurance coverage.
2. Enhanced sustainability of agrifood systems through improved natural resource management	2.1 Promote sustainable management of livestock. Strategic Action 2.1.a: Sustainable utilization of alpine rangeland and development of agroforestry systems for livestock that adapts to current and future climate change impacts. ● Short Term Activity 2.1.1: Identify and set up long term permanent research plots to study the impact of climate change on diversity of grasses in rangeland. ● Short Term Activity 2.1.2: Improve alpine rangeland governance systems to ensure adaptation to climate impacts. ● Short Term Activity 2.1.3: Develop and promote sustainable management and utilization plan of alpine rangeland resources ● Short Term Activity 2.1 4: Assess, map, identify and promote climate resilient indigenous forage/grass species	% increase in farms adopting sustainable livestock management practices. Number of fruits trees planted. No. of permanent research sites identified and established.	Resistance from farmers due to perceived productivity or profitability loss. Lack of immediate financial incentives to adopt sustainability practices. Degradation of rangeland resources

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Objectives	**Activities**	**KPIs**	**Risks**
	● Strategic Action 2.1 b: Enhanced availability of feeding resources through agro-silvopastural system as a means of adapting to impacts of climate change. ● Promote agro-silvopastural system (plantation of resilient fodder trees, improved pasture, legume crops) to enhance fodder availability and to mitigate GHG emissions. ● Short Term Activity 2 d: Upscale usage of crop residues through fodder enrichment (Effective microorganism, urea molasses treatment) and conservation (feed block, hay and silage) to enhance production. Strategic Action 2: Promote climate smart livestock farming practices through gender- and PWD- friendly farm-level technologies. ● Short Term Activity 2 a Promote use of feed additives and methane inhibitor such as methane bolus, seaweed, direct fed microbials in animal feeds to enhance digestibility and reduce GHG emission. ● Short Term Activity 2 b Promote solar and live fencing of pasture through fodder tree plantation to incidence of wildlife depredation on livestock and reduce GHG emissions. ● Short Term Activity 2 c Promote precision livestock farming (digitization, real time monitoring and management system such as controlled micro climatic conditions housing systems, timely response) to reduce environment impact and adapt to climate change. ● Short Term Activity 2 e Promote water efficient and low-cost hydroponics fodder production to meet fodder resource during lean season.	Rangeland Management plan developed and implemented. Suitable forage species identified and upscaled. Area under agro-silvopastural system Quantity of fodder conserved. No. of technology adopted to reduce GHG emissions. % reduction in cattle depredated No. of house holds (HH) adopted precision livestock farming. No. of HH practicing hydroponic fodder production	Labour and cost intensive and low acceptance by farmers. Increase investment cost. Increase one time investment cost. Limited knowledge and exposure on precision livestock farming Low and slow adoption of new technologies by farmers Initial skepticism or distrust of new varieties or techniques. Lack repository of conventional practices

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Objectives	Activities	KPIs	Risks
	● Short Term Activity 2 g Adopt gender responsive and energy efficient technology (devices and equipment) to reduce GHG emissions. ● Short Term Activity 2 (f): Explore and promote heat and cold resistant fodder varieties to ensure year-round fodder resources availability for livestock. Strategic Action 3.1: Strengthen surveillance and forecasting system for prevention and control of emerging animal diseases and threats under climate change: ● Short Term Activity 3.1e: Promote herd health management and farm biosecurity measures for climate resilience and reduction of GHG emissions. ● Short Term Activity 3.1f: Assess, identify and promote low inputs traditional knowledge and practices for safe and sustainable livestock production. Strategic Action 5.2 Development of integrated agriculture landscape system approach ● Short Term Activity 5.2 c: Promote perennial crop (fruits & plantation crops production to enhance smallholder farm income and improve climate resilience production system	No. of technology adopted. No. of resilient fodder species adopted No. of HH adopting herd health mgt/biosecurity measure	
	2.2 Enhance on-farm biodiversity, including pollinator friendly habitats, wildlife corridors and diverse crops. ● Short Term Activity 2.3 d Expand apiculture as a climate friendly and additional source of income for rural women and youth.	No. farms implementing biodiversity-enhancing measures. No. of rural women/youth	Lack of awareness or knowledge among farmers.

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Objectives	**Activities**	**KPIs**	**Risks**
	Strategic Action 1: Conservation and promotion of climate resilient native livestock breeds. ● Short Term Activity 1 a: Promote conservation and development of native poultry breeds for improved resilience. ● Short Term Activity 1 b: Promote conservation and development of native piggery breeds for improved resilience. Strategic Action 6.2 Promote sustainable practices and innovative solutions to … ● Short Term Activity 6.2 d: Develop and promote local agro-diversity and knowledge-based products	engaged in beekeeping. No. of HH adopting native livestock farming	possible extinction of climate resilient native livestock breed, with preference for exotic livestock breed
	2.3 Promote sustainable fishing and aquaculture practices adapted to climate change impacts. Strategic Action 2.3: Efficient utilisation of natural water bodies and land resources to boost fish production. ● Short Term Activity 2.3 a: Diversification of aquaculture systems (cage culture, biofloc, aquaponic, integrated aquaculture, recirculatory system, captured fishery) to adapt to climate change. ● Short Term Activity 2.3 b: Restocking of water bodies (river and lakes) with appropriate fish species to mitigate and adapt to climate change.	% reduction in overfished areas or species. Number of certified, sustainable aquaculture practices adopted. No. of fish stocked/introduced	Short-term economic losses for fishers transitioning to sustainable methods. lack knowhow, capital intensive initially and low acceptance by farmers. Conflicting mandates between agencies
	2.4 Develop monitoring and reporting mechanisms to improve natural resource management of agrifood resources. Strategic Action 2.4.1 Utilization of spatial information, remote sensing, and ICT for delivery of efficient and effective livestock services	Number of comprehensive reports generated and analyzed annually.	Inadequate technical expertise on use of GIS tools for effective monitoring, and digital solutions

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Objectives	**Activities**	**KPIs**	**Risks**
	• Short term activity 2.4.2: Adopt GIS tools (ValorE, .NET) to map cattle and yak migratory system, diseases epidemiology for effective monitoring and rapid response to climate impact. • Short term activity 2.4.3: Explore and adopt digital solution for climate challenges in livestock sector	Reduce TAT for extreme climate response	Lack capacity and high investment required
	2.5 Encourage water-efficient irrigation practices and reduce pollution runoff. Strategic Action 4.1: Improve planning, designing and implementation of climate resilient irrigation systems at farm-level. • Short Term Activity 4.1 a: Promote adoption of micro irrigation (drip, sprinkler) by increasing accessibility to farmers through simple, affordable, and smart technology. • Short Term Activity 4.1 b: Rehabilitation of the traditional irrigation system to reduce water loss through climate proof structures integration. • Short Term Activity 4.1 c: In-situ water harvesting - diverting, inducing, collecting, storing, and conserving local surface runoff, spring water and rainwater for agriculture production	% reduction in water use and pollutant runoff on participating farms. Area under micro efficient irrigation No of water harvesting structures constructed	High initial investment costs
	2.6 Promote and upscale sustainable land management (SLM) programs through enhanced technologies (Strategic Action 5.1) • Short Term Activity 5.1 a: Improve soil carbon, health, and fertility through adoption of improved and integrated soil nutrient management practices. • Short Term Activity 5.1 b Residue management including bio-degradable mulching • Short Term Activity 5.1 c Agriculture land development	Area under improved nutrient management and land development	Potential short-term yield reductions during transition.

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Objectives	Activities	KPIs	Risks
	• Short Term Activity 5.1 d Mapping of degraded agriculture land, and soil erosion • Short Term Activity 5.1 e Establish soil organic carbon monitoring, accounting, and reporting under different crop land		
	2.7 Promote environmental certification programs. • Short Term Activity 5.2 a Promote Bhutan Standard for Good Agriculture Practices (GAP) • Short Term Activity 5.2 b Strengthen Bhutan GAP certification process	Number of farms or agri-businesses achieving certification annually.	Perceived complexity and cost of certification processes.
	2.8 Promote reforestation/afforestation to sequester carbon and enhance biodiversity	Number of hectares reforested/afforested annually.	Land availability and competing land uses.
	2.9 Provide relevant training and educational resources to farmers.	Number of farmers trained annually.	Lack of interest or time from farmers
	2.10 Offer financial incentives and subsidies to farmers who adopt sustainable and biodiversity-friendly practices.	Number of incentives disbursed and number of farmers benefiting.	Misallocation or misuse of funds.
	2.11 Promote environmental protection from impact of agricultural activities.	% reduction in negative environmental incidents related to agriculture.	Conflicts between environmental regulations and farm profitability.
	2.12 Collaborate with conservation organizations, farm associations and NGOs to integrate biodiversity conservation and ecosystem enhancement goals into agri-food systems.	Number of collaborative projects or initiatives launched.	Misalignment of goals or priorities between stakeholders.

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Objectives	**Activities**	**KPIs**	**Risks**
	2.13 Invest in research and data collection to improve natural resource management and reduce environmental impacts	Number of research projects initiated and completed annually.	Lack of actionable insights from research.
3. Enhance the capacity of agriculture, livestock, and inland fisheries to adapt/mitigate climate change impacts and disasters.	3.1 Assess impacts of climate change on agriculture, livestock, and inland fisheries. This can include investing in long term research. ● Review and develop guidelines and extension materials on climate resilient livestock and fishery farming practices for dissemination. ● Explore and promote usage of gender friendly energy efficient farming technologies.	Completion of comprehensive assessment reports within a set timeframe.	Insufficient or outdated data sources.
	3.2 Ensure resilience of primary production facilities to climate disasters through upgrades to farm infrastructure and machinery. Strategic Action 7.2: Explore, develop, and promote climate resilient climate smart technologies to improve sustainable production systems. ● Short Term Activity 7.2 e: Promote energy efficient farm machineries	% of primary production facilities upgraded for climate resilience.	High upfront costs of adapting infrastructure to climate impacts and machinery upgrades. Unavailability of appropriate technology
	3.3 Develop and disseminate climate-resilient farming, livestock and fishing practices. Strategic Action 7.1: Ensure women's/ Vulnerable group access to gender friendly technologies at farm level. ● Short Term Activity 7.1 a: Adopt innovative, gender responsive technologies for smart climate resilient farming.	Number of best practice guidelines developed and disseminated.	Resistance of farmers to high upfront investment costs to climate proof infrastructure lack of awareness of climate risks among targeted communities.

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Objectives	**Activities**	**KPIs**	**Risks**
	3.4 Promote climate-resistant crop varieties and climate-adaptive livestock management techniques. Strategic Action 7.2: Explore, develop, and promote climate resilient crop varieties and climate smart technologies to improve sustainable production systems. ● Short Term Activity 7.2 a: Inventory/improve and promote climate resilient indigenous varieties to adapt to climate change impacts ● Short Term Activity 7.2 b: Generate/develop/breeding and promote climate resilient crop varieties. ● Short Term Activity 7.2 c: Increase cropping intensity through intensive climate smart cultivation systems (greenhouse, hydroponics, aeroponics, vertical farming) ● Short Term Activity 7.2 d Generate/develop and promote and diversify nutri-dense crop varieties.	No of climate resilient crop varieties promoted. Number of nutri-cereals promoted	Initial skepticism or distrust of new varieties or techniques. Low technical capacity to breed climate resilient crop varieties.
	3.5 Provide training and capacity-building programs for ministry staff, key businesses as well as farmers, herders, and fishermen on climate-smart practices. Strategic Action 8.1: Assess capacity needs for adaptation planning and implementation. ● Short Term Activity 8.1 a: Conduct capacity needs assessment (HR, infrastructure & equipment) of relevant government	Capacity assessment completed and training needs identified. Training materials developed. Number of instructors certified.	Limited engagement or perceived irrelevance of training content.

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Objectives	**Activities**	**KPIs**	**Risks**
	institutions, SOEs and communities for climate change adaptation. ● Strategic Action 8.2 Targeted training on impacts of climate change in food production at sectoral to community levels. ● Short Term Activity 8.2 a: Capacity building of technical officials on climate change impact on agriculture productivity and food security - including farm household models for strong decision making. ● Short Term Activity 8.2 b: Capacity building of livestock field staff and farmers	Number of individuals trained annually.	
	3.6 Develop contingency plans for responding to climate-induced emergencies in agriculture, livestock, and inland fisheries.	Number of contingency plans developed and successfully tested.	Plans may not cover all potential scenarios or may be inadequately communicated.
	3.7 Strengthen early warning systems for climate-related disasters affecting these sectors (see Outcome 5). This should include identifying how to include women and marginalized groups with appropriate and targeted communications.	Number of early warning systems strengthened.	Reliability of the data Failure of early warning systems to provide timely or accurate alerts.
	3.8 Strengthen pest surveillance systems and strengthen diagnostic facilities (Strategic Action 6.1) ● Short Term Activity 6.1 a: Strengthen pest surveillance system and diagnostic facilities. ● Short Term Activity 6.1 b: Promote Integrated Pest Management technologies	No. of HH Adopting IPM technologies	Concerns about pest-related crop losses.

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Objectives	**Activities**	**KPIs**	**Risks**
4. Strengthen the capacity of agrifood infrastructure, supply chains, and services to adapt/mitigate climate change impacts and disasters.	4.1 Identify and address vulnerabilities in agriculture supply chains responsible for producing and distributing feed, seed, fertilizers, pesticides, herbicides, etc.	Vulnerability assessment completed. % reduction in supply chain disruptions	Dependence on single sources of production or trade routes
	4.2 Identify and address trade/border vulnerabilities associated with climate change impacts on agricultural supplies and food availability.	Number of established trade agreements or protocols in place	Political tensions impact trade
	4.3 Develop and expand storage and aggregation facilities designed to cope with climate-induced variability in production and supply.	Increase in storage capacity (in tonnes)	Inadequate infrastructure or technology
	4.4 Enhance post-harvest handling practices and facilities to reduce food loss, especially related to climate change. Strategic Action 6.2 Promote sustainable practices and innovative solutions to reduce crop loss, food waste and improve post-harvest technologies through improved value chain development to enhance resilience of farmers. ● Short Term Activity 6.2 a: Develop efficient post-harvest infrastructures and distribution system to reduce food (crop and livestock) loss due to climate change.	% reduction in post-harvest losses	Lack of training or capacity at facilities
	4.5 Improve transportation and storage infrastructure to reduce food loss, including cold-chain systems. ● Short Term Activity 6.2 b: Establish cold chain facilities for agriculture products to reduce food loss.	% reduction in transportation-related food loss	Infrastructure breakdown or energy source interruptions that impact refrigeration.

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Objectives	**Activities**	**KPIs**	**Risks**
	● Short Term Action 6.2 c: Establish efficient cold chain facilities at strategic locations for livestock products		
	4.6 Facilitate food processing and value addition, integrating climate-resilient processing techniques and technologies.	Increase in value-added products produced.	Market rejection or lack of demand for new products
	4.7 Strengthen distribution networks and market linkages, focusing on adaptation and mitigation measures.	Increase in market reach (% of accessible markets)	Failure to meet market standards or regulations.
	4.8 Promote sustainable disposal and waste management practices that reduce GHG emissions.	% reduction in GHG emissions from waste management	Inadequate waste management systems or practices
	4.9 Promote the use of climate-based insurance and risk mitigation strategies for agri-food businesses to protect against climate-related losses.	Increase in businesses insured against climate-related losses.	Inadequate insurance coverage or understanding
5.0 Enhance knowledge management and dissemination of information on climate change hazards, impacts and emergency response strategies to all relevant stakeholders.	5.1 Develop and promote IPM strategies that utilize climate information to monitor and control pest and disease outbreaks in agriculture.	% reduction in pest-related crop losses year-over-year.	Inaccurate or outdated climate information.
	5.2 Strengthen early detection systems for disease that affect crops and livestock with triggers based upon climate conditions conducive to disease spread. This can include: ● Strengthening weather and climate services to provide agromet advisories to the end users.	% increase in early pest and disease detections year-over-year.	Insufficient monitoring tools or technology.

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Objectives	Activities	KPIs	Risks
	● Implementing disease surveillance programs for both crops and livestock, integrating climate data to anticipate disease outbreaks. ● Sensitize relevant stakeholders to climate hazards, impacts and emergency responses.	frequency of advisories issued	
	5.3 Adopt a One Health approach that considers the interconnectedness of human, animal, and environmental health in disease monitoring and prevention. ● Data Sharing and Collaboration: Foster collaboration and data sharing among health, agriculture, and environmental agencies to detect and respond to emerging diseases. ● Communication and Coordination: Establish mechanisms for sharing disease-related information between healthcare providers, veterinarians, and agricultural extension services. Strategic Action 3.1: Strengthen surveillance and forecasting system for prevention and control of emerging animal diseases and threats under climate change ● Short Term Activity 1a: Strengthen capacity of livestock research centres and laboratories to address emerging threats from climate change impacts. ● Short Term Activity 1b: Institute recording and reporting system on livestock loss due to climate induced extremes. ● Short Term Activity 1d: Strengthen transboundary animal disease reporting and management system.	Increase in integrated interventions addressing human, animal, and environmental health. Update of existing zoonotic monitoring systems to flag cross-over diseases. % decrease in zoonotic disease transmission incidents year-over-year.	Lack of expertise in zoonotic diseases. Lack of efficient coordination among sectors Siloed operations of various health departments.

Challenge: Food security is a national priority for Bhutan, however climate change will impact realizing this goal			
Goal: Establish an agrifood system in Bhutan capable of ensuring food and nutrition security while adapting to the impacts of climate change.			
Objectives	**Activities**	**KPIs**	**Risks**
	● Short Term Activity 1f: Promote and popularize ethnoveterinary medicines, traditional knowledge and practices for safe and sustainable livestock production.		
	5.4 Support vaccination and disease control programs in agriculture, informed by early warning data on disease risks. ● Quarantine Protocols: Develop and implement quarantine protocols for farms and production facilities in response to disease outbreaks.	% reduction in disease outbreaks in agriculture year-over-year.	Slow dissemination or inaccurate early warning data.
	5.5 Extend early warning systems to the broader agri-food supply chain to anticipate disruptions caused by extreme weather events, disease outbreaks, or other climate-related risks. ● Transportation and Logistics Alerts: Implement transportation and logistics alerts that consider climate data to ensure the timely and safe movement of agricultural products. ● Inventory Management: Assist agri-food businesses in adjusting inventory levels based on early warnings to prevent overstocking or shortages due to climate-related factors. ● Market Price Predictions: Use climate information to predict fluctuations in ● Publish crop yields and livestock production to provide advance notice to market participants and policymakers.	Increased availability of data to decision makers on key aspects of agrifood supply chain performance. % reduction in supply chain disruptions due to early warnings year-over-year.	Lack of centralized data capacities. Stakeholder non-compliance or lack of awareness.
	5.6 Develop emergency response plans for the agri-food supply chain that account for climate-induced disruptions and disease outbreaks. ● Technology Integration: Integrate technology, such as blockchain and IoT sensors, into the supply chain to enhance	Technologies identified and deployed in key agrifood supply chains to improve transparency.	Inadequate resources or manpower during emergencies.

Challenge: Food security is a national priority for Bhutan, however climate change will impact realizing this goal			
Goal: Establish an agrifood system in Bhutan capable of ensuring food and nutrition security while adapting to the impacts of climate change.			
Objectives	**Activities**	**KPIs**	**Risks**
	transparency and traceability, allowing for quicker response to issues. ● Capacity Building Across the Supply Chain: Train stakeholders at all levels of the agri-food supply chain on how to interpret and respond to early warning signals and disease-related information. ● Continuous Improvement: Continuously review and improve the integration of early warning systems across the agri-food supply chain, adapting to changing climate conditions and disease threats.	Training courses developed and delivered to key stakeholders, Reduction in response time to emergencies.	
	Public Awareness and Consumer Education: Educate consumers about the potential impacts of climate-related disruptions and disease outbreaks on food availability and safety	Increase in consumer awareness levels (measured through surveys).	Misinformation or lack of effective communication channels.

2.4 Risk Management

The Agrifood sector roadmap has several risks that can be managed through program implementation. The objectives and activities detailed in the previous section are likely to be more fully developed into individual projects with higher levels of detail provided. However, for those risks identified, a range of mitigation measures are outlined that can reduce unnecessary exposure to these risks.

Objective 1: Create an enabling policy environment and governance capacities that ensures agri-food systems in Bhutan can adapt to and mitigate climate change impacts.

Activity	Risk	Mitigation Measure
1.1 Map Bhutan's agrifood system and its vulnerabilities and impacts upon climate change.	Inadequate data sources leading to an incomplete or incorrect vulnerability map. Limited technical capacity to conduct this assessment.	Conduct assessments and surveys to collect up to date, accurate data
1.2 Review supporting policies, legislation and regulations to identify opportunities for strengthening adaptation/mitigation at national and local levels.	Lack of capacity to undertake regulatory review.	Engage stakeholders to participate in review. Employ specialists with appropriate skills. Enhance the capacity of relevant stakeholders
1.3 Develop strategy to address gaps in policies, legislation, regulations, guidelines, and decision support systems along with related governance capacities.	Lack of alignment between strategy recommendations and existing governance structures. Resistance or pushback from stakeholders due to perceived policy threats.	Early and continuous engagement with governance bodies during strategy development to ensure alignment and buy-in.
1.4 Implement capacity building strategy targeting government at national and local levels.	Lack of resources to fund and support implementation of capacity building strategy	Leverage existing resources through partnerships. Secure international donor support and prioritize training based upon available funding
1.5 Develop and implement insurance schemes for climate related impacts	Lack of understanding or trust in insurance mechanisms.	Undertake awareness raising scheme to elevate understanding of role of insurance in climate disasters in the agrifood sector.

Activity	Risk	Mitigation Measure
	Lack of insurance companies in Bhutan adequately set up to provide this type of insurance coverage.	Develop national capacities to provide climate related disaster insurance for agrifood system

Objective 2: Enhanced sustainability of agrifood systems through improved natural resource management

Activity	Risk	Mitigation Measure
2.1 Promote sustainable management of livestock.	Resistance from farmers due to perceived productivity or profitability loss.	Provide case studies showing long-term profitability and productivity benefits of sustainable livestock management. Adopt behavioural change communication strategy to promote uptake of new practices.
Enhanced availability of feeding resources through agro-silvopastural system as a means of adapting to impacts of climate change	Resistance from farmers due to perceived productivity or profitability loss.	Provide case studies showing long-term profitability and productivity benefits of agro-silvopastural systems. Exchange visits and training provided.
Upscale usage of crop residues through fodder enrichment (Effective microorganism, urea molasses treatment) and conservation (feed block, hay and silage) to enhance production year-round.	labour and capital intensive initially	facilitate one time government subsidy support
Promote climate smart livestock farming practices through gender- and PWD- friendly farm-level technologies.	limited knowledge on climate smart knowhow and adoption expected low	Awareness created on the advantage and opportunities of adopting climate smart livestock
2.2 Enhance on-farm biodiversity, including pollinator friendly habitats, wildlife corridors and diverse crops.	Lack of awareness or knowledge among farmers. Insufficient financial motivation to adopt sustainability practices.	Offer workshops and training on the benefits and methods of enhancing on-farm biodiversity. Develop demonstration plots. Provide short term financial incentives
2.3 Promote sustainable fishing and pisciculture practices that adapt to climate change impacts.	Short-term economic losses for fishers transitioning to sustainable methods.	Introduce phased implementation with financial support during transition periods.

Activity	Risk	Mitigation Measure
2.4 Develop monitoring and reporting mechanisms to improve natural resource management of agrifood resources.	Inadequate technical expertise for effective monitoring	Invest in training and capacity building for monitoring personnel.
2.5 Encourage water-efficient irrigation practices and reduce pollution runoff.	High initial investment costs Low technical know-how on installation and maintenance of micro irrigation system	Offer subsidies or financial incentives for transitioning to water-efficient systems. Enhance technical capacity of all stakeholders
2.6 Improve soil health management (no till, reduced chemical fertilizers, etc.)	Potential short-term yield reductions during transition Low acceptance of the technology or practices High cost for land development	Provide technical support and training for effective transition without significant yield loss. Awareness/sensitization on the importance of soil management practices Provide land development subsidies or financial incentives
2.7 Promote environmental certification programs.	Perceived complexity and cost of certification processes.	Simplify and subsidize certification processes where possible.
2.8 Implement integrated pest management (IPM) strategies that prioritize non-toxic, wildlife-friendly methods.	Concerns about pest-related crop losses.	Offer training and demonstrations showcasing effective IPM techniques.
2.9 Promote reforestation /afforestation to sequester carbon and enhance biodiversity.	Land availability and competing land uses.	Collaborate with local communities to identify suitable areas and benefits of reforestation.
2.10 Provide relevant training and educational resources to farmers	Lack of interest or time from farmers.	Offer flexible and varied training schedules, including digital resources.
2.11 Offer financial incentives and subsidies to farmers who adopt sustainable and biodiversity-friendly practices.	Misallocation or misuse of funds.	Establish clear criteria for eligibility and monitor use of funds.
2.12 Promote environmental protection from impact of agricultural activities.	Conflicts between environmental regulations and farm profitability.	Engage stakeholders in development of environmental protection regulations.

Activity	Risk	Mitigation Measure
		Provide incentives for sustainable practices. Fine those in violation of environmental protection regulations.
2.13 Collaborate with conservation organizations, farm associations and NGOs to integrate biodiversity conservation and ecosystem enhancement goals into agri-food systems.	Misalignment of goals or priorities between stakeholders.	Establish clear communication and hold alignment workshops at the onset of collaborations.
2.14 Invest in research and data collection to improve natural resource management and reduce environmental impacts.	Lack of actionable insights from research.	Collaborate with field experts to ensure research is relevant and actionable.

Objective 3: Enhance the capacity of agriculture, livestock, and inland fisheries to adapt/mitigate climate change impacts and disasters.

Activity	Risk	Mitigation Measure
3.1 Assess impacts of climate change on agriculture, livestock, and inland fisheries. This can include investing in long term research.	Insufficient data sources.	Collaborate with field experts, and leverage both historical and predictive models for comprehensive analysis.
3.2 Ensure resilience of primary production facilities to climate disasters through upgrades to farm infrastructure and machinery	High upfront costs for infrastructure and machinery upgrades. Unavailability of appropriate technologies	Explore phased implementation and potential external funding sources or partnerships.
3.3 Develop and disseminate climate-resilient farming, livestock and fishing practices	Resistance or lack of awareness among target communities.	Implement extensive awareness campaigns and demonstration projects showcasing the benefits.
3.4 Promote climate-resistant crop varieties and climate-adaptive livestock management techniques.	Initial skepticism or distrust of new varieties or techniques.	Provide pilot projects and case studies showcasing success stories. Enhance technical capacity building by collaborating

Activity	Risk	Mitigation Measure
	Low technical capacity to breed our own crop varieties.	with international research organizations.
3.5 Provide training and capacity-building programs for ministry staff, key businesses as well as farmers, herders, and fishermen on climate-smart practices.	Limited engagement or perceived irrelevance of training content.	Ensure training content is localized and relevant, with flexible delivery methods.

Objective 4: To enhance the capacity of agrifood infrastructure, supply chains, and services to adapt/mitigate climate change impacts and disasters.

Activity	Risk	Mitigation Measure
4.1 Identify and address vulnerabilities in agriculture supply chains responsible for producing and distributing feed, seed, fertilizers, pesticides, herbicides, etc.	Dependence on single sources or routes for essential supplies.	Diversify supply sources and establish alternate supply routes.
4.2 Identify and address trade/border vulnerabilities associated with climate change impacts on agricultural supplies and food availability.	Political or diplomatic tensions affecting trade.	Engage in diplomatic dialogues and foster multilateral agreements to ensure trade continuity.
4.3 Develop and expand storage and aggregation facilities designed to cope with climate-induced variability in production and supply.	Inadequate infrastructure or outdated technology.	Regular assessments and upgrades and explore partnerships with tech providers.
4.4 Enhance post-harvest handling practices and facilities to reduce food loss, especially related to climate change.	Lack of training or awareness among workers.	Provide regular training sessions and establish standard operating procedures.
4.5 Improve transportation and storage infrastructure to reduce food loss, including cold-chain systems.	Infrastructure breakdown or energy source interruptions.	Establish backup energy sources and regular maintenance checks.
4.6 Facilitate food processing and value addition, integrating climate-resilient processing techniques and technologies.	Market rejection or lack of demand for new products.	Conduct market research and engage with consumers to understand preferences.
4.7 Strengthen distribution networks and market linkages, focusing on adaptation and mitigation measures.	Failure to meet market standards or regulations.	Regularly review market standards and provide training to stakeholders
4.8 Promote sustainable disposal and waste management practices that reduce GHG emissions.	Inadequate waste management	Implement stringent checks and promote awareness on the

Activity	Risk	Mitigation Measure
	systems or non-compliance.	importance of sustainable waste practices.
4.9 Promote the use of climate-based insurance and risk mitigation strategies for agri-food businesses to protect against climate-related losses.	Inadequate insurance coverage or lack of understanding among businesses.	Educate businesses on insurance benefits and regularly review coverage options

Objective 5: To improve the dissemination of information on climate change hazards, impacts and emergency response strategies to all stakeholders involved in the agri-food system.

Activity	Risk	Mitigation Measure
5.1 Develop and promote IPM strategies that utilize climate information to monitor and control pest outbreaks in agriculture.	Inaccurate or outdated climate information.	Regularly update climate databases and establish collaborations with meteorological departments.
5.2 Strengthen early detection systems for disease that affect crops and livestock with triggers based upon climate conditions conducive to disease spread.	Insufficient monitoring tools or technology.	Invest in advanced monitoring tools and provide training on their use.
5.3 Adopt a One Health approach that considers the interconnectedness of human, animal, and environmental health in disease monitoring and prevention.	Siloed operations of various health departments and ministries. Lack of expertise in managing zoonotic diseases.	Foster collaboration between human health, animal health, and environmental agencies. Develop decision support systems that can monitor diseases with interspecies cross-over potential Develop and implement an awareness raising strategy
5.4 Support vaccination and disease control programs in agriculture, informed by early warning data on disease risks.	Slow dissemination or inaccurate early warning data.	Improve data sharing platforms and validate data sources regularly
5.5 Extend early warning systems to the broader agri-food supply chain to anticipate disruptions caused by extreme weather events, disease outbreaks, or other climate-related risks.	Stakeholder non-compliance or lack of awareness.	Transition from single hazard EWS to multi-hazard one to better address climate change risks Organize regular stakeholder engagement sessions and promote the benefits of early warning systems.

Activity	Risk	Mitigation Measure
5.6 Develop emergency response plans for the agri-food supply chain that account for climate-induced disruptions and disease outbreaks.	Inadequate resources or manpower during emergencies.	Regularly review and simulate emergency response plans, ensuring resource availability.
5.7 Educate consumers about the potential impacts of climate-related disruptions and disease outbreaks on food availability and safety.	Misinformation or lack of effective communication channels.	Use multiple communication platforms and regularly validate and update information disseminated.

2.5 Institutional Arrangements for Implementation

The Ministry of Agriculture and Livestock (MoAL) is the national focal point for all agrifood sector adaptation work in Bhutan. It is responsibilities include preparing the agriculture and livestock sections of the 13FYP and ensuring that proposed objectives and activities in Bhutan's NAP and Sectoral Road Map are integrated with this plan. Its activities are also guided by The Renewable Natural Resources Sector Adaptation Plan of Action (2016).

MoAL will work with other government agencies in the newly formed Economic Cluster to ensure proposed activities are integrated with sectoral work plans (see Text Box 2.1). This will be done by formulating annual performance agreements (APAs) with various government agencies, local governments and stakeholders.

Text Box 2.1: Coordination System for Bhutan's Agencies

Overall coordination of clusters is led by Bhutan's Cabinet, Office of Cabinet Affairs and Strategic Coordination.

- Economic Cluster – Ministry of Agriculture and Livestock, Ministry of Energy and Natural Resources, MICE, Ministry of Infrastructure and Transport
- Security Cluster – Ministry of Home Affairs, Ministry of Foreign Affairs and External Trade.
- Governance Cluster – Ministry of Finance, Government Technology Agency, Royal Monetary Authority, National Statistical Bureau, Royal Civil Service Commission
- Social Cluster – Ministry of Health, Ministry of Education and Skill Development, Royal University of Bhutan, Khesar Gyalpo University of Medical Science, National Land Commission.

For each cluster there is a Secretariate established that coordinates those activities.

MoAL will undertake this work in partnership with the Ministry of Finance which plays a key role in allocating and disbursing budgets to implementing agencies, as well as providing fiscal incentives to the private sector and members of the public. Many of the activities proposed in Bhutan's NAP have already been approved by the government and are part of sectoral Five-Year Plans. There is, however, still a need to mainstream adaptation activities with local governments plans and activities.

Proposed institutional arrangements to support objectives and an activity are reflected in the tables that follow.

Objective 1: Create an enabling policy environment and governance capacities that ensures agri-food systems in Bhutan can adapt to and mitigate climate change impacts.

Activity	Lead & Collaborating Agencies
1.1 Map Bhutan's agrifood system and its vulnerabilities and impacts upon climate change.	Ministry of Agriculture and Livestock (MoAL) would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR): DECC, Department of Water. Department of Forest and Park Services, Department of Energy ● Department of Local Governance and Disaster Management (DoLGDM) ● National Centre for Hydrology and Meteorology (NCHM) ● Ministry of Industry, Commerce and Employment (MICE): Department of Trade. Department of Revenue and Customs. ● Ministry of Infrastructure and Transport (MoIT) ● Ministry of Home Affairs (MoHA) ● Bhutan Chamber of Commerce & Industry (BCCI): ● Association of Bhutan Industries ● Food Corporation of Bhutan Limited (FCBL) ● Bhutan Livestock Development Corporation Ltd. ● Farm Machinery Corporation Ltd. (FMC) ● Drunagu ● College of Natural Resources (CNR)
1.2 Review supporting policies, legislation and regulations to identify opportunities for strengthening at national and local levels.	Ministry of Agriculture and Livestock (MoAL) would lead this exercise in collaboration with: ● Ministry of Finance ● Office of Cabinet Secretary and Strategic Coordination ● Department of Local Governance and Disaster Management (DoLGDM) ● Thromdes (municipalities) and Local Governments
1.3 Develop strategy to address gaps in policies, legislation, regulations, guidelines, and decision support systems along with related governance capacities.	Ministry of Agriculture and Livestock (MoAL) would lead this exercise in collaboration with: ● Ministry of Finance (MoF)

Activity	Lead & Collaborating Agencies
	● Office of Cabinet Secretary and Strategic Coordination ● Department of Local Governance and Disaster Management (DoLGDM) ● Ministry of Energy and Natural Resources (MoENR): DECC, ● Royal University of Bhutan (RUB) ● Development partners
1.4 Implement capacity building strategy targeting government at national and local levels.	Ministry of Agriculture and Livestock (MoAL) would lead this exercise in collaboration with: ● Ministry of Finance ● Office of Cabinet Secretary and Strategic Coordination ● Department of Local Governance and Disaster Management (DoLGDM) ● Ministry of Energy and Natural Resources (MoENR): DECC, ● Royal University of Bhutan (RUB) ● Development partners ● Royal Civil Service Commission (RCSC)
1.5 Develop and implement insurance schemes for climate related impacts.	Ministry of Agriculture and Livestock (MoAL) would lead this exercise in collaboration with: ● Ministry of Finance (MoF) ● Office of Cabinet Secretary and Strategic Coordination ● Department of Local Governance and Disaster Management (DoLGDM) ● Ministry of Energy and Natural Resources (MoENR): DECC, ● Insurance Companies (RICBL and BIL) ● Royal Monetary Authority (RMA) ● Financial Institutions ● Micro credit and NGOs

The MoAL will coordinate all Objective 1 activities through the Economic Cluster mechanism as well as by working closely with local governments, industry associations and key business, universities.

Updating and strengthening Bhutan's policies and insurance mechanisms to better address climate adaptation needs aligns with commitments made in Bhutan's NAP as well as the 13 Five Year Plan. Many of the policies and plans shown in Table 2 below already make some reference to climate change but could be further strengthened to support a more coherent strategy to ensure resilience across Bhutan's agrifood supply chains.

Table 2.0 Policies, Strategies & Programs Relevant to Agrifood Sector Climate Adaptation.

General:

- 13 Five Year Plan
- Bhutan's National Adaptation Plan 2023
- Bhutan's Nationally Determined Contributions (NDCs) – June 2021
- Climate Change Policy of the Kingdom of Bhutan 2020

Agrifood

- Livestock Act of Bhutan 2001
- Livestock Rules and Regulations of Bhutan 2008
- Food and Nutrition Security Policy of Bhutan 2023
- Food Act of Bhutan 2005
- Food Rules and Regulations of Bhutan 2017
- Biosecurity Policy of Bhutan 2010
- Plant Quarantine Act of Bhutan 1993
- Seed Act of Bhutan 2000
- The Renewable Natural Resources Sector Adaptation Plan of Action (2016).
- Pesticides Act of Bhutan 2000
- Biosafety Act of Bhutan 2015

Environment:

- Biodiversity Act of Bhutan 2003
- Environmental Assessment Act 2000,
- Forest & Nature Conservation Act of Bhutan 1995
- National Environment Protection Act of Bhutan 2007,

Health

- List here if relevant

Human Settlements:

- List here if relevant

Water:

- Bhutan Water Policy 2025
- Bhutan Water Vision 2025
- The Water Act of Bhutan 2011
- Water Policy 2007
- Bhutan National Integrated Water Resources Management Plan 2016

Transport

- Surface Transport Policy,

Energy:

- Alternative Renewable Energy Policy (2013),
- Energy Efficiency Roadmap (2019),
- Renewable Readiness Assessment
- Sustainable Hydropower Development Policy (2020),
- National Energy Efficiency Policy (2019),
- Power System Master Plan 2040,
- Renewable Energy Master plan (2017-2032),

Disaster Management

- Disaster Management Act of Bhutan, 2013
- Disaster Risk Management Strategy (DMSF)
- Disaster Management Rules and Regulation, 2014
- Non-Structural (Falling Hazards) Mitigation Manual
- Operational Guidelines for Disaster Financing

Objective 2: Enhanced sustainability of agrifood systems through improved natural resource management

Activity	Lead & Collaborating Agencies
2.1 Promote sustainable management of livestock.	Ministry of Agriculture and Livestock (MoAL) and Ministry of Energy and Natural Resources (MoENR) would lead this exercise in collaboration with: ● National Center for Hydrology and Meteorology (NCHM) ● Bhutan Chamber of Commerce & Industry (BCCI): ● Association of Bhutan Industries ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Farm Machinery Corporation Ltd. (FMC) ● College of Natural Resources (CNR)
2.2 Enhance on-farm biodiversity, including pollinator friendly habitats, wildlife corridors and diverse crops	MoAL and MoENR would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR): DECC, Department of Water. Department of Forest and Park Services, Department of Energy ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● Beekeeping Association of Bhutan, Bumthang ● National Biodiversity Centre
2.3 Promote sustainable fishing and aquaculture practices.	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management ● Bhutan Livestock Development Corporation limited. ● Food Corporation of Bhutan
2.4 Develop monitoring and reporting mechanisms to improve natural resource management of agrifood resources in the face of climate change impacts.	MoAL and MoENR would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR): DECC, ● Ministry of Finance ● Department of Local Government and disaster management (DoLGDM) ● Development Partners
2.5 Encourage water-efficient irrigation practices and reduce pollution runoff.	MoAL and MoENR would lead this exercise in collaboration with: ● Ministry of Infrastructure and Transport (MoIT) ● Department of Local Government and disaster management (DoLGDM) ● Development Partners

Activity	Lead & Collaborating Agencies
2.6 Promote and upscale sustainable land management (SLM) programs through enhanced technologies (Strategic Action 5.1)	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management (DoLGDM) ● Development Partners
2.7 Promote environmental certification programs	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management (DoLGDM) ● Bhutan Food and Drug Authority (BFDA) ● International Institutes
2.8 Promote reforestation/afforestation to sequester carbon and enhance biodiversity	MoAL and MoENR would lead this exercise in collaboration with: ● CSOs and SOEs
2.9 Provide relevant training and educational resources to farmers	MoAL and MoENR would lead this exercise in collaboration with: ● Ministry of Finance (MoF) ● Department of Local Government and disaster management (DoLGDM) ● Royal University of Bhutan (RUB)
2.10 Offer financial incentives and subsidies to farmers who adopt sustainable and biodiversity-friendly practices	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management (DoLGDM) ● Financial Institutions
2.11 Promote environmental protection from impact of agricultural activities.	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management (DoLGDM) ● Ministry of Energy and Natural Resources (MoENR): DECC, ● SOEs and CSOs
2.12 Collaborate with conservation organizations, farm associations and NGOs to integrate biodiversity conservation and ecosystem enhancement goals into agri-food systems.	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management (DoLGDM) ● NGOs ● International Organizations ● Development Partners

Activity	Lead & Collaborating Agencies
2.13 Invest in research and data collection to improve natural resource management and reduce environmental impacts.	MoAL and MoENR would lead this exercise in collaboration with: ● Department of Local Government and disaster management (DoLGDM) ● Ministry of Energy and Natural Resources (MoENR): DECC, ● National Centre for Hydrology and Minerology (NCHM) ● Royal University of Bhutan (RUB) ● Development Partners ● SOEs and CSOs

The Ministry of Agriculture and Livestock (MoAL) and Ministry of Energy and Natural Resources (MoENR) would coordinate all Objective 2 activities using the Economic Cluster mechanism as well as by working closely with relevant local governments, industry associations and key business, universities.

Enhancing the sustainability of Bhutan's agrifood systems aligns with commitments made in Bhutan's NAP 2023 as well as the 13 Five Year Plan. It is also in keeping with the following policies, plans and strategies:

General: ● Bhutan's National Adaptation Plan 2023 ● Bhutan's Nationally Determined Contributions (NDCs) – June 2021 ● Climate Change Policy of the Kingdom of Bhutan 2020 Environment: ● Biodiversity Act of Bhutan 2022 ● Environmental Assessment Act 2000, ● Forest & Nature Conservation Act of Bhutan 1995 ● National Environment Protection Act of Bhutan 2007,	Agrifood ● Livestock Act of Bhutan 2001 ● Livestock Rules and Regulations of Bhutan 2008 ● Food and Nutrition Security Policy of Bhutan 2023 ● The Renewable Natural Resources Sector Adaptation Plan of Action (2016). Water: ● Bhutan Water Policy 2025 ● Bhutan Water Vision 2025 ● The Water Act of Bhutan 2011 ● Water Policy 2007 ● Bhutan National Integrated Water Resources Management Plan 2016

Objective 3: Enhance the capacity of agriculture, livestock, and inland fisheries to adapt/mitigate climate change impacts and disasters.

Activity	Lead & Collaborating Agencies
3.1 Assess impacts of climate change on agriculture, livestock,	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with:

Activity	Lead & Collaborating Agencies
and inland fisheries. This can include investing in long term research.	● Ministry of Energy and Natural Resources (MoENR) ● National Centre for Hydrology and Meteorology (NCHM) ● Department of Local Governance and Disaster Management (DoLGDM) ● Association of Bhutan Industries ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● CSOs
3.2 Ensure resilience of primary production facilities to climate disasters through upgrades to farm infrastructure and machinery	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Department of Local Governance and Disaster Management (DoLGDM) ● Association of Bhutan Industries ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● CSOs
3.3 Develop and disseminate climate-resilient farming, livestock and fishing practices.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● National Center for Hydrology and Meteorology (NCHM) ● Association of Bhutan Industries ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● CSOs ● Local government ● Media
3.4 Promote climate-resistant crop varieties and climate-adaptive livestock management techniques.	MoAL would lead this exercise in collaboration with: ● Bhutan Livestock Development Corporation Ltd ● Farm Machinery Corporation Ltd (FMCL) ● College of Natural Resources (CNR) at RUB ● CSOs
3.5 Provide training and capacity-building programs for ministry staff, key businesses as well as farmers, herders, and fishermen on climate-smart practices.	MoAL would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR) ● National Centre for Hydrology and Meteorology (NCHM) ● Water User Associations ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● CSOs

Activity	Lead & Collaborating Agencies
3.6 Develop contingency plans for responding to climate-induced emergencies in agriculture, livestock, and inland fisheries.	MoAL and the Department of Local Governance and Disaster Management (DoLGDM) would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR) ● National Centre for Hydrology and Meteorology (NCHM) ● Association of Bhutan Industries ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● CSOs
3.7 Strengthen early warning systems for climate-related disasters affecting these sectors (see Outcome 5). This should include identifying how to include women and marginalized groups with appropriate and targeted communications.	MoAL and the Department of Local Governance and Disaster Management (DoLGDM) would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR) ● National Center for Hydrology and Meteorology (NCHM) ● Water User Associations ● Association of Bhutan Industries ● Food Corporation of Bhutan (FCBL) ● Bhutan Livestock Development Corporation Ltd. ● College of Natural Resources (CNR) ● CSOs: Tarayana Foundation, National Women and Children Commission, RENEW; ● Media - BBSC, Kuensel corporation, Bhutan Times
3.8 Strengthen pest surveillance systems and strengthen diagnostic facilities (Strategic Action 6.1)	MoAL would lead this exercise in collaboration with: ● College of Natural Resources (CNR)

The Ministry of Agriculture and Livestock (MoAL) and Ministry of Energy and Natural Resources (MoENR) would coordinate all Objective 3 activities using the Economic Cluster mechanism as well as by working closely with relevant local governments, industry associations and key business, universities.

Enhancing adaptation and emergency response capacities of Bhutan's agriculture, livestock, and inland fisheries capacities aligns with commitments made in Bhutan's NAP as well as the 13 Five Year Plan. It is also in keeping with the following policies, plans and strategies:

General: ● Bhutan's National Adaptation Plan 2023 ● Bhutan's Nationally Determined Contributions (NDCs) – June 2021 ● Climate Change Policy of the Kingdom of Bhutan 2020 Environment: ● Biodiversity Act of Bhutan 2003	Agrifood ● Livestock Act of Bhutan 2001 ● Livestock Rules and Regulations of Bhutan 2008 ● Food and Nutrition Security Policy of Bhutan 2023 ● The Renewable Natural Resources Sector Adaptation Plan of Action (2016). Water:

● Environmental Assessment Act 2000, ● Forest & Nature Conservation Act of Bhutan 1995 ● National Environment Protection Act of Bhutan 2007 Disaster Management ● Disaster Management Act of Bhutan, 2013 ● Disaster Risk Management Strategy (DMSF) ● Disaster Management Rules and Regulation, 2014 ● Non-Structural (Falling Hazards) Mitigation Manual ● Operational Guidelines for Disaster Financing	● Bhutan Water Policy 2025 ● Bhutan Water Vision 2025 ● The Water Act of Bhutan 2011 ● Water Policy 2007 ● Bhutan National Integrated Water Resources Management Plan 2016

Objective 4: To enhance the capacity of agrifood infrastructure, supply chains, and services to adapt/mitigate climate change impacts and disasters.

Activity	Lead & Collaborating Agencies
4.1 Identify and address vulnerabilities in agriculture supply chains responsible for producing and distributing feed, seed, fertilizers, pesticides, herbicides, etc.	Ministry of Agriculture and Livestock (MoAL) would lead this exercise in collaboration with: ● Ministry of Industry, Commerce and Employment (MoICE) ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● National Center for Hydrology and Meteorology (NCHM) ● Department of Local Governance and Disaster Management (DoLGDM) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Universities
4.2 Identify and address trade/border vulnerabilities associated with climate change impacts on agricultural supplies and food availability.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Ministry of Foreign Affairs and External Trade ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● Department of Local Governance and Disaster Management (DoLGDM)
4.3 Develop and expand storage and aggregation facilities designed	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with:

Activity	Lead & Collaborating Agencies
to cope with climate-induced variability in production and supply.	● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT)
4.4 Enhance post-harvest handling practices and facilities to reduce food loss, especially related to climate change	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Department of Local Governance and Disaster Management (DoLGDM) ● Universities
4.5 Improve transportation and storage infrastructure to reduce food loss, including cold-chain systems.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Universities
4.6 Facilitate food processing and value addition, integrating climate-resilient processing techniques and technologies.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Ministry of Energy and Natural Resources (MoENR) ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Universities
4.7 Strengthen distribution networks and market linkages, focusing on adaptation and mitigation measures	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● Association of Bhutanese Industries (ABI),

Activity	Lead & Collaborating Agencies
	● Bhutan Chamber of Commerce and Industry (BCCI) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Universities
4.8 Promote sustainable disposal and waste management practices that reduce GhG emissions	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Department of Infrastructure Development (DoID) ● Ministry of Health (MoH) ● Ministry of Infrastructure and Transportation (MoIT) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Universities
4.9 Promote the use of climate-based insurance and risk mitigation strategies for agri-food businesses to protect against climate-related losses.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Royal Monetary Authority (RMA) ● Ministry of Finance (MoF) ● Financial Institutions ● Insurance Companies ● NPO ● Development Partners

The Ministry of Agriculture and Livestock (MoAL) and Ministry of Foreign Affairs and External Trade would coordinate all Objective 4 activities using the Economic Cluster mechanism as well as by working closely with relevant local governments, industry associations, key business, universities and CSOs.

Enhancing adaptation and emergency response capacities of Bhutan's agrifood infrastructure, supply chains, and services is critical in a post COVID world. It also aligns with commitments made in Bhutan's NAP as well as the 13 Five Year Plan and is keeping with the following policies, plans and strategies:

General: ● 13FYP ● Bhutan's National Adaptation Plan 2023 ● Bhutan's Nationally Determined Contributions (NDCs) – June 2021 ● Climate Change Policy of the Kingdom of Bhutan 2020 Agrifood ● Livestock Rules and Regulations of Bhutan 2008	Disaster Management ● Disaster Management Act of Bhutan, 2013 ● Disaster Risk Management Strategy (DMSF) Import-Export: ● Customs Rules and Regulations of Bhutan 2017 ● Rules and Procedures for import from third countries ● National export strategy of the kingdom of Bhutan 2022

● Food and Nutrition Security Policy of Bhutan 2023 ● The Renewable Natural Resources Sector Adaptation Plan of Action (2016). Environment: ● National Environment Protection Act of Bhutan 2007	Industry ● Cottage, small and medium industry policy 2019 ● Economic Development Policy of Bhutan 2016

Objective 5: To improve the dissemination of information on climate change hazards, impacts and emergency response strategies to all stakeholders involved in the agri-food system.

Activity	Lead & Collaborating Agencies
5.1 Develop and promote IPM strategies that utilize climate information to monitor and control pest outbreaks in agriculture.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Ministry of Health (MoH) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Royal University of Bhutan (RUB)
5.2 Strengthen early detection systems for disease that affect crops and livestock with triggers based upon climate conditions conducive to disease spread.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Department of Local Governance and Disaster Management (DoLGDM) ● National Centre for Hydrology and Meteorology (NCHM) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Royal University of Bhutan (RUB) ● Media
5.3 Adopt a One Health approach that considers the interconnectedness of human, animal, and environmental health in disease monitoring and prevention.	Ministry of Agriculture and Livestock (MoAL) and the Ministry of Health (MoH) would lead this exercise in collaboration with: ● Khesar Gyalpo University of Medical Sciences ● World Organization for Animal Health (WOHA) ● Royal Centre for Disease Control (RCDC) ● International laboratory and Universities ● Bhutan Food and Drug Regulatory ● DoLGDM ● CSOs ● Media
5.4 Support vaccination and disease control programs in agriculture, informed by early warning data on disease risks.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Ministry of Health (MoH)

Activity	Lead & Collaborating Agencies
	● Department of Local Governance and Disaster Management (DoLGDM) ● Food Corporation of Bhutan (FCB) ● Bhutan Livestock Development Corporation Ltd. ● Royal University of Bhutan (RUB)
5.5 Extend early warning systems to the broader agri-food supply chain to anticipate disruptions caused by extreme weather events, disease outbreaks, or other climate-related risks.	Ministry of Agriculture and Livestock (MoAL) and the Department of Local Governance and Disaster Management (DoLGDM) would lead this exercise in collaboration with: ● Ministry of Health (MoH) ● National Centre for Hydrology and Meteorology (NCHM) ● Food Corporation of Bhutan (FCB) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Bhutan Livestock Development Corporation Ltd. ● Royal University of Bhutan (RUB) ● Media
5.6 Develop emergency response plans for the agri-food supply chain that account for climate-induced disruptions and disease outbreaks.	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Ministry of Health (MoH) ● Department of Local Governance and Disaster Management (DoLGDM) ● National Center for Hydrology and Meteorology (NCHM) ● Food Corporation of Bhutan (FCB) ● Association of Bhutanese Industries (ABI), ● Bhutan Chamber of Commerce and Industry (BCCI) ● Bhutan Livestock Development Corporation Ltd. ● Royal University of Bhutan (RUB) ● Media
5.7 Educate consumers about the potential impacts of climate-related disruptions and disease outbreaks on food availability and safety	Ministry of Agriculture and Livestock (MoAL) and would lead this exercise in collaboration with: ● Ministry of Health (MoH) ● Ministry of Education ● Department of Local Governance and Disaster Management (DoLGDM) ● Food Corporation of Bhutan (FCB) ● Royal University of Bhutan (RUB) ● Media

MoAL) would coordinate all Objective 5 activities using the Economic Cluster mechanism as well as by working closely with relevant local governments, industry associations, key business, universities and CSOs.

Improve the dissemination of information on climate change hazards, impacts and emergency response strategies to all stakeholders involved in the agri-food system will require improving the data as well as the systems used for outreach. As such it aligns with commitments made in Bhutan's NAP and NDCs as well as the following policies, plans and strategies:

General: ● 13 Five Year Plan ● Bhutan's National Adaptation Plan 2023 ● Bhutan's Nationally Determined Contributions (NDCs) – June 2021 ● Climate Change Policy of the Kingdom of Bhutan 2020 Agrifood ● Livestock Act of Bhutan 2001 ● Livestock Rules and Regulations of Bhutan 2008 ● Food and Nutrition Security Policy of Bhutan 2024 ● Food Act of Bhutan 2005 ● Food Rules and Regulations of Bhutan 2017 ● Biosecurity Policy of Bhutan 2010 ● Plant Quarantine Act of Bhutan 1993 ● Pesticides Act of Bhutan 2000 ● Biosafety Act of Bhutan 2015 ● The Renewable Natural Resources Sector Adaptation Plan of Action (2016).	Water: ● Bhutan Water Policy 2025 ● Bhutan National Integrated Water Resources Management Plan 2016 Transport ● Surface Transport Policy, Disaster Management ● Disaster Management Act of Bhutan, 2013 ● Disaster Risk Management Strategy (DMSF) ● Disaster Management Rules and Regulation, 2014 ● Non-Structural (Falling Hazards) Mitigation Manual ● Operational Guidelines for Disaster Financing Environment: ● Environmental Assessment Act 2000, ● National Environment Protection Act of Bhutan 2007, Health ● List here if relevant

3 Awareness & Sensitization Plan

To ensure successful implementation of the Agrifood climate change NAP, an awareness and sensitization plan is required to ensure key stakeholders are:

- aware of the Agrifood Sector NAP, its goals and objectives
- understand how the implementation of the NAP impacts their organization and their own work.
- know what resources, financing and tools are available to support implementation.
- engaged in monitoring, evaluation and learning exercises.

3.1 Stakeholder Identification & Information Needs

The Agrifood Sector comprises a wide range of stakeholders that all have a stake in climate adaptation. Each group will have a different set of information needs regarding the current NAP and its implementation. In general, stakeholders include:

- Government ministries: Will need to lead and coordinate the implementation of their relevant NAP activities. They will also be responsible for identifying how existing policies, programs and activities will be used to support proposed NAP goals and activities as well as report on progress.

- Industry associations: These are potentially key partners for implementing the Agrifood NAP. Their roles can include outreach to members, capacity building, co-hosting workshops and conferences and other awareness raising activities. This work will likely have to receive financial support and be formally incorporated with climate funding activities.

- Major businesses: There are likely a few key businesses, including SOEs, that operate in Bhutan that are key players in the Agrifood system. A list of these will need to be developed, however their engagement is likely crucial for achieving adaptation goals.

- Stakeholder groups: Beyond industry associations, farmers cooperatives and other stakeholder groups will be important to engage in awareness raising activities, especially as they relate to local adaptation initiatives.

- Not for Profits: NGOs will likely play a key role in implementing adaptation activities at the local level. Not only should they be targeted for awareness raising of Agrifood objectives. Local NGOs in particular should also benefit from training that builds specific skills to support project implementation.

- University and Research Centers: these institutions can play a pivotal role in (i) conducting related climate adaptation research (ii) providing professional training and (iii) ensuring students are equipped with the knowledge and skills required to support adaptation efforts post-graduation.

- International Aid Organizations: It's important for international organizations to be engaged throughout implementation of the sectoral NAP so they understand what progress has been made, lessons learned, and what potential gaps need to be met from a funding perspective.

Table 4.1 on the following page provides an overview of the major stakeholder groups and the information needs. The role of each organization listed in preparing Bhutan's Agriculture and Livestock NAP has been identified, along with proposed awareness goals regarding supporting implementation of the Agrifood Sector Road map. The rationale for engaging each organization in awareness raising is provided in the column entitled "relevance to mandate".

The final column indicates where staff from the organization listed can access information and resources that increase their:

- awareness of the Agrifood Sector NAP, its goals and objectives
- understanding how the implementation of the NAP impacts their organization and their own work.
- access to resources, financing and tools are available to support implementation.
- ability to engage in monitoring, evaluation and learning exercises related to implementation.

In most cases these resources are absent and need to be further developed.

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
1. Government Ministries:				
Ministry of Agriculture and Livestock	MoAL is the focal point for the production of crops, livestock and fisheries in Bhutan. It has a member to the technical working group and drafting committee for Bhutan's NAP.	Understand opportunities for working with other sectors to implement the Agrifood Sector Roadmap. Understand what resources are available to support its work	To enhance food and nutrition security of the country	https://www.moal.gov.bt/ To Be Further Developed
Ministry of Energy and Natural Resources (MoENR):	Department of Water (DoW) is the lead agency for Bhutan's water sector. DoW also represents the technical working group of NAP	Understand Agrifood Sector Roadmap how it relates to staff responsibilities. Understand intersectoral linkages and how to work with other ministries and stakeholders for how to coordinate activities.	DoW's mandate is to ensure safe and clean water for all in the face of changing climate. It is the focal agency overseeing the water sector NAP implementation and progress tracking. As such it would lead on awareness raising goals	https://www.moenr.gov.bt/ To Be Further Developed
	Department of Environment and Climate Change is the lead agency for overseeing Bhutan's NAP and other climate change plans and programs. It also serves as the Secretariat of the National Environment Commission.	Understand Agrifood Sector Roadmap and how it relates to staff responsibilities.	DECC is responsible for coordinating and collaborating with other ministries and relevant stakeholders to support NAP	http://www.nec.gov.bt/ To Be Further Developed

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
	As such it will play a key role in ensuring central and sectoral government agencies coordinate their efforts to achieve Agriculture Sector adaptation	Understand intersectoral linkages and how to work with other ministries and stakeholders for how to coordinate activities. Understand what resources are available to support its work.	implementation. It also aligns department plans and programmes with NAP goal/objectives and takes the lead in related capacity building initiatives.	
	Department of Energy is the lead agency for energy sector NAP work. With regard to the Agrifood NAP it plays a key role in hydroelectric power generation and is therefore a key stakeholder as a water sector user but also as a provider/enabler of power to the agriculture sector. -	Understand how objectives and activities proposed in the Agrifood Sector Roadmap power generation. Understand what opportunities there are for working with other sectors to co-manage water resources link to agrifood sector. Understand what resources are available to support its work.	Ensuring appropriate allocation of power and allocation of water through hydroelectric power management	https://www.moenr.gov.bt/?page_id=12960 To Be Further Developed
	Department of Forests and Park Services is the focal agency for forests and biodiversity in Bhutan's NAP. It therefore plays a key role in managing watershed and river basin	Understand how objectives and activities proposed in the Agrifood Sector	DFPS role is to conserve and manage Bhutan's forest biological resources to ensure	https://www.dofps.gov.bt/ To Be Further Developed

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
	areas critical for realizing the goals and objectives of the Water Sector Roadmap	Roadmap impact forests and biodiversity. Understand what opportunities there are for working with other sectors to co-manage agrifood sector and water resources. Understand what resources are available to support its work.	socio- economic and environmental well being. This includes (i) ensuring that natural ecosystems have access to sufficient water to ensure their sustainability, and (ii) helping manage river basins to ensure adequate supply and quality of water for other sectors.	
Ministry of Industry, Commerce and Employment	Department of Industry is responsible for promoting the sustainable growth and development of Bhutan's industries. MoF is responsible for budget allocation for NAP activities and is a member of the NAP technical working group.	Understand how objectives and activities proposed in the Agrifood Sector Roadmap link to food industry and retail Understand what opportunities there are for working with other sectors to co-manage water resources. Understand what resources are available to support its work.	Promoting green economy Sustainable growth and development of industries	https://www.moice.gov.bt/ https://industry.gov.bt/ To Be Developed
Ministry of Health	MoH is responsible for ensuring the health of Bhutan's population. This	Understand how objectives and activities	MoH works with other agencies to	https://www.moh.gov.bt/

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
	includes access to nutritious, healthy food as well as monitoring and responding to disease threats. MoH is a member of NAP technical working group	proposed in the Agrifood Sector Roadmap impact the Health Sector in Bhutan. Understand what opportunities there are for working with other sectors to co-manage water resources to optimize health and agrifood sector outcomes. Understand what resources are available to support its work.	implement strategies for vector control and prevention programs. BFDA a part of MOH is responsible for food safety. Implement the findings from climate risk assessment on health	To Be Developed
Ministry of Infrastructure and Transport	MoIT Infrastructure and Transport plays a key role in the construction and maintenance of water and transportation infrastructure in Bhutan. It is therefore a key player implementing the Agrifood Sector Roadmap. Department of Infrastructure Development (DoID) was involved in consultations leading to the formulation of Bhutan's NAP.	Understand how objectives and activities proposed in the Agrifood Sector Roadmap impact the development and maintenance of water and transport infrastructure. Understand what opportunities there are for working with other sectors to co-manage agrifood sector activities	Provision of safe drinking water & clean sanitation to citizens. Provision of transportation infrastructure critical to agrifood supply chains.	https://www.moit.gov.bt/en/home-2/ To Be Developed https://www.moit.gov.bt/en/departments/department-of-engineering-services/vision-mission/ To Be Developed

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		and minimize climate impacts. Understand what resources are available to support its work.		
Ministry of Home Affairs (MoHA)	MoHA oversees matters related to local governance and disaster risk reduction. Department of Local Governance and Disaster Management (DoLGDM) at MoHA is the national lead for: ● Mainstreaming disaster risk reduction into development plans, policies, programmes and projects; ● Develop, maintain and update Disaster Management Information System in coordination with relevant agencies.	Understand relevance of disaster management objectives in the Agrifood Sector Roadmap to its own work. Understand opportunities for working with other sectors to reduce risk to agrifood resources. Understand what resources are available to support its work	Mainstream disaster risk reduction into development plans, policies, programmes and projects; Develop, maintain and update Disaster Management Information System in coordination with relevant agencies. To strengthen disaster management capabilities for prevention and response to disasters.	Dept. Local Governance & Disaster Management (dlgdm.gov.bt) To Be Developed
Ministry of Finance (MoF) (Department of Macro-Fiscal and Development Finance)	MoF plays a key role in ensuring adequate financing is available to implement objectives and activities in the Agriculture Sector Roadmap.	Understand cross sectoral importance of Agrifood Sector Roadmap objectives and activities.	MoF is responsible for climate financing as well as macroeconomic policy formulation and coordination. It	To Be Further Developed

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		Understand how to balance competing financial needs of other sectors with agrifood sector needs. Understand what resources are available to support its work	plays a leading role developing relations with bilateral and multilateral financial institutions. It is also Bhutan's National Designated Authority for the Green Climate Fund (GCF).	
National Centre for Hydrology and Meteorology	NCHM plays a leading role in identify long term climate change trends and risks to the agrifood sector. It is a member of the NAP technical working group.	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand its role in facilitating cross sectoral collaboration through sharing of relevant data. Understand what resources are available to support its work	NCHM is responsible for climate services and long-term monitoring of climate change impacts to agrifood resources. This includes making this information available in form and format accessible to all people, including those with disabilities. It leads the assessment and mapping of hydro-meteorological and GLOF hazards at the sub-basin and basin level and updates	National Centre for Hydrology and Meteorology (nchm.gov.bt)

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
			Bhutan's climate projections Promote collaboration with organizations related to climate, weather, hydrology, cryosphere, and water resources.	
Local Government (Including municipalities)	Local governments provide inputs through regional consultation for NAP formulation. They are a key player for implementing local activities proposed for the Water Sector that impact agrifood systems including renovation and construction of irrigation canals, formation and management of Water User Associations, and watershed management.	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for working with other sectors to reduce risk to agrifood resources. Understand what resources are available to support community level work	Local Governments play a key role in implementing water sector and agrifood activities identified in the NAP and 13 FYP	To Be Developed
2. Industry Associations:				
Bhutan Chamber of Commerce & Industry (BCCI):	BCCI was involved in national consultation during the drafting of the NAP and is a considered a key implementation partner.	Understand how objectives and activities of Agrifood Sector	BCCI plays a key role in promoting private sector development in Bhutan. Through	To Be Developed

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
	Involved with agriculture and trade and is potentially a key partner in disseminating information on Agrifood NAP Sector objectives and activities to members	Roadmap are relevant to its work. Understand opportunities for working with its members to realize Agrifood Sector objectives and partner on implementation of proposed activities. Understand what resources are available to support this work.	its membership it can play a key role in raising awareness of Agrifood Sector NAP goals, as well as working with members to forge critical partnerships to implement key activities identified for the agrifood sector.	
3. Major Businesses:				
Food Corporation of Bhutan (FCB)	Ensure food security of the nation for all times to come	Understand how objectives and activities proposed in the Agrifood Sector Roadmap can be used in enhancing the resilience of the agrifood sector and enhance food security.	FCBL plays an important role in ensuring availability, affordability and accessibility of quality food for all by providing reliable and sustainable marketing platform and distribution chain for farm produce and essential commodities across the country	To Be Developed
Bhutan Livestock Development Corporation Ltd.	To Be Determined	To Be Determined	To Be Determined	To Be Developed

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
Farm Machinery Corporation Ltd. (FMC)	Import and export businesses that deal with food products.	Understand how objectives and activities proposed in the Agrifood Sector Roadmap can be used in enhancing the resilience of the agrifood sector and enhance food security.	FMC provides farm mechanization goods and services to the Bhutanese farming community at an affordable price	To Be Developed
4. Not-for-profits/NGOs:				
Bhutan for Life	Works on Bhutan's biodiversity conservation efforts by managing wildlife preserves, but also adjacent lands	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	To Be Determined	Unknown
Bhutan Trust Fund for Environmental Conservation (BTFEC):	An independent organization, BTFEC supports many environmental projects.	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work.	BTFEC implements activities in 5 thematic areas (Preserving biological diversity, mitigating and adapting to	Unknown

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	climate change, enabling human wildlife coexistence, addressing adverse development impacts to the environment)	
WWF Bhutan: World Wildlife Fund (WWF)	WWF has a presence in Bhutan and, while primarily an environmental conservation organization, they engage in projects involving preserving habitats and reducing human-wildlife conflict.	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	WWF works on various environmental conservation programs including protection of terrestrial and freshwater ecosystems, and climate change.	Unknown
Bhutan Ecological Society:	This organization promotes research, knowledge-sharing, and best practices in ecological conservation.	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work.	BES carry out numerous activities on biodiversity conservation, advocacy and policy influence, and	Unknown

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	climate change adaptations	
Tarayana Foundation:	Member of NAP technical working group	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	Focuses on working in remote, rural villages to bring about holistic community growth and development by serving vulnerable and disadvantaged communities.	Unknown
Royal Society for Protection of Nature (RSPN)	RSPN as TWG of NAP Involved in the conservation of the Kingdom's environment.	Educate community on climate adaptation initiatives. Advocacy on how RSPN development	Community engagement in sustainable livelihoods	Unknown

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		programmes can align contribute to climate change adaptation	Conservation of environment	
Loden Foundation	CSO working towards supporting entrepreneurship development, social impacts and environmental projects	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	Supporting projects related to environmental conservation and sustainable practices. Encouraging environmentally friendly entrepreneurship and awareness.	Unknown
5. Universities/Research Institutions:				
College of Natural Resources	Technical working group and board member of NAP from RUB College of Natural Resources is actively involved as the facilitators of capacity building of Climate Action training for mid-level civil servants, LG leaders, financial institutions and media personnel.	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities.	Provide higher education in Agriculture, Natural Resources Management and Rural Development. Transfer knowledge through research in Agriculture, Natural Resources Management and Rural Development	Unknown

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		Understand what resources are available to support this work.		
College of Science and Technology	Involved as a member of the NAP technical working group Offers B.E. in Water Resource Engineering	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities. Understand what resources are available to support this work.	Only institute offering the tertiary level water resource curriculum course	Unknown
6. Stakeholder Groups:				
Association of Bhutanese Industries	Consulted during the NAP formulation. Member of technical working group for NAP	Understand how objectives and activities of Agrifood Sector Roadmap are relevant to its work. Understand opportunities for supporting the implementation of Agrifood Sector objectives and activities.	Could play a key role in raising awareness of Agrifood Sector goals and objectives with members. Could be a key partner in helping members actively engage in implementation of Agrifood sector NAP activities.	Unknown

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		Understand what resources are available to support this work.		
7. International Agencies:				
Asian Development Bank	Supported various projects including hydropower development, climate smart transport systems and climate adaptation and environment conservation. Is supporting development of Agrifood Sector Roadmap	Understand how proposed agrifood sector activities align with its funding priorities. Understand alignment of proposed NAP work with 13 FYP and existing policies.	ADB provides policy based loans and technical assistance that can potentially be used to support the implementation of Agrifood Sector objectives and activities.	Not applicable
IFAD	Supports major agriculture initiatives in Bhutan	Understand how proposed agrifood sector activities align with its funding priorities and current programming work. Understand alignment of proposed NAP work with 13 FYP and existing policies.	IFAD is the only specialized global development organisation exclusively focused on and dedicated to transforming agriculture, rural economies and food systems.	Not applicable
FAO	Supports the implementation of a wide range of agriculture projects in Bhutan	Understand how proposed agrifood sector activities align with its funding priorities and current programming work.	FAO is the lead UN organization working in the agrifood sector. It provides a wide range of technical assistance in climate adaptation.	Not applicable

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		Understand alignment of proposed NAP work with 13 FYP and existing policies.		
United Nations Development Programme (UNDP)	Project Management Unit for NAP Coordinate with National lead partner and other stakeholders in formulation of NAP documents and NAP readiness project. Facilitate and mobilize resources for climate adaptation projects.	Understand how proposed agrifood sector activities align with its funding priorities. Understand alignment of proposed NAP work with 13 FYP and existing policies.	Supporting three directions of change, structural transformation, leaving no one behind and building resilience. Through six signature solutions, poverty and inequality, governance, resilience, energy environment and gender equality. Enhanced by three enablers, strategic innovation, digitalization, and development financing.	To Be Determined
World Health Organization (WHO):	Has been supporting public health initiatives in Bhutan. These have a direct link to health outcomes articulated in the Agrifood Sector NAP.	Understand how proposed agrifood sector activities align with its funding priorities. Understand alignment of proposed agrifood	Prescription of water quality standards	To Be Determined

Stakeholder Groups	Agrifood Sector NAP Role	Awareness Goals	Relevance to mandate	NAP Awareness Resource Availability
		NAP work with 13 FYP and existing health policies.		
World Bank (WB)	WB has supported numerous projects on health, energy, water, education and rural development sectors	Understand how proposed agrifood sector activities align with its funding priorities. Understand alignment of proposed NAP work with 13 FYP and existing policies.	Promote renewable and sustainable forms of energy, water conservation and management, etc.	To Be Determined
World Food Programme		Understand how proposed agrifood sector activities align with its funding priorities. Understand alignment of proposed NAP work with 13 FYP and existing policies.	WFP supports the national health system in the prevention and management of malnutrition. WFP also works with the Ministry of Agriculture and Forests to increase production of nutritious crops, and to link farmers and their produce directly to schools.	To Be Determined

3.2 Outreach Activities

3.2.1 Raising Awareness

It will be important for all relevant ministries and their staff to be aware of the Agri-food Sector NAP, its goals and objectives. To this end the following activities should be undertaken:

- Organize Official Launch Events: Ministries can plan to host an inaugural event for the Agri-food Sector NAP, inviting all relevant national government officials, donors, key staff and stakeholders. It will be particularly important to ensure joint ministerial events are developed so that ministries understand the importance of partnerships and coordination required to achieve NAP objectives.

- Distribute Relevant Documentation: Ensure that copies of the Agrifood NAP roadmap – and any other relevant documents -are distributed to key staff.

- Briefings: Ensure that department heads brief their staff on the relevance of the NAP to their work, workplan and progress.

- Newsletters and email bulletins: Periodic updates should be provided to staff on progress being made towards achieving deliverables through internal newsletters or email bulletins. This can also leverage social media to access remote areas.

3.2.2 Internalize NAP Goals & Objectives

It will be important for Ministries and other stakeholders to understand how the NAP impacts their work, resources and performance. A series of workshops should be held that bring key senior staff together to discuss how Agrifood NAP activities will be:

- integrated with existing policies, strategies, programs.
- coordinated with other ministries and stakeholders.
- supported by existing tools, budgets and resources.
- monitored and reported upon using agreed upon KPIs (including KPIs from National Plan) and databases.
- supported by staff training and HR strategies.

Findings from these workshops will be used to strengthen the NAP road map and support implementation.

3.2.3 Supporting Agrifood Sector NAP Awareness Strategy Rollout

It will also be important for ministry staff and key stakeholders to be aware of available resources, financing, and tools to support NAP implementation. The following resources and activities should be undertaken, along with supportive outreach activities:

- Agrifood Portal: Relevant ministries and stakeholders should consider developing and maintaining a joint web portal where updates, events, resources, tool kits can be posted. Centralizing this information will also help promote improved coordination among stakeholders.

- Tracking system: the Agrifood NAP would benefit from having a database system developed that tracked progress of activities against stated outcomes in the NAP sector road map. This will be particularly important since the success of stated goals and objectives will depend upon inter-ministerial and multi-stakeholder coordination.

- Resource guidelines, training modules and toolkits should be developed/compiled and distributed to support NAP implementation. Outreach activities will need to be conducted to ensure staff and stakeholders are aware of these resources and understand how to access them.

- Financing Workshops: Organize sessions in collaboration with the Ministry of Finance and potential donors to inform officials about budget allocations, external funding sources, and financial management related to NAP implementation.

3.3 Engagement in monitoring, evaluation, and learning exercises:

Finally, it will be important for ministerial staff and key stakeholders to understand the importance of monitoring, evaluating and learning from the implementation of NAP activities. Related awareness raising activities include:

- Training on Monitoring and Evaluation (M&E): Equip officials with skills and knowledge on M&E practices specific to the Agrifood NAP. This could be done in collaboration with monitoring and evaluation experts from various stakeholder groups to better understand the challenges and opportunities for compiling results and reporting.

- Periodic Review Meetings: Host quarterly or biannual review meetings where officials can report on progress, challenges, and lessons learned from their respective sectors.

- Feedback Mechanism: Establish a clear feedback channel for officials to report observations, provide insights, and suggest modifications to the NAP's implementation strategy.

- Annual Workshops: Organize annual refresher workshops or learning events that not only gauge progress but also facilitate knowledge sharing among different departments, ministries and stakeholder groups.

4. Conclusions & Next Steps

The current version of this Road Map requires further work for completion. Specifically, consultations and inputs are required from the following groups:

- Senior management from each lead government agency.
- Staff from departments within lead ministries responsible for implementation climate adaptation activities that were not included in Phase 1
- Cross cutting government agencies (note that this was originally envisioned to take place during the workshop, however due to limited funding was not possible)
- major stakeholder groups
- donors

The objective of these consultations would be to reach consensus and sign-off from senior management, and to ensure gender considerations are mainstreamed (where appropriate) with proposed activities.

To support this work the following activities are proposed:

a) Resolving Phase 1 issues: This will be done with NAP focal points to resolve outstanding issues flagged in this report.

b) Training: As per Phase 1, training would be undertaken to support further inputs from stakeholders. Proposed topics to be covered could include:

   - logframework development for staff who still require training.
   - climate adaptation training targeting sectoral needs.
   - gender mainstreaming approaches.

c) Working Sessions: A second round of off-site working sessions would be conducted with select sectoral stakeholders to

   - review goals, objectives and activities in sectoral road maps,
   - identify gender needs for proposed objectives and activities,
   - review institutional implementation arrangements and
   - finalize proposed awareness and sensitization strategies.

d) Donor Resource Mobilization Workshops: Results of working sessions would then be presented to a group of donors at a separate workshop for their inputs and comment. Since many donors work across all 3 sectors a single workshop could likely serve this purpose.

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Attachment 1: NAP Monitoring & Evaluation Guidelines

NAP monitoring and evaluation (M&E) strategies allow countries to track their progress, understand the effectiveness of interventions, and take remedial action where required. They also help ensure transparency and accountability to donors and stakeholders.

Since the proposed objectives, activities and tasks outlined in the previous section are likely to be financed and implemented as separate projects, a detailed M&E strategy for the Agrifood NAP Sector is not presented here. Instead, an overview of best practice is provided to help guide future work.

The subsections that follow provide a comprehensive overview of what components M&E strategies should address. Smaller projects may apply a subset of these variables to track.

Provide A Clear Statement of Objectives:

A monitoring and evaluation strategy needs to be developed with a clear understanding of the goals and objectives of a project.[3] It also should reflect a clear understanding of the desired outcomes expected as a result of a project's activity.

Logframeworks are ideal tools for this purpose. They are used to present a logical coherent framework of objectives, activities and tasks that "add-up" to a stated goal.[4] They can also be used to identify KPIs and Risks that need to be monitored and managed respectively. Section 2.1 of this report provides the starting point for developing an M&E strategy for this NAP sector.

Develop SMART Indicators (KPIs) To Assess Progress and Impacts

When developing and implementing a project there are three types of indicators that can be developed and used to measure the effectiveness of project:

- Output Indicators: Measure the direct results of activities (e.g., number of workshops held, number of solar panels installed, etc.). These are the easiest to measure, and often provide an indication of progress being made against project schedules.

- Outcome Indicators: Measure the change that has come about because of the outputs (e.g., increased number of houses with access to power, reduced number of communities vulnerable to flooding). These often take longer to establish and measure than output indicators. As a result, it is important to allocate sufficient time, resources and budget as a project begins to wrap up for these indicators to be measured.

[3] Source : https://thecompassforsbc.org/how-to-guide/how-develop-monitoring-and-evaluation-plan
[4] Source : https://assets.publishing.service.gov.uk/media/5a7eb90aed915d74e622610c/Back-to-Basics.pdf

- Impact Indicators: These indicators are used to measure the broader, long-term changes produced by the NAP (e.g., increased agricultural productivity in a region). Often, they fall outside of a project's timeline and budget. However, countries often track these indicators as part of measuring their economic/social performance.

All indicators used should be SMART – meaning:

- Specific to the desired outcome,
- Measurable to allow for clear tracking,
- Achievable in the context of the resources and time available,
- Relevant to the NAP's objectives, and
- Time-bound to ensure they provide timely feedback[5].

Develop Feedback Mechanisms for Project Management:

In addition to project impact data, project managers will need to have access to additional information to ensure the project is running smoothly. Examples of this data include:

- Financial Data: Information on budget allocations, expenditures, financial forecasts, and any financial anomalies. Reporting this data supports financial accountability, transparency, and optimization of resource allocation.

- Operational Data: Data on day-to-day operations, staff performance, logistical issues, etc can be used to optimize operational efficiency of the project team and address logistical challenges.

- Stakeholder Feedback Data: Qualitative and quantitative feedback from stakeholders (like local communities, partner organizations, etc.) will help flag concerns and perceptions on project effectiveness.

- Risk and Issue Logs: Data on identified risks, their potential impact, and mitigation strategies, along with a log of issues that arise during implementation are critical. Collecting this data assists project managers proactively resolution of emerging challenges. Section 2.3 provides an overview of risks to be managed with proposed mitigation measures.

- Capacity and Training Metrics: Fata on capacity-building activities, attendance and training outcomes can be used to evaluate effectiveness of training initiatives and identify where further efforts are required.

- Environmental Data: monitoring environmental impacts associated with project activities (involving for instance construction) can help ensure alignment with NAP goals.

[5] Source : here

- Lessons Learned and Best Practices: Documented experiences, both positive and negative, from the project is an important requirement of many donors. It also facilitates continuous learning, can be used to inform future NAP strategies.

Collecting the above data on a regular basis helps ensure that project managers have a holistic understanding of project performance. This enables them to make informed decisions, address issues, and adapt to evolving circumstances effectively. Proper data collection also requires the use of suitable tools, methodologies, and trained personnel to ensure accuracy and relevance. For larger projects a range of project management software is available to collect, analyze and report on data.

Establish Roles and Responsibilities:

The M&E strategy needs to clearly define who will be responsible for various M&E tasks. This involved determining which ministries and partners are responsible for implementing specific M&E activities. Ideally these are the same organizations involved in implementing NAP activities and tasks.

Section 2.5 of this report provides an overview of institutional arrangements for implementing the Renewable Energy NAP program. These same groups will be involved in monitoring and evaluating the activities they are responsible for. However, a lead focal point/ministry will need to be designated as being responsible for amalgamating and reporting on data collected.

The M&E strategy also needs to identify:

- Data Collection Tools & Decision Support Systems to Be Used: Determine which tools and decision support systems will be most effective for collecting, managing and reporting on data collected. Depending on the project this can involve collecting both qualitative and quantitative data using surveys, remote sensing, community feedback, etc. Where possible decision support systems used should link with other national M&E systems to create synergies, avoid duplication, and promote efficiency.

- Personnel and Training Needs: It will be important to ensure that staff involved in monitoring and evaluation activities have the appropriate knowledge and skills. This can involve training, workshops, and sharing of best practices.

Develop a Budget

How one develops and presents a budget for a monitoring and evaluation strategy will depend very much on (i) the size and complexity of the project (ii) sources of funding and any donor requirements.

There are a few important points to keep in mind when developing an M&E budget:

- Involve Stakeholders: Engage with key stakeholders early in the process. This includes national and local government agencies, NGOs, community representatives, and international donors. Their input can provide insights into potential costs, available resources, and priorities for M&E activities.

- Clearly Define M&E Activities: List all planned M&E activities, such as data collection, analysis, reporting, workshops, stakeholder consultations, and capacity-building sessions. This will facilitate a more accurate estimation of costs.

- Consider the Entire Project Lifecycle: M&E activities should include baseline studies, ongoing monitoring, mid-term evaluations, end-term evaluations, and post-implementation reviews. The latter are critical for capturing longer term impacts.

- Prioritize M&E Activities Based on Importance and Feasibility: Given limited resources, it's essential to prioritize M&E activities based on their relevance to project objectives, feasibility of implementation and value for informing decision making. This can include periodically assessing the cost-effectiveness of M&E activities to decide whether or not to continue investing in these activities or cut back.

- Use a Mix of Data Collection Methods: Utilize a mix of qualitative and quantitative methods to collect required data and information. When doing so, consider the cost implications of each method. There will be trade-offs with each one. For instance, surveys might provide comprehensive data, but they can also be expensive than focus group discussions or key informant interviews.

- Invest in Technology and Tools: Collecting, storing and analyzing data will require an investment in appropriate tools. This can include software for data analysis, mobile devices for field surveys, etc. Investments in technologies should be done when a long-term case can be made for their use. If a ministry has existing M&E systems or frameworks, align the NAP M&E budget with them to optimize resources and avoid duplication.

- Ensure Funds are Budgeted for Capacity Building: Training staff in M&E techniques and tools is essential for collecting accurate and consistent data. Budget for workshops, training sessions, and materials to build internal M&E capacity.

- Contingency Allowance: Always have a contingency allowance in your budget to address unforeseen challenges that arise during M&E implementation. Many donors will allow between 5-12% of a project budget to be held in reserve for this purpose. Often use of these funds requires permission from the donor.

- Regularly Review and Adjust the Budget: M&E budget needs may change over time for larger projects. Regularly review the budget against M&E needs and re-allocate where appropriate.

By adopting these best practices, ministries can develop M&E budgets for their NAPs that are comprehensive, realistic, and aligned with their adaptation priorities. Proper budgeting is a foundational step to ensure that M&E systems effectively inform decision-making throughout the NAP process.

Develop a Schedule for Monitoring & Evaluation Activities:

It is important to establish a timeline for monitoring and evaluation activities that supports project implementation. Key milestones include:

Establish Baseline Data: Its critical to ensure that baseline data be collected before the project starts to implement its activities. This data provides a reference point against which to measure positive impacts that can be attributed to the project's interventions.

Regular Monitoring: Regular monitoring activities are required to report on project activities. In addition, key milestones in project delivery also need to be supported by monitoring of related data. This information needs to be collected, analyzed and reported on at regular intervals to allow project managers to make adjustments if certain strategies aren't working.

Evaluation: At specific milestones, projects are required to conduct a more comprehensive analysis of the progress and impact. Typically, this is done through:

- A Mid-Term Evaluation: Evaluates the progress halfway through a project's implementation. Mid-term evaluations can be done internally or outsourced to a third party for a more objective assessment of impact and progress. In some cases, both options are exercised to provide a basis for comparison.

- And End-of-Project Evaluation: Assesses the overall impact and effectiveness of the NAP upon its completion. Similarly internal reports and external evaluations by third parties can be conducted for large initiatives.

Stakeholder Engagement: Outside of the immediate project activities it is important to engage relevant stakeholders in the M&E process. This can include soliciting inputs from and reporting to government agencies, local communities, NGOs, and others.

Donor Reporting: Many donors require projects to provide project updates on regular basis. Including donors in the stakeholder engagement process can also promote transparency and can aid in securing funding for future initiatives.