ADAPTATION FUND

# REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to the email: submissions@adaptation-fund.org

ADAPTATION FUND

# LOCALLY-LED ADAPTATION PROJECT/PROGRAMME PROPOSAL FOR SINGLE COUNTRY

## PART I: PROJECT/PROGRAMME INFORMATION

**Title of Project/Programme: Securing Water & Enhancing Climate Resilience in Thimphu (Rural) District, Bhutan.**

**Country:** Bhutan
**Thematic Focal Area:** Water Management
**Type of Implementing Entity:** National Implementing Entity

**Implementing Entity:** Bhutan Trust Fund for Environmental Conservation (BTFEC)
**Executing Entities:**

- Department of Water (DoW), Ministry of Energy and Natural Resources
- Department of Forests and Park Services (DoFPS), Ministry of Energy and Natural Resources
- Department of Agriculture (DoA), Ministry of Agriculture and Livestock
- Department of Infrastructure Development (DoID), Ministry of Infrastructure and Transport
- Thimphu Dzongkhag Administration
- Bhutan Ecological Society (BES)

**Amount of Financing Requested: US$ 5,000,000 / US$ 100,000 for PPG** (in U.S Dollars Equivalent)

**Letter of Endorsement (LOE) signed: Yes**
*NOTE: The LOE should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply- funding/designated-authorities*

**Stage of Submission:**

☐ This proposal has been submitted before including at a different stage (**concept**, fully developed proposal)

☐ This is the first submission ever of the proposal at any stage. In case of a resubmission, please indicate the last submission date: **18 January 2024**

**Please note that concept note proposal documents should not exceed 50 pages including the annexes.**

## Project / Programme Background and Context:

The proposed project, **Securing Water & Enhancing Climate Resilience in Thimphu District, Bhutan**, aims to address several interrelated challenges faced by communities in Thimphu District, Bhutan. The Thimphu District's economic, social, and environmental context poses significant risks to water security and overall climate resilience, impacting the livelihoods and well-being of communities in Thimphu.

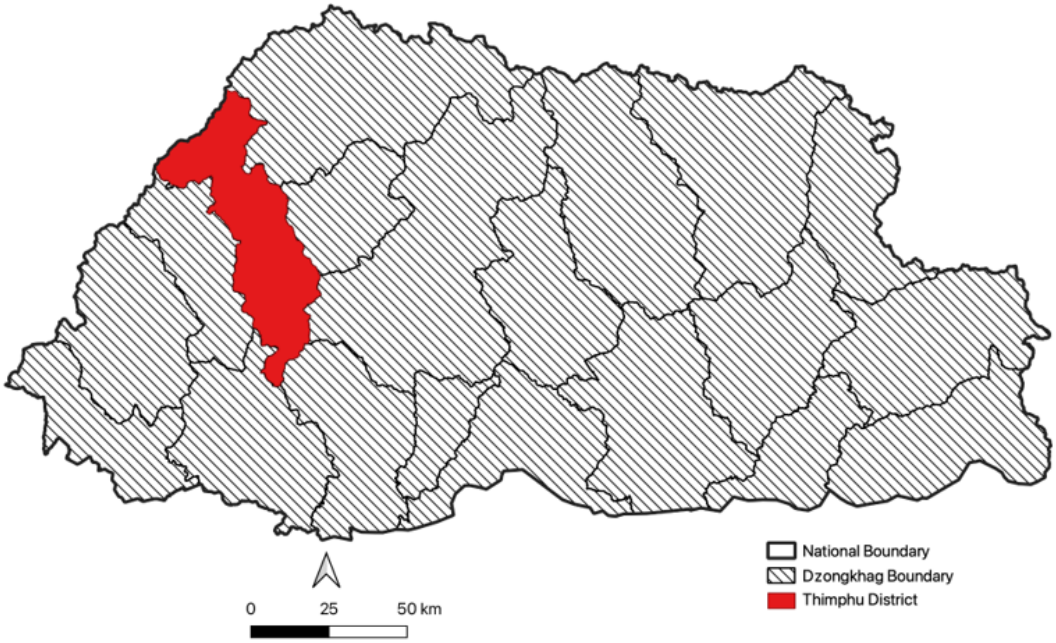


*Figure 1. Location of proposed project in the Thimphu District, Bhutan (Data Source: National Land Commission Secretariat, 2023).*

### Bhutan: Climate Change Challenges, Actions & Strategies

Bhutan, a least developed nation known for its commitment to environmental conservation and carbon neutrality faces significant vulnerability to the adverse impacts of climate change. As a landlocked and least developed country (LDC) characterized by a delicate mountainous environment, the nation's susceptibility is further compounded by its heavy reliance on predominantly subsistence agriculture and the pivotal role of hydropower in driving economic growth. The country is confronted with escalating climate hazards and extreme events, including flash floods, glacial lake outburst floods, windstorms, forest fires, and landslides. Increasingly, Bhutan faces challenges in maintaining pristine catchment areas, water availability and climate resilience in peri-urban regions. These areas are particularly vulnerable due to increasing urbanization, deforestation, and changing weather patterns. The combination of these factors results in reduced water availability, higher forest fire risks, and limited access to clean water for domestic and agricultural use[1].

Despite these challenges, Bhutan is committed to achieving its development goals while upholding the principles of Gross National Happiness and ecological balance. Realizing that climate change is one of the biggest impediments to sustainable development and livelihood of the people, Bhutan has committed to taking all measures to address the impacts of climate change. In 2009, at the UNFCCC COP15, Bhutan declared its intention to remain carbon neutral, and reaffirmed its commitment in 2015 through its first

[1] Climate Change Policy of the Kingdom of Bhutan, 2020. National Environment Commission. Royal Government of Bhutan.

Nationally Determined Contribution (NDC). Our constitutional mandate to maintain a minimum of 60% of the land area under forest cover for all times also has a global benefit for carbon sequestration. To maintain its carbon-neutral status, Bhutan recognizes the necessity of mitigating emissions arising from economic expansion by pursuing low-emission development pathways across all sectors[2]. Further, Bhutan adopted a policy decision to pursue green growth through the Economic Development Policy of 2016.

In this context, Bhutan developed its Climate Change Policy in 2020 to provide strategic guidance to ensure that Bhutan remains carbon neutral and protects the well-being of the Bhutanese by adapting to climate change in an efficient and effective manner. The Climate Change Policy reaffirms Bhutan's unwavering commitment to remain carbon neutral, as pledged during the COP15 summit, and reiterated in its NDC under the Paris Agreement. This policy is designed to offer a clear roadmap for achieving a climate-resilient and carbon-neutral economy that contributes to the nation's overarching goal of promoting Gross National Happiness. Furthermore, the policy seeks to tackle challenges and leverage opportunities, including securing international support in the form of financial aid, technology transfer, capacity building, research, and awareness initiatives on climate change at both the national and international levels. By fostering collaboration, inclusivity, and innovative approaches, the policy endeavors to safeguard Bhutan's distinct environmental heritage while actively contributing to global endeavors in combating climate change. This inclusive approach entails the active participation of public-private sectors to collectively address for a more climate resilient future.[3]

To further balance conservation with development, and enhance implementation and operationalization of the existing legislation in all spheres of government, down to the local level, Bhutan developed the National Environment Strategy (NES) 2020-2030. The primary objective of the National Environment Strategy is to establish a thriving and sustainable environment that caters to the well-being of current and future generations, aligning with the pursuit of Gross National Happiness. Notably, the strategy is committed to maintaining carbon neutrality, advocating for environmentally friendly and climate-resilient roads and infrastructure. Furthermore, it aims to foster sustainable and climate-resilient agricultural practices.[4]

In 2023, Bhutan launched its National Adaptation Plan (NAP), which serves as a guiding framework for climate change adaptation planning at the national level. The NAP sets clear priorities, primarily aimed at reducing exposure and vulnerability to climate-related hazards, while simultaneously enhancing adaptive capacity. Additionally, the plan is aimed at enhancing implementation through integration into development plans at all levels. The NAP is also intended to convey the priorities and needs for adaptation in Bhutan internationally.[5]

These foundational policies and strategic documents for climate change action in the country outline the necessary conditions for effectively implementing prioritized adaptation measures.

## Socio-economic Scenario: Challenges, Progress and Future Perspectives

[2] Intended Nationally Determined Contribution of the Kingdom of Bhutan, 2015. National Environment Commission. Royal Government of Bhutan, Thimphu.
[3] Climate Change Policy of the Kingdom of Bhutan, 2020. National Environment Commission. Royal Government of Bhutan.
[4] National Environment Strategy, 2020. National Environment Commission Secretariat. Royal Government of Bhutan.
[5] National Adaptation Plan (NAP) for the Kingdom of Bhutan 2023. Department of Environment and Climate Change, Royal Government of Bhutan, Thimphu.

*Socio-economic Context of Bhutan*

Bhutan's economy, one of the smallest in the world, was badly affected by the COVID-19 pandemic. The GDP dropped to BTN 171,572.90 billion (USD 2,344.05 million) in 2020 from 178.56 billion, from 2019, which is a contraction of BTN 6.99 billion. The GDP recorded a negative growth of 10.08% in 2020 compared to growth of 5.75% in 2019.[6] The latest figures show that the key contributing economic sectors to the GDP are: i) the primary sector (agriculture, livestock and forestry (14.67% of GDP), ii) secondary sector (industry), 31.82%, and iii) tertiary sector (services), 53.50%.[7]

The renewable natural resources sector remains the most important economic sector for employment, with 49.90% of the total employed persons engaged in the agriculture sector, followed by the service sector that employs 36.60% of the total employed persons. Tourism is a key component of the service sector which makes a significant contribution to the country's economy particularly in terms of foreign exchange and employment. The colossal economic shock due to the COVID-19 pandemic has impacted the performance of all sectors but has had particularly devastating impact on tourism and related sectors[8].

Bhutan's estimated population in 2023 reached around 787,424 (401,092 males and 369,184 females), with ~20% of the population residing in the capital Thimphu. The working-age population of Bhutan is estimated at 496,600, with an employment rate of 96.6%. Of the total employed (~300,400), 71.2% (~214,200) are in rural areas and 28.7% (~86,200) in urban areas. Population projections show that Bhutan will grow to about 883,900 people by 2047, indicating an annual growth rate of less than 0.3%. The current proportion of the population living in rural areas (59%) is expected to decrease to 43% by 2047, with 30% of the total population expected to be residing in Thimphu[9].

Utilizing a poverty line at BTN 2,195.95 (USD 33.82) per person per month (approximately a dollar a day), an estimated 8.2% of the population is found to be poor, an impressive reduction over the last twenty years from 32%. Poverty in rural areas (11.9%) is significantly higher than in urban areas (0.8%). The highest poverty rates are observed in five districts namely Dagana, Zhemgang, Mongar, Trongsa, and Pema Gatshel. While the Gini index, which measures inequality, has remained constant at the national level (0.36 in 2012 and 0.38 in 2017), a marked disparity in aggregate simple literacy can be observed between the poor and non-poor, especially those living in urban areas[10]. While the contributing factors for poverty are diverse and multi-sectoral, few prominent attributes identified in the Bhutan Poverty Analysis 2017 are: access to market, connection to road networks, topography of the farmland, access to irrigation and drinking water. Areas with high incidences of poverty tend to have low access to markets and poor connection to road networks, slope to steep topography of farmland leading to low productivity, low number of productive livestock, large incidence of human-wildlife conflict, low access to irrigation water, and drinking water.

The proposed project thus includes the most vulnerable communities, targeting the poorer and more economically and environmentally vulnerable communities of Thimphu district for all interventions. This adaptation project aims to enhance access to irrigation and drinking water in rural and local communities of Thimphu district to increase economic resilience and adapt to climate change.

Bhutan is blessed with an exceptional natural environment, earning it the title of the 'crown jewel' of the

[6] National Accounts Statistics 2021. National Statistics Bureau. Royal Government of Bhutan.
[7] National Accounts Statistics 2023, National Statistics Bureau, Royal Government of Bhutan.
[8] Annual Report 2020-21, Tourism Council of Bhutan, Royal Government of Bhutan.
[9] Population Projections Bhutan 2017-2047, National Statistics Bureau, Royal Government of Bhutan
[10] Poverty Analysis Report 2017, National Statistics Bureau, Royal Government of Bhutan

Eastern Himalayas, a region recognized as a global biodiversity hotspot[11]. The country boasts an impressive 69.71% forest cover[12] and 51.44% of its land designated as protected areas[13], which has played a crucial role in preserving its rich biodiversity and ensuring ample water resources.

Thanks to its extensive forest cover, limited polluted industrial activities, and a significant reliance on hydropower for electricity generation, Bhutan stands out as possibly the only nation in the world with negative carbon emissions[14,15]. However, despite this positive environmental record, Bhutan is not immune to the impacts of global warming and climate change, and these challenges still affect the country's ecosystems and mostly our local communities.
Bhutan is renowned for its abundant water resources in the region, boasting one of the highest reported water availability per capita[16]. Despite this, the country still grapples with water accessibility issues that persist throughout the nation. This situation arises from a combination of factors, primarily driven by the impacts of climate change, leading to the drying up of water sources.

The most imminent threat that Bhutan faces due to the impact of climate change is the risks from the Glacial Lake Outburst Floods (GLOFS). Bhutan had experienced a total of 21 GLOFs in the past. GLOFs cause cascading effects downstream, destroying water-related infrastructure, loss of properties, and livelihoods downstream. Bhutanese glaciers are also retreating at a faster rate due to the impacts of climate change. A total of 567 glacial lakes covering a total area of 55.04 ±.0.055 $km^2$ or 0.14% of the total land area, has been mapped by the National Center for Hydrology and Meteorology.[17] Furthermore, inadequate infrastructure development and maintenance, along with governance-related challenges, contribute to the paradox of high-water availability but limited accessibility in the country.

### *Development Context*

Bhutan's commitment to sustainable development and environmental conservation is embodied in its Gross National Happiness (GNH) philosophy. GNH values collective happiness as the goal of governance, by emphasizing harmony with nature and traditional values as expressed in the and 4 pillars (sustainable and equitable socio-economic development; environmental conservation; preservation and promotion of culture; and good governance) and 9 domains (psychological well-being, health, time use, education, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, and living standard)[18]. However, due to rapid urbanization, infrastructure development and increased climate-related risks have emerged. Unplanned urban growth, deforestation, and inadequate water management exacerbate the vulnerability of peri-urban areas to environmental degradation and climate change impacts.

[11] Jewel of the Eastern Himalayas. WWF Bhutan 2010.
[12] National Forest Inventory Volume I: State of the Forest Report, Department of Forests and Park Services, Royal Government of Bhutan.
[13] Annual Forestry Statistics,2022. Department of Forest and Park Services, Royal Government of Bhutan.
[14] Bhutan the First Carbon negative Country in the world August 18,2022. Retrieved on 10th January 2023 from https://earth.org/bhutan-carbon-negative-country/

[15] Third National Communication to the UNFCCC 2020. Kingdom of Bhutan. National Environment Commission.
[16] National Environment Commission. *Bhutan State of the Environment Report 2016*; National Environment Commission: Thimphu, Bhutan, 2016.
[17] Bhutan Glacial Lake Inventory 2021: National Center for Hydrology and Meteorology, Royal Government of Bhutan.
[18] www.grossnationalhappiness.com/.

### *Socio-economic Context of Thimphu District*

Thimphu district has one of the lowest poverty rates of 1.5 % compared to all other districts[19].The poverty rate however has increased by 0.4% in 2022, compared to the poverty rate of 1.1% in 2017[20]. This indicates that while urban poverty is an emerging social issue, poverty is relatively a rural phenomenon. Thimphu district serves as the economic hub of Bhutan, attracting urbanization and industrialization. The rapid urbanization of the city has had a ripple effect on and aided in the economic growth of the rest of the district. At the same time, several negative impacts such as unemployment, crime, air pollution, cultural deterioration, housing and water shortages, congestion and increasing waste problems especially in the city keep swelling in the district[21]. The increasing population and economic activities have led to higher water demand for both domestic and industrial needs. Further, unsustainable land use practices, deforestation, and urban expansion have contributed to the degradation of catchment areas, leading to reduced water availability for agricultural and domestic use[22]. Water scarcity affects agricultural productivity and poses challenges for small-scale farmers who heavily rely on irrigation for their livelihoods.

Thimphu District experiences rapid population growth, as rural communities migrate to urban and peri-urban areas seeking better economic opportunities. The Dzongkhag has the highest unemployment rate in the country with 6.0% against the national average of 2.4%[23]**.** The high rate of unemployment is attributed to high level of rural-urban migration to Thimphu mostly youth; the Dzongkhag has the highest proportion of population who were migrants with 84.92[24].

This demographic shift puts pressure on existing water resources and infrastructure, leading to competition for water among various user groups.[25] Furthermore, the availability of clean drinking water is not evenly distributed, leading to disparities in access, particularly for marginalized communities. Women, who often bear the responsibility of water collection, face increased burdens and time constraints in securing water for their families.

## Climate Trends and Climate Change Threats

### *Climate - Historical Trends*

Bhutan's climate is diverse, owing to the dramatic variations in elevation and topography. In general, temperature increases have been experienced in Bhutan, with minimum temperatures increasing at a faster rate than maximum temperatures. An analysis of trends in climate parameters using CRU data for the country from 1976 to 2005 showed an increasing trend in temperature. The mean annual temperature has increased. by 0.8 degrees Celsius for the 1976 to 2005 period[26]. Temperatures are higher during summer and lower over

[19] National Statistics Bureau of Bhutan (2022). Bhutan Poverty Analysis Report. National Statistics Bureau of Bhutan. Royal Government of Bhutan.

[20] National Statistics Bureau of Bhutan (2017). Bhutan Poverty Analysis Report. National Statistics Bureau of Bhutan. Royal Government of Bhutan.

[21] 12th Five Year Plan for Thimphu District (2018-2023). Gross National Happiness Commission.

[22] Giri, N., & Singh, O. P. (2013). Urban growth and water quality in Thimphu, Bhutan. Journal of Urban and Environmental Engineering, 7(1), 82-95.

[23] Population and Housing Census Report of Bhutan 2017. Thimphu Dzongkha. National Statistical Bureau, 2018. Royal Government of Bhutan.

[24] Center for Bhutan Studies and GNH Research 2015. A Compass Towards a Just and Harmonious Society :2015 GNH Survey Report. Center for Bhutan Studies and GNH Research.

[25] Giri, N., & Singh, O. P. (2013). Urban growth and water quality in Thimphu, Bhutan. Journal of Urban and Environmental Engineering, 7(1), 82-95.

[26] NCHM (2019). Analysis of Historical Climate and Climate Projection for Bhutan. National Center for Hydrology and Meteorology Royal Government of Bhutan,Thimphu.

winter months. As shown in Figure 2, there is a significant seasonal range in temperatures: the summer months of June–August averaging temperatures of 24 C–29 C, compared to the winter months of December–February which are near 0°C, for the most recent climatology, 1991–2020. Average monthly rainfall follows a similar pattern, in which considerably more rainfall occurs during the summer months (approximately 240 millimeters [mm]) than during the winter months (approximately 90 mm). Southern parts of the country with lower elevation tend to have higher temperatures and greater precipitation, while northern regions are often cooler with less precipitation.[27]

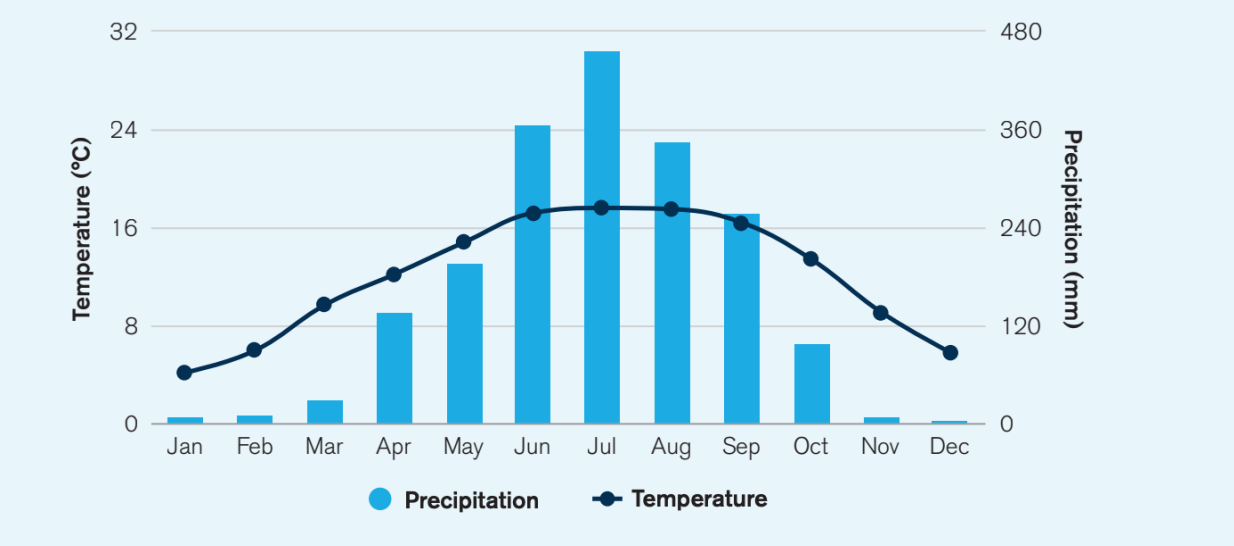


*Figure 2. Average monthly temperature and rainfall in Bhutan (1991-2020).*[28]

The southwest monsoon over the Indian sub-continent produces a seasonal precipitation cycle in Bhutan, with rainy summer seasons over most of the country from June to September. However, Bhutan experiences a high degree of rainfall variability and distribution spatially.[29] The analysis of historical data revealed a decreasing trend in rainfall at mean annual scales with high variability. Seasonal rainfall trends reveal a wet summer monsoon (JJAS) and dry winter season (DJF)[30].

### *Climate of Thimphu*

Thimphu has a temperate climate with winter temperatures ranging from -2.6 C to 12.3 C and summer temperatures range from 21.6 C to 32 C. The annual rainfall of Thimphu varies between 500 mm and 1000 mm.[31] Historical climate of Thimphu also follows the general trend observed for Bhutan as a whole. The mean summer temperatures are higher and winter temperatures are lower (Figure 3).

[27] Climate Risk Country Profile: Bhutan (2021): The World Bank Group and the Asian Development Bank.
[28] WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Historical. URL:https://climateknowledgeportal.worldbank.org/country/bhutan/climate-data-historical
[29] Stewart, S.B., Choden, K., Fedrigo, M., Roxburgh, S.H., Keenan, R.J. and Nitschke, C.R. (2017). The role of topography and the north Indian monsoon mean monthly climate interpolation within the Himalayan Kingdom of Bhutan. International Journal of Climatology, 37, pp. 897–909. URL: https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/joc.5045
[30] NCHM (2019). Analysis of Historical Climate and Climate Projection for Bhutan. National Center for Hydrology and Meteorology, Royal Government of Bhutan,Thimphu
[31] Walcot, S. (2009) “City Profile: Thimphu”. Cities 26:158-170

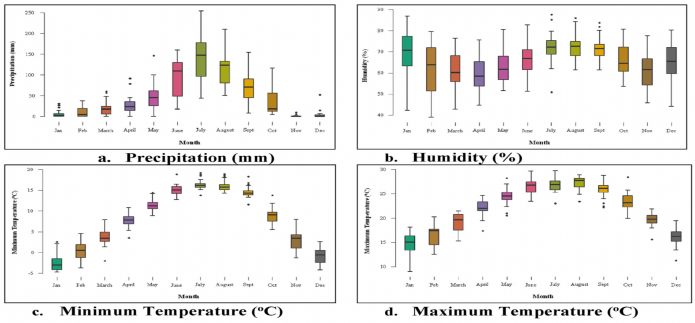


*Figure 3. Mean of monthly climatic parameters of Thimphu (Simtokha Climate Station data 1995-2020)*[32]

## Future Climate

Mountainous countries such as Bhutan are among the most vulnerable countries to the adverse impacts of climate change. Under the RCP 4.5 scenario, the climate projection for surface temperature indicates an increase of about 0.8 C – 1.6 C during 2021-2050 (representing the 2030s mid-term climate change scenario) and about 1.6 C – 2 C towards the end of the century (2070-2099).[33] Projections of temperature rise in Bhutan are slightly greater than the global average: 3.9 C compared to 3.7 C by the 2090s under the highest emissions pathway, RCP 8.5.[34]

| | Average Daily Maximum Temperature | | Average Daily Temperature | | Average Daily Minimum Temperature | |
|---|---|---|---|---|---|---|
| **Scenario** | **2040–2059** | **2080–2099** | **2040–2059** | **2080–2099** | **2040–2059** | **2080–2099** |
| **RCP2.6** | 1.3 (–0.6, 3.5) | 1.3 (–0.6, 3.4) | 1.3 (–0.1, 2.8) | 1.2 (0.0, 2.9) | 1.2 (–0.3, 3.2) | 1.3 (–0.4, 3.2) |
| **RCP4.5** | 1.7 (–0.3, 3.7) | 2.5 (0.3, 4.8) | 1.6 (0.2, 3.0) | 2.4 (0.8, 4.0) | 1.7 (0.0, 3.6) | 2.3 (0.8, 4.5) |
| **RCP6.0** | 1.5 (–0.6, 3.6) | 2.8 (0.6, 5.2) | 1.5 (0.1, 3.0) | 2.8 (1.3, 4.5) | 1.6 (–0.2, 3.4) | 2.9 (1.2, 5.0) |
| **RCP8.5** | 2.3 (0.2, 4.2) | 4.7 (2.4, 7.0) | 2.2 (0.8, 3.6) | 4.5 (2.8, 6.5) | 2.2 0.7, 4.0) | 4.6 (2.8, 7.1) |

*Table 1 Projected anomaly (changes °C) for maximum, minimum, and average daily temperatures in Bhutan for 2040–2059 and 2080–2099, from the reference period of 1986–2005 for all RCPs. The table shows the median of the CCKP model ensemble and the 10–90th percentiles in brackets.*

[32] Pandey et. al; (2023). Attributable factors for climate change adaptation among urban informal settlers of a least developed country, Bhutan, Habitat International, Volume 136, 2023 https://doi.org/10.1016/j.habitatint.2023.102817

[33] The World Bank Group and the Asian Development Bank (2021). Climate Risk Country Profile-Bhutan

[34] WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Historical. URL https://climateknowledgeportal.worldbank.org/country/bhutan/climate-data-historical

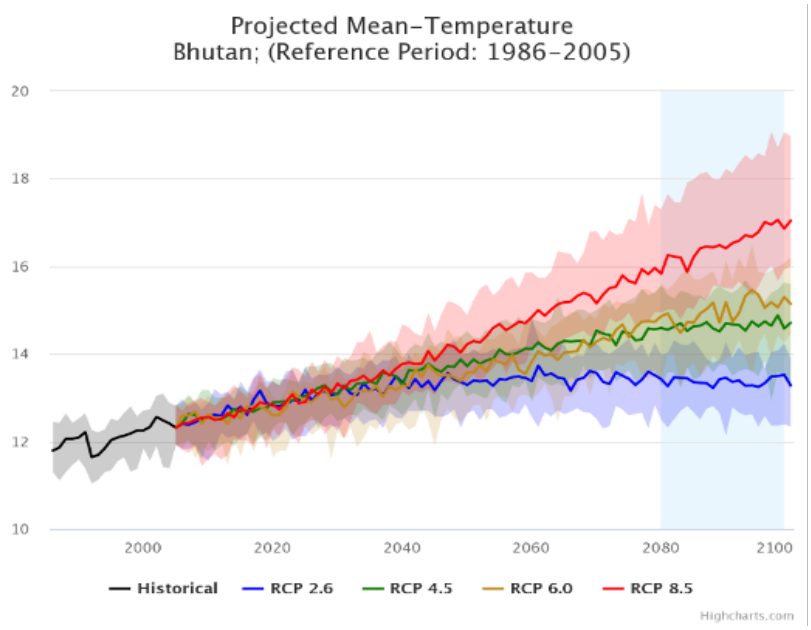


*Figure 4. Historic and projected average annual temperature in Bhutan under various RCPs estimated by the model ensemble. Shading represents the standard deviation of the model ensemble.*[35]

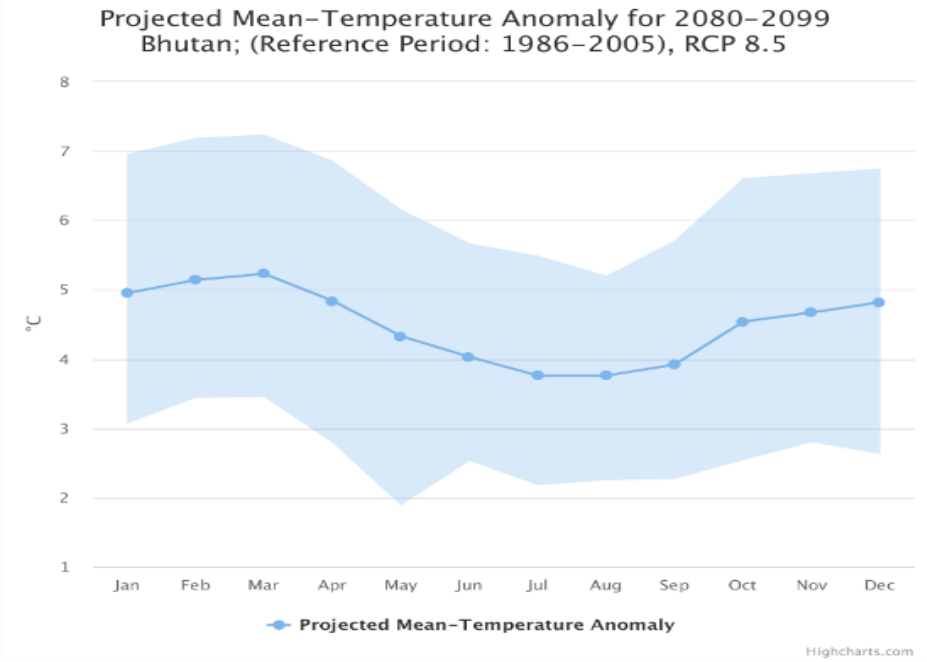


*Figure 5. Projected change (anomaly) in monthly temperature, shown by month, for Bhutan for the period 2080–2099 under RCP 8.5. The value shown represents the median of the model ensemble with the shaded areas showing the 10th–90th percentiles.*[36]

Projected precipitation trends, although less certain, show a likely increase in precipitation for the country, with eastern areas experiencing higher amounts of rainfall. However, it is anticipated that Bhutan will

[35] *WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Projections. URL: https://climateknowledgeportal.worldbank.org/country/bhutan/climate-data-projection*
[36] *Ibid*

experience an increase in intensity for extreme rainfall events.[37] Spatial representation of future projections of annual temperature and precipitation for mid and late century under RCP 8.5 are presented in the figures below. Under all emissions pathways, an increase in the precipitation associated with a maximum 5-day rainfall event is expected across Bhutan, with heaviest rainfall occurring in the southeastern areas of the country.

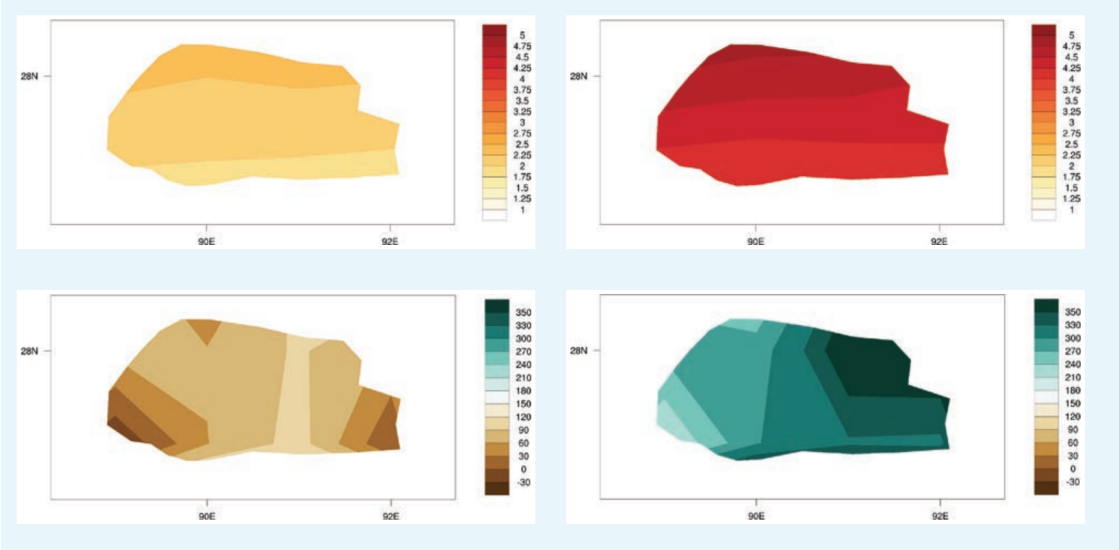


*Figure 6. CMIP5 ensemble projected change (32 GCMs) in annual temperature (top) and precipitation(bottom) by 2040–2059 (left) and by 2080–2090 (right) relative to 1986–2005 baseline under RCP 8.5.*[38]

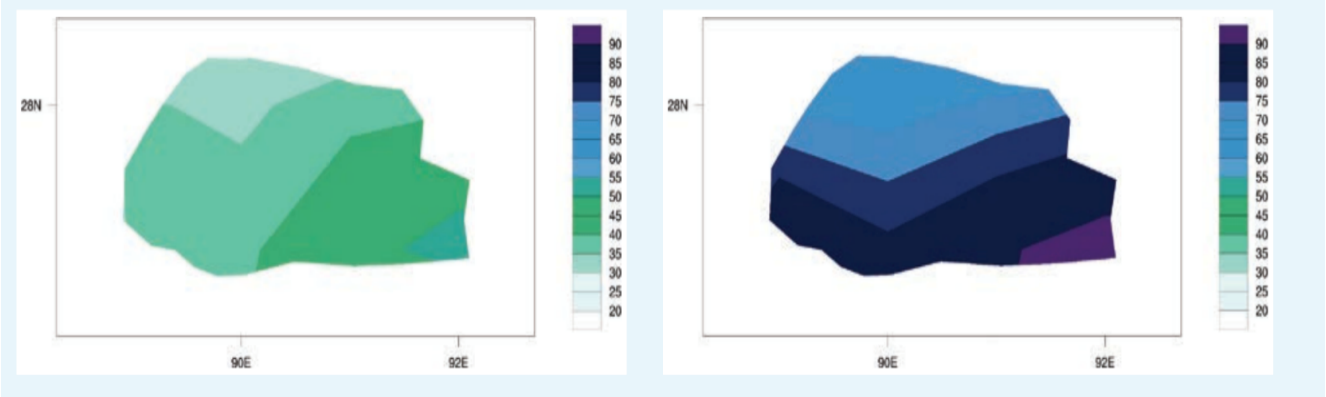


*Figure 7. Projected change in the maximum 5-day rainfall (mm) over Bhutan for the period 2040–2059 (left) and for the period 2080–2099 (right) for emissions pathways RCP 8.5 compared to the 1986–2005 baseline.*

All these climatic changes are expected to have devastating effects on agriculture, Bhutan having already experienced the effects of climate change on agriculture multiple times. In 1996, rice farmers in high-altitude areas were devastated with 80–90% crop loss to blast disease. Turcicum leaf blight of maize in 2007 damaged more than 50% of the farmers' harvest. Also, in 2008, a severe windstorm destroyed all maize crops belonging to hundreds of households.[39]

[37] Climate Risk Country Profile: Bhutan (2021): The World Bank Group and the Asian Development Bank.

[38] *WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Projections. URL: https://climateknowledgeportal.worldbank.org/country/bhutan/climate-data-projection*

[39] Chhogyel, N., Kumar, L. Climate change and potential impacts on agriculture in Bhutan: a discussion of pertinent issues. *Agric*

Due to large topographical differences accompanied by huge altitudinal variation, erratic climatic natural hazards—such as glacier lake outburst floods (GLOF), flash floods, erosions, and landslides—are predicted to intensify in the future.[40] Thimphu, the most populated capital city, is expected to experience more frequent and intense forest fires, posing risks to water catchment areas and disrupting the delicate ecological balance as a result of impacts of climate change[41]. Climate change-induced shifts in precipitation patterns may further exacerbate water scarcity in Thimphu, impacting households, agriculture and ecosystems. Thus, Thimphu district, one of the most populated districts, will be increasingly vulnerable to the impacts of climate change.

### *Natural Hazards Related to Climate Change*

Bhutan is vulnerable to a range of natural disasters, including floods, earthquakes and landslides. Bhutan faces risks from natural disasters but relatively less than other countries, ranking joint 115th out of 191 countries in the INFORM 2019 Risk Index[42]. The most significant natural hazard is exposure to earthquakes, due to location along the Himalayan Mountain belt. Amongst the climate-related hazards, flooding is the country's most significant hazard, ranking 76th globally. The risks associated with other climate-related natural hazards such as drought and tropical cyclones, are extremely low, both scoring 0 on the INFORM 2019 Index.[43]

### *Flooding and GLOFs*

Climate change-induced erratic rainfall patterns with the heavy showers during monsoon, and rapid retreating of glaciers, have increased the probability of flash floods and GLOF in the river catchments areas. Examples of such disasters are, GLOF in Punakha (1994), and floods in Gelephu because of the rise in Mao Chhu with heavy rainfall. Bhutan has faced over 21 GLOFs and frequent occurrences of floods and landslides every year. These disasters have damaged agricultural land, public properties, institutions and took many lives. The risk of GLOF is pronounced in northern parts of Bhutan, which possesses 667 glaciers that feed into 2,6774 glacial lakes, out of which, 25 are at risk of bursting. The impact of flooding on human health and livelihoods is expected to grow and could be 4% of GDP by the 2030s.[44]

A recent climate risk assessment on water resources in Bhutan also identified Thimphu district as a hotspot susceptible to water-related hazards such as flash floods, landslides, rainstorms, hailstorms, soil erosion, and river flooding.[45] Higher temperatures are projected to also contribute to increased snowmelt which could change patterns of river discharge and water availability. Impacts on infrastructure could grow significantly in the second half of the 21st century.[46]

---

*& Food Secur* 7, 79 (2018). https://doi.org/10.1186/s40066-018-0229-6

[40] Shrestha et al (2010) Climate Change in the Eastern Himalayas: Observed Trends and Model Projections; ICIMOD: Kathmandu, Nepal; p. 20.

[41] UNDP (2021). Assessment of climate risks on forests and biodiversity for National Adaptation Plan (NAP) formulation process in Bhutan. UNDP, Thimphu, Bhutan.

[42] European Commission (2019). INFORM Index for Risk Management. Bhutan Country Profile. URL: https://drmkc.jrc.ec.europa.eu/inform-index/Countries/Country-Profile-Map

[43] *Ibid*

[44] National Centre for Hydrology and Meteorology (n.d.). Compendium of climate and hydrological extremes in Bhutan since 1968 from Kuensel.

[45] Department of Water, 2023.Assessment of Climate Risks on Water Resources for National Adaptation Plan (NAP) for Bhutan. October 2023. Department of Water, Royal Government of Bhutan·

[46] *Ibid*

### *Droughts*

In addition to flooding, climate models project a significant increase in the likelihood of heatwaves and droughts, impacting the communities in Bhutan's inner dry valleys. The dry spell classification of the country identified Thimphu as one of the drought prone areas due to its relatively drier climate. By the 2090s, the current median probability of heatwave of 2% is projected to increase to approximately 20% under RCP 4.5 and RCP 6.0, and as high as 36% under RCP 8.5 under the Coupled Model Inter- comparison Project Phase 5 (CMIP5) projections.[47]

### *Fires*

Forest fires are considered one of the biggest threats to forest resources in Bhutan.[48] Blue pine ecosystems are of high concern because of their importance for rural livelihoods and relatively high occurrence of forest fires. Blue pine forests are the most dominant forest type in Thimphu district. Blue pine are species native to the Himalayas and are prone to fire incidents. Younger trees, with their thin bark and high flammability, are particularly susceptible to wildfire-induced mortality.[49] Blue pine is considered an early successional species and tends to grow in proximity to human settlements, often on abandoned farmland. Due to their close association with settlements, these blue pine forests are subject to considerable human impact, including demands for forest ecosystem services like timber, firewood, and livestock forage. Additionally, they face an elevated risk of wildfires caused by human activities,[50,51,52] and further aggravated by climate change.

A study by Villarel et al, 2020 showed that blue pine ecosystems in Thimphu are more susceptible to wildfires compared to other areas. The study also predicted that under extreme weather conditions, fire hazards in northern and southern Thimphu would experience a two-fold increase. Thimphu showed a higher potential for more intense and severe wildfires under all future climate scenarios.[53]

A report by UNDP (2021) highlighted that under extreme climatic changes, Thimphu would experience increased fire hazards. Forest fires in Bhutan continue to take a substantial toll on wildlife and biodiversity with annual fire incidences averaging about 57 events and scarring an average of about 200 ha annually.[54] The districts experiencing the highest incidence of fires include Thimphu, Wangdue Phodrang, Punakha, Mongar, Lhuentse, and Trashigang.

---

[47] The World Bank Group and the Asian Development Bank (2021). Climate Risk Country Profile-Bhutan

[48] Chhetri, D. 1994. Seasonality of forest fires in Bhutan. International Forest Fire News, 10, 5-9.

[49] Chhetri, D. 1994. Seasonality of forest fires in Bhutan. International Forest Fire News, 10, 5-9.

[50] Dukpa, D., Cook, E.R., Krusic, P.J., Rai, P., Darabant, A., Tshering, U., 2018. Applied dendroecology informs the sustainable management of Blue Pine forests in Bhutan. Dendrochronologia 49, 89–93. https://doi.org/10.1016/j.dendro.2018.03.003

[51] Gyeltshen, C., Gratzer, G., Meigs, G., & Keeton, W. (2016). *Fire risks in blue pine forests of Bhutan* (Doctoral dissertation, Master thesis, University of Natural Resources and Life Sciences (Boku), Vienna, Austria)

[52] Tenzin, K. (2001). The Management of Blue Pine (*Pinus wallachiana)* in Secondary Forest in Bhutan (Doctoral dissertation, University of Edinburgh).

[53] Vilà-Vilardell, L. et al. 2020. Climate change effects on wildfire hazards in the wildland-urban-interface– Blue pine forests of Bhutan. Forest Ecology and Management, 461, 117927.

[54] UNDP (2021). Assessment of climate risks on forests and biodiversity for National Adaptation Plan (NAP) formulation process in Bhutan. UNDP, Thimphu, Bhutan.

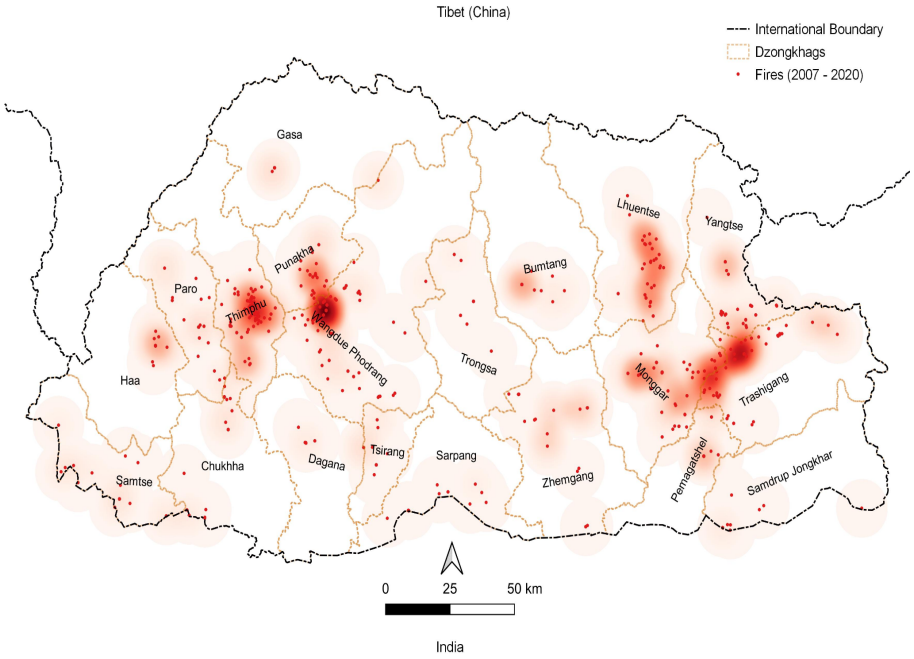


*Figure 8. Fire occurrence locations (2007 -2020) and current fire risk zones. Darker shades correspond to higher fire occurrences and more area burnt.*[55]

Current fires are mostly concentrated in the chir pine and blue pine zones forests, with occasional fires within sub-tropical broadleaved forests. Model projections under future climatic scenarios also indicate that chir pine, blue pine and mixed conifer forests will be the most impacted. Concurrently, Kawang and Mewang *gewogs* (Sub-district)[56] under Thimphu *dzongkhag (Block),*[57] are at most risk from fire hazards within the blue pine forests zone.[58]

[55] *Ibid*

[56] Referred to Sub-district/block in Bhutan

[57] Bhutanese term for District.

[58] UNDP (2021). Assessment of climate risks on forests and biodiversity for National Adaptation Plan (NAP) formulation process in Bhutan. UNDP, Thimphu, Bhutan.

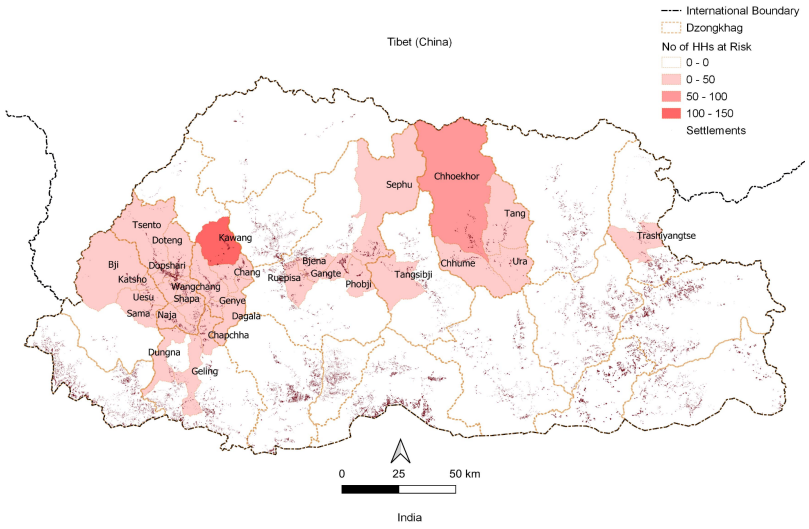


*Figure 9. Households most at Risk in Blue Pine Forests RCP 4.5 now until 2050.*[59]

## Impact of Climate Change on Agriculture

### *Climate change impacts on agriculture in Bhutan*

Agriculture in Bhutan is highly vulnerable to climatic conditions due to its dependence on monsoon rains and short growing periods. Climate change is likely to influence food production due to alterations to carbon dioxide concentration, precipitation and temperatures.[60] This is accentuated by the structure of agricultural production and concentration of agricultural activity in vulnerable areas. Around 30% of agricultural production takes place on slopes that are vulnerable to landslides and soil erosion. Only 2.93% of the total area of Bhutan constitutes arable agricultural areas, which renders the agriculture sector more vulnerable to the impacts of climate change.[61]

With climate change, agro-biodiversity loss (about 30% of traditional crop varieties are lost already in Bhutan)[62] as well as incidences of pests and diseases are expected to increase along with a worsening of water-related issues.[63] Soil erosion, aridification and change in soil organic matter will further impact the agriculture production. Diminishing snow cover will add to the growing water woes across Bhutan.[64] Additionally, crop and livestock loss to wildlife continues to take a significant toll on farmers' economic productivity and psychosocial well-being.[65]

---

[59] UNDP (2021). Assessment of climate risks on forests and biodiversity for National Adaptation Plan (NAP) formulation process in Bhutan. UNDP, Thimphu, Bhutan.

[60] Behera, B., Haldar, A. & Sethi, N. Agriculture, food security, and climate change in South Asia: a new perspective on sustainable development. *Environ Dev Sustain* (2023). https://doi.org/10.1007/s10668-023-03552-y

[61] NSSC, PPD. Bhutan land cover assessment 2010—technical report. Thimphu: NSSC and PPD, Ministry of Agriculture and Forests; 2011.

[62] Katwal, T.B.; Dorji, S.; Dorji, R.; Tshering, L.; Ghimiray, M.; Chhetri, G.B.; Dorji, T.Y.; Tamang, A.M. Community Perspectives on the On-Farm Diversity of Six Major Cereals and Climate Change in Bhutan. *Agriculture* **2015**, *5*, 2-16. https://doi.org/10.3390/agriculture5010002

[63] Sivakumar, M. V., & Stefanski, R. (2011). Climate change in South Asia. In *Climate change and food security in South Asia* (pp. 13-30). Springer, Dordrecht

[64] Gurung, D. R., Kulkarni, A. V., Giriraj, A., San Aung, K., & Shrestha, B. (2011). Monitoring of seasonal snow cover in Bhutan using remote sensing technique. *Current Science*, 1364-1370.

[65] Barua, M., Bhagwat, S. A., & Jadhav, S. (2013). The hidden dimensions of human–wildlife conflict: health impacts, opportunity, and transaction costs. *Biological Conservation*, *157*, 309-316.

Climate projections suggest that the annual growing season length could increase by an estimated 25.9 days by the end of the century, primarily in northern regions.[66] It is also projected that the change in daily maximum temperature could increase between 1.3 C and 3.1 C by the 2050s. Increasing temperatures and an expanding number of hot days are likely to impact livestock and milk production.

The number of summer days with temperatures above 25 C are expected to increase in the southern regions as are the expected days with precipitation above 20 mm; the maximum monthly rainfall with a ten-year return period is also expected to increase.[67] Sustained temperature increases are likely to shift in the optimal growing ranges of current crops towards the north, and at higher elevations. Increased temperatures for some areas may result in expanded growing seasons and a net gain in agriculturally productive land. However, the increase in other stressors may offset these gains. Specifically, the risk that an increase in the frequency of very hot days (>35 C) and potential water resource limitations may reduce yields.[68]

To illustrate, the potato has emerged as Bhutan's primary crop, cultivated by around 34,000 rural households, mainly in the temperate agro-ecological zone, contributing significantly to their livelihoods. The sale of potatoes generated BTN 709.81 million in revenue in 2019, aiding farmers in purchasing staple foods and household necessities. However, climate change impacts are adversely affecting Bhutan's agricultural sector, including the potato crop. Studies predict unsuitability for potato cultivation in current areas by the 2050s, particularly in high-elevation zones (>3000 masl) due to rising temperatures.[69]

### *Climate change impacts on agriculture in Thimphu District*

Though there is a lack of published scholarship on the subject, residents living in Thimphu claim that evidence of rising temperatures and their impacts on agriculture are clearly visible. Some experts reported that climate change is making it possible to grow tropical species such as banana and tomatoes in Thimphu.[70]

Generally, crop production and acreage of land use in the Thimphu district saw a gradual decline in recent years. For instance, paddy, a major cereal grown in the district, has dropped both in terms of acreage and production. From 632 acres producing 1,490 t in 2016, paddy production fell to 1,323 t from 579 acres. Similarly, the area for wheat and barley production reduced from 261 acres and 25 acres to 199 acres and 15 acres respectively. The three crops together recorded a fall from 1,820 t in 2016 to 1,566 t in 2018.[71] The impacts of climate change have started to pose a serious threat to agriculture, biodiversity and livelihood of the Bhutanese people.

Bhutan has witnessed frequent extreme weather events, causing widespread damages to crops and livelihoods. Increasingly under future climate scenarios, Thimphu will also witness greater impacts as both

[66] Li, H., Xu, C.Y., Beldring, S., Tallaksen, L.M. and Jain, S.K. (2016). Water resources under climate change in Himalayan basins. Water Resources management, 30(2), pp. 843–859. URL: http://folk.uio.no/chongyux/papers_SCI/WARM_14.pdf

[67] Royal Government of Bhutan (2021). Third National Communication to the UNFCCC. URL: https://unfccc.int/sites/default/files/resource/TNC%20of%20Bhutan%202020.pdf

[68] The- World Bank Group and the Asian Development Bank. (2021). Climate Ris-k Country Profile: Bhutan. URL: https://www.adb.org/sites/default/files/publication/722636/climate-risk-country-profile-bhutan.pdf

[69] Rai P, Bajgai Y, Rabgyal J, Katwal TB, Delmond AR. Empirical Evidence of the Livelihood Vulnerability to Climate Change Impacts: A Case of Potato-Based Mountain Farming Systems in Bhutan. Sustainability. 2022; 14(4):2339. https://doi.org/10.3390/su14042339

[70] Wangmo, Choki (1st November,2021).Climate change: a local perspective.Kuenselonline.Retrieved in December 2023 from https://kuenselonline.com/climate-change-a-local-perspective/

[71] Namgay, Thinley(April 22,2020).Land remains fallow in most of the gewogs in Thimphu.Kuenselonlne.com. Retrieved in December 2023 from https://kuenselonline.com/land-remains-fallow-in-most-of-the-gewogs-in-thimphu/

wetland and dryland agriculture is expected to be affected by climate change. Under both irrigated and rainfed systems, rice farming stands out to be highly sensitive to climate change since it requires large quantities of water. Even yield of dryland crops such as maize, wheat, barley, buckwheat and millet are expected to be negatively impacted due to the combined effects of $CO_2$ fertilization, changing patterns of precipitation and heat stress.[72] In the case of apple orchards, wooly aphids, brown rot, collar rots and apple scab diseases have been reported in almost all apple-growing northern districts and impacting the yield.[73]

## Impact of Climate Change on Water

### *Climate change impacts on water in Bhutan*

Not only is water one of the most abundant natural resources in Bhutan, it is also the most critical. Water supports the two most important economic sectors – agriculture and hydropower. Water is also critically vulnerable to climate change in Bhutan, as all rivers depend principally on glacier melt, snow, and seasonal rainfall. Springs and small streams are the main water sources for rural parts of the country.

Many rural communities face water scarcity during the dry season when the natural springs they rely on dry up considerably, if not completely. Climate change could alter these water sources. In fact, a study by the Watershed Management Division reported that of the 6,555 water sources in the country, 2,317 (35%) are drying up while 147 have dried up already.[74]

Projections for future river flows due to climate change impact on glacial and river systems show mixed results, but generally models suggest there could be an overall increase in precipitation at the national level. Projected increases in the number of days with very heavy precipitation could further increase the risk of flooding and impact runoff, erosion, and rates of river discharge. The CCKP model ensemble projects a 10%–15% increase in the volume of water falling during a 5-day extreme rainfall episode by the 2050s under RCP 8.5 [75].

### *Climate change impacts on water in Thimphu District*

Thimphu District is characterized by its rich biodiversity and delicate ecosystems. However, deforestation, land degradation, and climate change have led to more frequent and intense forest fires, posing risks to water catchment areas and disrupting the delicate ecological balance. Climate change-induced shifts in precipitation patterns may further exacerbate water scarcity in the district, impacting households, agriculture and ecosystems.

According to a 2021 report from the Watershed Management Division, Department of Forests and Park Services, approximately 37% of the 145 water sources in Thimphu Dzongkhag are experiencing drying conditions. The majority of these affected water sources are located in Kawang and Mewang *gewogs*.[76] Out of the total, 54 water sources are currently in a drying state, while the remaining ones have not experienced

---

[72] Chhogyel, N., Kumar, L. Climate change and potential impacts on agriculture in Bhutan: a discussion of pertinent issues. *Agric & Food Secur* 7, 79 (2018). https://doi.org/10.1186/s40066-018-0229-6

[73] Dorji P. Deciduous fruit production in Bhutan. Deciduous fruit production in Asia and the Pacifc; 1999. p 18

[74] WMD (2021). Assessment and Mapping of Water Sources in Bhutan (A comprehensive inventory and status of water sources used by Bhutanese communities). Watershed Management Division, Department of Forests and Park Services.

[75] WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data: Projections. URL: https://climateknowledgeportal.worldbank.org/country/bhutan/climate-data-projection

[76] WMD (2021). Assessment and Mapping of Water Sources in Bhutan (A comprehensive inventory and status of water sources used by Bhutanese communities). Watershed Management Division, Department of Forests and Park Services.

any changes in their discharge levels and are in a normal state. Notably, all water sources in Mewang and Genekha *gewogs* are currently in a drying condition.

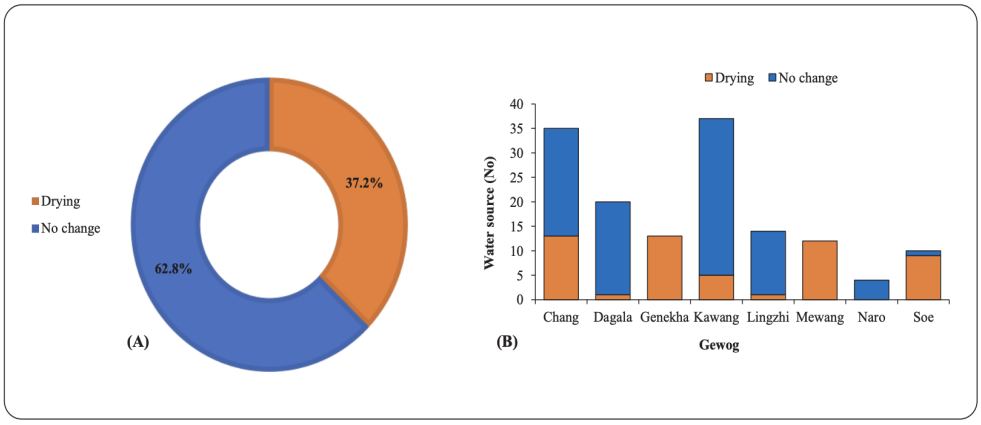


*Figure 10. Status of Water Source in Thimphu Dzongkhag (A : Dzongkhag Level; B: Gewogs)*[77]

In addition, the assessment report of 2020 on selected watersheds of Thimphu Dzongkhag reported that watersheds of Pulluna, Chudingkha, Siluna, Jamephu, Tsaphu, Wooluna, Sisilum, Churalum, Khariphu, Geney Rongchu, Dorji Nye, Hongola fall under the 'Degraded Category.'[78]

| WS ID No. | Name of sub-watershed | Uses | Beneficiaries | Gewog | Overall risk score |
|---|---|---|---|---|---|
| 73 | Pulluna | Drinking and dryland irrigation | Pulluna, Monastries, RNR Center, Chicken Farm | Mewang | Degraded |
| 73 | Chudingkha | | Jimina industrial estate | | |
| 73 | Siluna | | Siluna, Lingzhephaka, Jimina school | | |
| 74 | Jamephu | Drinking and irrigation | Ramtokto, Nyzerkha, Danglu, Simu, Dramsa,Chhudingkha, Namseling | | |
| 74 | Tsaphu | | Khasadrapchu town and school, RNR Center, Singye | | |
| 74 | Wooluna | | Wooluna, Danglo | | |
| 85 | Sisilum | | Sisina, Dalukha, Khasakha, Community school, Rehab center | | |
| 85 | Churalum | | Patsikha, Kinzang Dechenling, Drupdey, Sisi nun center, Old-age home | | |
| 85 | Khariphu | | Khariphu and adjoining industries | | |
| 89 | Geney rongchhu | | Wang Barma Central School, Cheju Goempa, Goesarbu Lhakhang, Laktsham, Chuzon Gate, BPC colony | Geney and Dagala | |
| 89 | Dorji Nye | Drinking and dryland irrigation | Genekha Gewog Center, Genekha School | Geney | |
| 89 | Hogola | Dryland irrigation | Tshocheykha, Zamto and adjoining villages in mewing gewog | Geney and Dagala | |

*Table 2. Degraded Watersheds in Thimphu District.*[79]

[77] *Ibid*
[78] *Ibid*
[79] *Ibid*

## Impact of Climate Change on Poverty

The projected climate change impacts shall affect the poorest groups disproportionately since poverty is most prevalent in rural districts, where the population rely on agriculture for livelihood. The adaptive capacities of the rural poor are minimal, especially in terms of investing in climate-resilient agricultural technology and methods. Poorer farmers may not afford local water storage, irrigation infrastructure, and technologies for adaptation.

While the Bhutanese government has been successful in reducing poverty over the last two decades, the agriculture sector's vulnerability to climate change vastly increases the risk of the rural populations of Bhutan falling back into poverty.

A study in the Punakha District found 91% of the households surveyed were affected by monsoon pattern changes, impacting water availability for irrigated rice farming.[80] Recently, in October 2021, incessant rainfall affected paddy harvests in several districts across the country, damaging an estimated 1,945 t of rice production in Paro District alone.[81,82]

### *Climate change impacts on Poverty in Thimphu District*

According to the latest report by the National Statistical Bureau, the poverty rate for Bhutan is 12.4%. Poverty however is not evenly distributed across areas; while the rural poverty rate is 17.5%, it drops to 4.2% in urban areas.[83] Although, poverty rate in Thimphu (1.2%) is one of the lowest among the districts, climate change is expected to further exacerbate the food security in general for the vulnerable farming communities.[84]

## Climate Change and Gender

Although women in Bhutan enjoy significant rights, the status of gender equality presents a complex scenario. Substantial efforts have been taken to enhance the well-being of women and girls, shown by achievements such as gender parity in education up to the secondary level, a decline in maternal mortality, and an increase of women's involvement in societal and professional areas.

Simultaneously, Bhutan has committed to numerous international gender conventions and agreements, and equal rights are explicitly outlined in the country's Constitution and other legal frameworks. However,

---

[80] Warner, K. and Van der Geest, K. (2013). Loss and damage from climate change: local-level evidence from nine vulnerable countries. International Journal of Glbal Warming, 5(4), pp. 367–386. URL: https://www.researchgate.net/publication/258120139_Loss_and_damage_from_climate_change_Local-level_evidence_from_nine_vulnerable_countries

[81] Phuba Lhamo et al. (2021). Incessant rain damages paddy crops across the country. Kuensel. URL: https://kuenselonline.com/incessant-rain-damages-paddy-crops-across-the-country/

[82] Phub Dem. (2021). Rains damage about 1,945MT of rice in Paro. Kuensel. URL: https://kuenselonline.com/rains-damage-about-1945mt-of-rice-in-paro/

[83] National Statistics Bureau of Bhutan (2022). Bhutan Poverty Analysis Report. National Statistics Bureau of Bhutan. Royal Government of Bhutan.

[84] Chhogyel, N., Kumar, L. Climate change and potential impacts on agriculture in Bhutan: a discussion of pertinent issues. *Agric & Food Secur*7,79 (2018). https://doi.org/10.1186/s40066-018-0229-6

persistent gender inequalities exist, notably in areas like unequal land ownership and the limited representation of women in certain sectors[85].

Gender differences are visible in Climate change vulnerability, participation in CC decision-making action, and diverse levels of benefit-sharing. In 2017, almost 60% of employed women were active in agriculture, as compared to 34% of the employed men.[86] The feminization of agriculture because of out-migration of males bears notable significance in the impact of climate change on agriculture, and thus women. Women also experience a higher unemployment rate, gender payment gaps, and gender-based violence.[87] In rural households, gender-specific tasks include livelihood tasks such as collection of drinking water by females and irrigation water by males; household tasks which are mainly carried out by females; non-farm work/off-farm employment especially of males; and decision-making and attending meetings mainly by males.

While climate change issues have been integrated in the 'National Gender Equality Policy' and the 'National Plan of Action for Gender Equality' (2019-2023), application of the various tools to mainstream gender into climate change actions are limited due to limited resources and capacity gaps.[88]

Adaptation measures related to farming practices, forest management, and protected areas require women's active and informed participation, to be effective. However, women's active participation and gender balance in climate policy development and decision-making overall is significantly lower than that of men. A study on gender and climate change showed that there is an urgent need to empower female farmers and enhance their communication skills to improve women's decision-making abilities in (local) governance and farming decisions, including those related to climate smart agriculture and climate resilient agriculture.[89]

### Project Sites:

The proposed project, **"Securing Water & Enhancing Climate Resilience in Thimphu District, Bhutan,"** aims to address several interrelated challenges faced by communities in Thimphu District, Bhutan. The Thimphu Dzongkhag's economic, social, and environmental context poses significant risks to water security and overall climate resilience, impacting the livelihoods and well-being of communities in Thimphu Dzongkhag.

In the context as put forth above, the proposed project aims to restore catchments, reduce the risks of forest fires, and enhance drinking water and irrigation systems in Thimphu district. By implementing sustainable water management practices and promoting community engagement, the project seeks to secure water resources, improve climate resilience, and enhance the socio-economic well-being of vulnerable communities in Thimphu.

The project will focus on (Kawang, Mewang, Chang and Dagala gewogs benefiting a total of 576

[85] National Commission for Women and Children (2020). Gender and Climate Change. URL: https://www.ncwc.gov.bt/publications/Gender_and_Climate_Change_Bhutan1583629500.pdf
[86] National Statistical Bureau (2017). Population and Housing Census Bhutan (PHCB) (2017). National Statistics Bureau. Royal Government of Bhutan.
[87] National Commission for Women and Children (2020). Gender and Climate Change. URL: https://www.ncwc.gov.bt/publications/Gender_and_Climate_Change_Bhutan1583629500.pdf
[88] *Ibid*
[89] *Ibid*

households from the four *gewogs* and at least 52% women population. The following figure illustrates the location of the project sites.

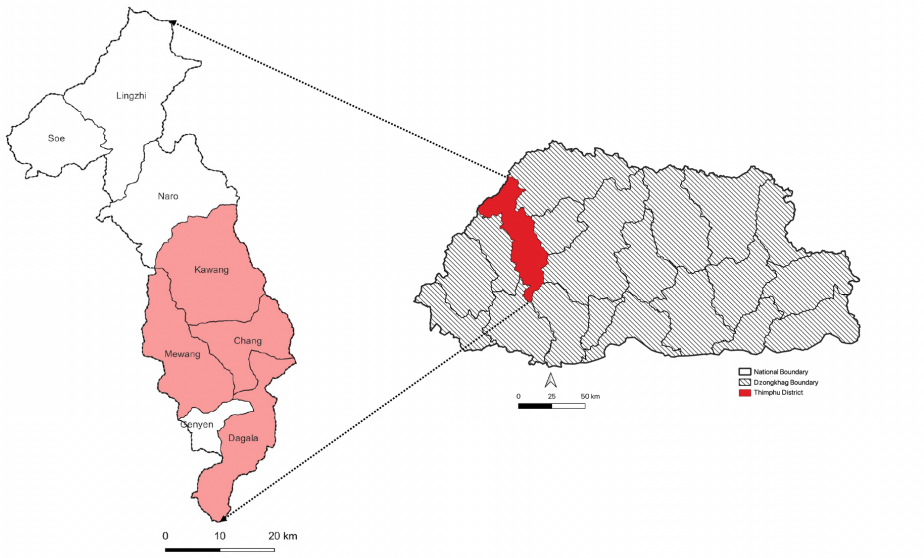


*Figure 11. Location of project sites (Kawang, Mewang, Chang and Dagala gewogs) within Thimphu District (Map by Norbu Wangdi, BES, Data Source: National Land Commission Secretariat, 2023).*

Through collaboration with local stakeholders and the adoption of holistic approaches, the project aspires to align with Bhutan's GNH principles, ensuring a balanced and sustainable development trajectory for the region.

The following outcomes are expected through the proposed activities:
1. Increased ecosystem resilience in vulnerable communities
2. Increased agricultural productivity and income for the farmers especially women.
3. Improved health and well-being of communities and their families through access to clean reliable drinking water.
4. Enhanced community resilience to climate change impacts

## Project / Programme Objectives:

The overall objective of the project is to enhance the adaptive capacities of communities to impacts of climate change by building resilience and implementation of ecosystem-based adaptation measures in Thimphu district.

**The Specific objectives are to**:

**1. Increase ecosystem resilience in response to climate change and variability-induced stress:** Implement ecosystem-based adaptation interventions to ensure natural capacity for water infiltration, recharge and water buffering through restoration, rehabilitation, and protection of degraded catchment areas/ watersheds, thereby improving water retention, groundwater recharge, and overall water availability.

**2. Enhance Sustainable Water Resource Management:** Improve access to clean and safe drinking water and resilient irrigation systems through the development of community-based water supplies, strengthen

Water User Associations (WUAs) with 30% women participation and promote sustainable water resource management.

**3. Strengthen the adaptive capacities of local communities and organizations:** Enhance the capacities of local communities and organizations in the planning, governance and implementation of water adaptive mechanisms to reduce vulnerability against climate change with special consideration to women (at least 30% women participation in all capacity building activities).

### Project / Programme Components and Financing:

| Project/Programme Components | Expected Concrete Outputs | Expected Outcomes | Amount (US$) |
|---|---|---|---|
| 1. Ecosystem-based adaptation (EbA) to ensure natural capacity for water infiltration, recharge and water buffering. | **Output 1.1** Water Resource Management & Governance strengthened<br>**Output 1.2** EbA solutions & SLM to enhance watershed functions; minimize impact of floods and extreme rainfall implemented<br>**Output 1.3.** Mitigation of forest fire hazards by promoting integrated forest fire management. | **Outcome 1**: Increased ecosystem resilience in response to climate change and climate variability-induced stress. | **1,000,000** |
| 2. Community-based climate resilient drinking water and irrigation infrastructure established | **Output 2.1** Community-based climate resilient drinking water infrastructure established<br>**Output 2.2** Community-based climate resilient irrigation infrastructure established & improved | **Outcome 2**. Ensured access to irrigation and safe and reliable drinking water. | **2,858,442** |
| 3. Capacity of local communities and organizations on knowledge and skills related to sustainable water resource management, local climate adaptation planning and implementation enhanced. | **Output 3.1** User groups in the community strengthened for effective management of irrigation and drinking water<br>**Output 3.2** Capacity of local communities, local leaders and organizations enhanced on local adaptation planning and implementation.<br>**Output 3.3** Dissemination of Project Results and Lessons Learned | **Outcome 3**. Increased resilience of local communities to climate change through enhanced capacity in adaptation planning and implementation | **200,000** |
| 4. Project/Programme Execution cost (12%) | | | **487,013** |
| 5. Total Project/Programme Cost | | | **4,545,455** |

| | |
|---|---|
| 6. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable) (10%) | **454,545** |
| **Amount of Financing Requested** | **5,000,000** |

### Projected Calendar:

| Milestones | Expected Dates |
|---|---|
| CN submission | June 2024 |
| PPG + Full Blown Proposal (14 months) | September 2025 |
| Start of Project | January 2026 |
| Mid-term Review (if planned) | July 2027 |
| Project/Programme Closing | January 2029 |
| Terminal Evaluation | March 2029 |

## PART II: PROJECT / PROGRAMME JUSTIFICATION

**A.** Description of project / programme components.

The project for securing water and enhancing climate resilience in Thimphu District is expected to cultivate more vibrant ecosystems and enhance the quality of associated services. At the heart of this initiative lies a systematic approach to addressing issues tied to water availability and utilization throughout the entire watershed. Moreover, the project takes a holistic view of sustainability, considering technical, financial, and institutional considerations, thereby enhancing its potential for enduring success. Significantly, the active participation of beneficiaries serves as a linchpin, ensuring the project's effectiveness and fostering resonance within the local community. Furthermore, integrated forest fire management adds another layer of proactive environmental stewardship to the project's multifaceted goals, safeguarding against potential threats and further promoting ecological balance.

**Component 1: Ecosystem-based adaptation (EbA) to ensure natural capacity for water infiltration, recharge and water buffering implemented.**

This component focuses on implementing the best practices of ecosystem-based adaptation (EbA) measures to enhance natural capacity for water recharge and improving watershed conditions. The spring water revival, habitat enrichment, plantations, trenching are some of the best practices implemented in Bhutan for overall improvement of watershed conditions. The eco-restoration of degraded watersheds and catchments will enhance habitat quality and biodiversity by safeguarding watersheds and expected to reduce instances of water sources drying up during extreme climate events like droughts.

EbA solutions, such as vegetative buffers or plantations and riparian zones, are expected to contribute to improving water quality by preventing soil erosion and filtering pollutants. This further helps in maintaining the ecological integrity of water bodies within the watersheds. Rainwater harvesting is another successful EbA solution to enhance overall water security in water scarce areas. The feasibility of rainwater harvesting will also be explored in targeted water-stressed communities within Thimphu district and implemented to ensure water needs for washing, flushing and kitchen gardening, to enhance overall water security for communities. The exact prioritized EbA measures will be reviewed for degraded sites during the pre-feasibility in the project development phase.

Habitat enrichment within managed watersheds will enhance biological diversity and an increase in provisioning ecosystem services, such as a higher availability of NWFPs like mushrooms, and fiddlehead ferns, which are commonly harvested to supplement household income.

Under this component, the proposed project intends to achieve the following outputs:

**Output 1.1 Water Resource Management & Governance strengthened**
This output focuses on strengthening water resources management practices and governance.

The objective is to enhance the efficiency, equity, and resilience of water resource management systems. Under this one of the key activities will be to enhance collaboration among stakeholders and promote transparent decision-making processes, through development of localized integrated water resource plans. Through this, we hope that all stakeholders, including marginalized communities, will have fair access to water resources, foster social justice and equality. Improved governance will also ensure that water resources are used efficiently, reducing wastage, and promoting sustainable practices.

Another important activity is to enhance informed decision making for climate change adaptation. Currently, only one meteorological station is established at Simtokha, which doesn't meet the data requirement for determining future climatic changes in water resource regimes in Thimphu. Gathering accurate and timely information on local weather patterns, temperature variations, and precipitation data in these degraded watersheds which are crucial for informed decision-making, early warning systems, and adapting to climate change.

**Specific activities of this output are:**
*1.1.1: Develop localized integrated water resource master plan.*
*1.1.2: Carry out hydrological mapping and appropriate revival measures.*
*1.1.3: Develop a guide to establish a centralized harmonized water data repository system.*
*1.1.4: Develop a guideline for climate proofing and resilient structure for adaptation and sustainability.*
*1.1.5: Establish microclimate and meteorological stations for enhancing decision making.*

**Output 1.2 EbA solutions & SLM to enhance watershed functions; minimize impact of floods and extreme rainfall implemented**
This output focuses on the implementation of EbA solutions and sustainable land management (SLM) interventions to enhance watershed functions. EbA interventions are proven to enhance biodiversity and contribute to the overall health of ecosystems besides reducing vulnerability to climate related disasters, enhancing community and ecosystem resilience.

The overall goal is to minimize the impact of floods and extreme rainfall events, mitigating the risks associated with water-related disasters and promoting ecological resilience. As such, effective EbA interventions will be implemented through local community participation, such as reforestation, green infrastructure, and soil conservation measures. Sustainable land management practices can effectively reduce the risk of flooding and improve soil and water conservation. Under this output, the identified degraded watersheds within Thimphu district will be restored through implementation of feasible EbA interventions and adoption of sustainable land management practices. The exact prioritized EbA measures will be reviewed for degraded sites during the pre-feasibility in the project development phase.

**Specific activities of this output are:**
*1.2.1: Identification of degraded watersheds*
*1.2.2: Implementation of the EbA solutions through community participation and engagement*
*1.2.3: Community capacity building for implementation of EbA solutions*

**Output 1.3 Mitigation of forest fire hazards by promoting integrated forest fire management.**
In recent years, Thimphu district has experienced a surge in the occurrence of forest fires, which have caused substantial depletion of forest resources, compromised water sources, and posed danger to human lives and property. To manage the adverse impacts from the increasing hazards, a range of fire management interventions will be implemented under this project.

**Specific activities of this output are:**
*1.3.1: Establishment of Gewog level forest fire coordinating group (GFCGG) in Thimphu district to foster community participation in forest fire management.*
*1.3.2: Procure and distribute the forest firefighting equipment (water backpacks, fire pumps, and hoses) for effective suppression during fire incidences to Interagency Forest Fire Coordinating Groups (IFFCG) and Gewog level Forest Fire Coordinating Group (GFFCG).*
*1.3.3: Develop a comprehensive forest fuel type classification using remote sensing and field data validation to guide mitigation measures and future interventions in Thimphu district.*
*1.3.4: Post Fire assessment framework and valuation tool developed.*

**Component 2: Community-based climate resilient drinking water and irrigation infrastructure established**

Component 2 focuses on enhancing the access to clean, safe and reliable drinking water for households and supply of adequate irrigation water for farmers in four gewogs of Thimphu.

Thimphu has the highest population amongst districts and faces increasing pressure on natural resources, particularly water. Recent studies reported drying water sources in Kawang, Dagala, Chang and Mewang county exacerbating the challenges of inadequate drinking water and intensifying the impacts of urbanization and population growth to public health, agriculture, and overall community well-being.

The project will enhance the climate resilience of irrigation infrastructure, reducing the costs associated with climate change-induced extreme events and easing the burden on public resources from continuous recovery expenses. Improved irrigation schemes are expected to boost agricultural productivity and income of households. Climate-resilient irrigation systems are expected to provide a more flexible and reliable water supply, promoting diversification into higher-value crops. The introduction of technologies like hydro-pressure pipes will reduce water losses from uncontrolled spillages and evapotranspiration.

Continuous water supply will also reduce the economic burden on users seeking alternatives during erratic water availability, ultimately reducing vulnerability to risks of drying water sources. Increased incomes due to engagement in other economic activities related to ecosystem-based adaptation measures, and higher agricultural productivity, will alleviate poverty in vulnerable rural communities.

**Output 2.1 Enhanced access to clean and safe drinking water**
This output focuses on strengthening the efforts to ensure access to reliable supply of clean and safe drinking water in identified communities in Thimphu.

**Specific activities of this output are:**
*2.1.1: Pumula to Woluna Integrated Irrigation & Drinking Water Supply under Maedwang Gewog*
This activity aims to integrate irrigation and drinking water supply systems in the Waluna under Maedwang Gewog. Households in Waluna are grappling with issues related to water availability for drinking and irrigation. The existing water supply system is quite old, not able to meet the increasing demands due to peri-urban expansion, in Waluna, which further pressurizes the water resource crunch in the area. Therefore, this activity will help to optimize water resources, and provide a sustainable and efficient solution to meet the dual needs of agriculture and potable water for communities in Waluna. The activity will benefit a total of 30 households and a total population of 50 individuals (includes 30 females) and a total of 46 acres of agricultural land (~11 acres of dryland; 27 acres wetland).

*2.1.2: Construction of Changtagang Water Supply under Kawang Gewog*
The construction of the Changtagang Water Supply is aimed towards addressing the drinking water needs of the Changtanag community. This activity will ensure a consistent and secure source of clean water for daily consumption and other domestic purposes to meet the rising demand due to peri-urban expansion. This will benefit a total of 83 households of Changtagang with 330 individuals (including 180 females).

*2.1.3: Construction of Helela Water supply at Chamgang under Dagala Gewog*
This activity is targeted to enhance the access to safe, clean and reliable drinking water supply to the communities of Chamgang. Due to increasing number of households because of peri-urban expansion the demand for drinking water has increased recently. People also reported acute water shortages in these areas. This activity will benefit 122 households, and 892 individuals, including 436 females.

*2.1.4: Construction of Rama Water Supply under Chang Gewog*
This activity is targeted to ensure improved access to safe drinking water for households in Rama. Due to increasing number of households due to peri-urban expansion, increasing commercial establishments in Rama, and shrinking water source, there is acute shortage of drinking water supply in Rama. This will benefit 87 households and a total of 238 individuals, including 113 females.

**Output 2.2: Enhanced access to adequate irrigation water**
Promotion of sustainable agriculture and food security is at the core of Output 2.2. This output focuses on enhancing access to adequate and reliable irrigation water for enhancing agriculture in vulnerable communities of Thimphu district.

**Specific activities of this output are:**
*2.2.1: Construction of Khasakha Irrigation, Maedwang Gewog*
The construction of Khasakha Irrigation infrastructure will enhance agricultural productivity by providing a reliable water supply for irrigation for farming households of Khasakha, under Maedwang Gewog. The

Khasakha Irrigation scheme will benefit 60 households, with 300 individuals (170 females), and a total of 206 acres of agricultural land (~128 acres dryland and ~64 acres wetland).

*2.2.2: Construction of Sigay Irrigation, Maedwang Gewog*
Similarly, the construction of the Sigay Irrigation scheme will also enhance agricultural productivity by providing a reliable water supply for irrigation for 25 households of Sigay, with 100 individuals (60 females); a total of 27.8 acres of agricultural land (~8 acres dryland, 18.5 acres wetland).

*2.2.3 Construction of Sisilung to Dalukha Irrigation, Maedwang Gewog*
The construction of Sisilung to Dalukha Irrigation scheme, will also enhance irrigation water for 14 households of Dalukha with 170 individuals (102 females); a total of ~124 acres of agricultural land (~80 acres dryland;~31 acres wetland).

2.2.4 Rehabilitation of Hongtsho Toed - Maed Irrigation scheme, Chang Gewog
The Hongtsho Toed and Maed irrigation Schemes were established quite some time ago and are now due for maintenance to ensure its continued contribution to agriculture sustainability.
The rehabilitation of the Hongtsho Toed-Maed Irrigation scheme will benefit a total of 125 households with 418 individuals (212 females); a total of 25 acres of dryland agricultural land.

**Component 3: Capacity of local communities and organizations on knowledge and skills related to sustainable water resource management, local climate adaptation planning and implementation enhanced.**

Capacity building of the local communities and relevant stakeholders empower them to actively participate in the effective water resource management, also, it fosters a sense of ownership and responsibility leading to adoption of the best practices. Bhutan is vulnerable to various climate change impacts; capacity building helps communities to adapt to the changes by providing them with the right skill and tools to cope with water related issues. The capacity building also helps the water users collect and maintain right information on water usage, progress and impacts of adaptation interventions, and making informed decisions for future planning.

This can be achieved through the following outputs and activities:

**Output 3.1 Community based Water User Associations (WUAs) strengthened for effective management of irrigation and drinking water.**

This output focuses on formalizing and strengthening capacities of Water User Associations (WUAs) in targeted communities to enhance sustainable effective management of irrigation and drinking water resources. By fostering collaboration and shared responsibility, the project aims to create resilient and self-sufficient user groups capable of ensuring the sustainable use of water resources. Specific trainings-workshops, and community engagement initiatives, will be organized to empower these user groups with the knowledge and skills necessary for efficient water management.

**Specific activities of this output are:**
*3.1.1: Community engagement and WUA establishment*
*3.1.2: Capacity building and training for the WUAs*

**Output 3.2 Capacity of local communities, local leaders and organizations enhanced on local adaptation planning and implementation.**

This output is focused on building the capacity of local communities, leaders, and organizations for local adaptation planning and implementation. Through the project targeted communities will be equipped with the tools and expertise needed to adapt to changing climatic conditions. Training programs, knowledge-sharing platforms, and hands-on workshops on adaptation planning and implementation will be organized for local leaders and key stakeholders. Capacity of Local leaders and key stakeholders will be enhanced to identify, plan, and implement effective strategies for climate adaptation at the community level.

**Specific activities of this output are:**
*3.2.1: Capacity building for local adaptation planning and implementation of local communities, leaders, and organizations*
*3.2.2: Conduct workshops for community-based water user groups to strengthen the organizational and leadership skills.*
*3.3.3: Capacity building training workshop for communities on integrated water resource management and best practices*

**Output 3.3 Project Results and Lessons Learned disseminated effectively.**
As part of the knowledge-sharing and capacity-building strategy, this output focuses on the effective dissemination of project results and lessons learned. Valuable insights, successful strategies, and best practices from the project implementation will be disseminated through various communication channels such as workshops, seminars, reports, and community events. The effective dissemination and sharing of the achievements of the project is aimed to facilitate cross-community learning and inspire replication of successful approaches in other districts. Output 3.3 not only ensures that the project's impact extends beyond the immediate community but also contributes to a broader understanding of effective water management and local adaptation strategies.

**Specific activities of this output are:**
3.3.1: *Knowledge products developed, disseminated and utilized via knowledge sharing platform*
*3.3.2: Organize community forums and workshops to share experiences and lessons learned*
*3.3.3: Regular Monitoring and Evaluation of project results*

**Project Governance and Implementation Modality**

The project places a strong emphasis on building the capacity of local institutions, such as local governments at the Gewog (block) level and community representatives of the Water User Associations in the target project sites within Thimphu. The project design is based on participatory approaches, with adaptation activities prioritized from the community level and included in District Level Plans. Community Leaders and existing groups, particularly Water User Association members, will receive training in adaptation planning and implementation. Specific training in financial management and monitoring and evaluation is also proposed, enabling communities to make better decisions regarding adaptation planning and implementation.

The project will establish local adaptation committees and implement community-based monitoring systems to engage local stakeholders in progress tracking and reporting for adaptation actions. It will also strengthen community feedback mechanisms for assessing the effectiveness of adaptation measures and

making necessary adjustments. The project aims to strengthen participatory governance to empower local-level decision-making and recognizes the importance of integrating local indigenous knowledge into adaptation strategies, ensuring that traditional practices and insights are valued and utilized in the design and implementation of adaptation actions.

Further, the project aims to build the capacities of local institutions, including the Bhutan Ecological Society, an active civil society organization, to access and implement adaptation activities in close collaboration with local communities. The PMU will be housed under the Bhutan Ecological Society and lead the implementation of the project in collaboration with the Local Government of the target gewogs, with technical support from the concerned central agencies, NDA and DA.

The Project Implementation arrangement is as illustrated in Figure 12:

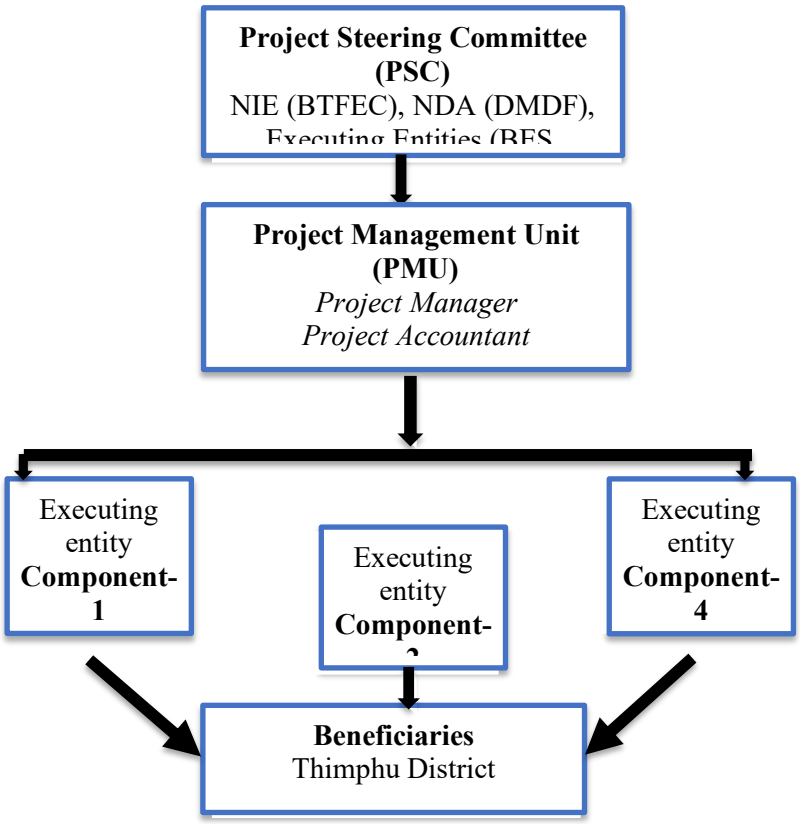


Figure 12: Project Governance & Implementation Modality

**B. Economic, social and environmental benefits**

The anticipated effects of climate change will place additional pressure on ecosystem-based livelihoods and further challenge vulnerable groups. Thus, the project's primary focus will be on local-level adaptation, aiming to enhance benefits for exposed or sensitive communities and fostering positive changes at various levels.

## Environmental Benefits

- The project is developed on the basic understanding that resilient and healthy ecosystems are fundamental to sustaining natural and human systems.
- The eco-restoration of degraded watersheds and catchments will enhance habitat quality and biodiversity by safeguarding watersheds. This will help reduce instances of water sources drying up during extreme climate events like droughts.
- The strengthening of community-based water management groups/WUAs will foster collaboration between upstream and downstream communities, leading to stronger ownership and stewardship of the natural environment.
- Formalizing Water User Associations (WUAs) will improve efficient utilization and management of water resources, enabling systematic monitoring and better decision-making for effective recharge of catchment areas.
- Improved irrigation systems will minimize negative environmental impacts, such as landslides resulting from poorly maintained open irrigation canals.
- The introduction of technologies like hydro-pressure pipes will reduce water losses from uncontrolled spillages and evapotranspiration.
- Sustainable Land Management (SLM) / Ecosystem based solutions will combat topsoil erosion and land degradation, enhancing soil fertility and biodiversity.
- Improved adaptation planning at the local government level will empower communities to build climate resilience through better management of natural resources.
- Local government involvement will strengthen institutional channels for comprehensive water management from source to end-users.

## Economic benefits

- Catchment protection will enhance the water availability in water stressed communities.
- Continuous water supply will reduce the economic burden on users seeking alternatives during erratic water availability, ultimately reducing vulnerability to risks of drying water sources.
- Increased incomes due to engagement in other economic activities related to ecosystem-based adaptation measures, and higher agricultural productivity, will alleviate poverty in vulnerable rural communities.
- More stable income will enhance the capacity of vulnerable groups to cope with the negative impacts of a warmer climate in their locality.
- Habitat enrichment within managed watersheds will enhance biological diversity and an increase in provisioning ecosystem services, such as a higher availability of NWFPs like mushrooms, and fiddlehead ferns, which are commonly harvested to supplement household income.
- The project will enhance the climate resilience of irrigation infrastructure, reducing the costs associated with climate change-induced extreme events and easing the burden on public resources from continuous recovery expenses.
- Improved irrigation schemes will boost agricultural productivity and income of households.
- Climate-resilient irrigation systems will provide a more flexible and reliable water supply, promoting diversification into higher-value crops.
- Catchment restoration reduces the downstream sediment load, which could otherwise hamper the efficiency of Bhutan's hydropower dams and constrain energy generation – a significant export for the country.
- Women empowerment in water governance and management will result in improved and gender-

sensitive decisions concerning the protection and management of community and household assets, including those of vulnerable communities.

## Social Benefits

- Women, facing heightened vulnerability to climate risks due to their engagement in household activities, will benefit from various social protection measures proposed in the climate resilience interventions in water for drinking and water and irrigation.
- Women and children especially will benefit from improved sanitation due to enhanced water availability.
- The integrated water resources management proposed for drinking and irrigation purposes is expected to increase water availability and foster dialogue among communities, ultimately reducing disputes over water in the long term. Currently, many water-related conflicts between communities in Bhutan have been resolved only through legal means, providing only partial contributions to social well-being.
- The formalization of Water User Associations (WUAs) will promote equitable sharing of water resources among community members, especially at the grassroots level, leading to inclusive decision-making in water governance and management.
- Active participation by community members in watershed management, and Sustainable Land Management (SLM) implementation is also anticipated to improve social capital within the community.
- The project will conduct assessments of existing policies and work towards creating a more inclusive and enabling policy environment, fostering coordination and collaboration among stakeholders, with increased participation from underrepresented groups.
- Inclusive participation in adaptation planning will shed light on the specific needs of marginalized groups, including women, children, and the elderly.
- As a result, the local climate resilience interventions planned at the local government (LG) level will promote the protection of economic and social rights by reducing vulnerability and supporting disaster risk reduction.
- The project aims to identify vulnerable and marginalized households in consultation with representatives from each beneficiary community during the first six months of implementation. These vulnerable groups include households in isolated settlements, communities without motorable access roads, households with only elderly members or without a labor force, households with very few members, households with no resident members, women, and households headed by divorcees. Recognizing the challenges these groups may face in actively participating in the project, such as community labor contributions, the project will ensure their inclusion by not requiring cash or labor contributions during implementation.
- Water infrastructure's operation and maintenance, developed by the project, will be managed by WUAs, with minor maintenance contributions from member households. The articles of association of the WUAs will include clauses granting community exemptions for contributions from vulnerable and marginalized groups. These articles of association will be developed with support from the Project Management Unit (PMU) and concerned dzongkhags during the project implementation and will emphasize equal access for all community members.

## Avoidance/mitigation of potential negative impacts

- The Bhutan Trust Fund for Environmental Conservation (BTFEC) is mandated to promote environmentally sound and sustainable development in all its programs. Consequently, the screening of projects to identify potential negative impacts is an integral part of its internal processes.

- Given the nature of the intervention, which primarily focuses on environmental improvement and societal benefits, and the strict adherence to national regulations and standards (as outlined in section E), the risk of impacts is low.

- To better comprehend the potential effects of the proposed activities, specific studies will be conducted for each component, with particular emphasis on assessing environmental and social risks. Any identified risks, no matter how minor, will be accompanied by appropriate mitigation proposals. This approach is crucial, especially in a delicate environment with competing demands on natural resources.

- A comprehensive gender assessment will also be carried out during the full proposal development stage and a Gender Action Plan will also be developed to ensure that gender-related risks are managed, and project decisions are inclusive of all genders. To promote gender equity, a minimum of 30% women's participation will be guaranteed in project-related consultations, meetings, and training.

- A project-level Environmental and Social Management Plan (ESMP) will also be developed at a later stage, considering the risks and impacts identified by the project stakeholders. The implementation of the ESMP will ensure that social and environmental impacts are mitigated or minimized, leading to no adverse environmental or social consequences from the project activities.

- During the initial six months of project implementation, the Gender Action Plan (GAP) and ESMP will be reviewed and revised by the Environmental Social and Gender (ESG) Expert. This revision will be based on the evolving project activity designs, particularly for the drinking water and irrigation schemes, as specific details emerge

## C. Analysis of the cost-effectiveness

- In the Bhutanese context, where natural resources hold a central position in society and the economy, Ecosystem-based Adaptation (EbA) emerges as the most sustainable and cost-effective method to enhance resilience and reduce vulnerability to climate change impacts[90]. EbA not only provides a foundation for human systems to flourish, primarily through vigorous provisioning services, but it also enhances resource management. For instance, employing a sound EbA approach, coupled with an integrated watershed management strategy, would eventually reduce water treatment costs at user ends.
- In terms of irrigation infrastructure development, the adoption of environmentally friendly and durable methods brings about a transformative impact in Bhutan,[91] particularly by enhancing agricultural productivity (given that over 60% of the population is engaged in agriculture) and improving public health. The project introduces climate-smart technologies and HDPE pipeline interventions for irrigation, which, over time, result in minimal maintenance costs and increased water usage efficiency by reducing conveyance losses. When compared to conventional concrete lining or structures for irrigation, which might seem initially cheaper, the climate-resilient approach through HDPE pipelines proves to be more cost-effective in the long run due to its extended lifespan, lower maintenance costs, and higher adaptability to climate risks, thus reducing potential environmental impacts.
- Various types of land degradation in Bhutan, particularly water-induced degradation such as gullies, landslides, and ravine formation, significantly impact agricultural productivity and livelihoods. With the

[90] Department of Environment and Climate Change (2023). National Adaptation Plan for the Kingdom of Bhutan.

[91] World Bank (2019). Climate Smart Agriculture-Country Profile Bhutan.https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Bhutan.pdf

project's support on Ecosystem-based solutions, such as eco-restoration plantations, spring revivals, contour trenching, check dams, etc. surface runoff and soil erosion will be mitigated, leading to improved soil fertility and moisture retention. To address challenges faced by farmers in implementing SLM/Ecosystem-based interventions, alternative approaches such as informal labor-sharing groups and community mobilization have proven successful and are being replicated in other areas.

- Climate-related extremes like heat waves, droughts, floods, and wildfires have exposed ecosystems and human systems to current climate variability, making them vulnerable. The project aims to enhance resilience by strengthening community-based forest fire management groups to minimize the impacts of climate-induced disasters, particularly forest fires.
- Furthermore, the expected results align with existing national plans, such as the target to ensure 24/7 safe and reliable drinking water supply for every household. However, current means are insufficient to meet all the country's needs, and the proposed project seeks to address this gap.

**D. Linkages to national, sub-national and local sustainable development strategies**

The following table highlights the relevant national, subnational strategies, policies, plans and instruments aligned with this project proposal.

| Name of strategy / policy / plan (Year) | Alignment with the proposed project |
|---|---|
| National Adaptation Plan (NAP) of the Kingdom of Bhutan 2023 | Amongst other, NAP recognizes the vulnerabilities in water, agriculture and forest and biodiversity sector to the impacts of climate change. It highlights the need to promote climate smart and resilient agriculture and livestock development, sustainable forest management and conservation of biodiversity and securing and managing natural sources of water to ensure optimal use and management of water for drinking and irrigation. |
| 13th Five Year Plan | Aligns with the output 4 “Ecological Services enhanced and climate resilience strengthened “of the 13 FYP and KPIs as “% of the population supplied with reliable, clean and safe water for drinking and irrigation” . |
| Climate Change Policy of the Kingdom of Bhutan 2020 | Aimed to provide guidance to achieve a climate resilient and carbon neutral economy that contributes to gross national happiness and ensures a continued participation of relevant stakeholders in climate change action. |
| National Environment Strategy (NES), 2020 | Proposes improving access to safe drinking water and sanitation and implementing integrated water resources management. |
| Bhutan Water Policy 2007 | Focused on sustainable and equitable use of water resources while preserving their environmental, social, cultural, and economic values. |
| Water Act of Bhutan 2011, | Ensure protection, conservation, and management of water resources in an economically efficient, |

| | |
|---|---|
| | socially equitable, and environmentally sustainable manner. |
| Water Regulation of Bhutan 2014 | Aimed at enforcing the objectives and purpose of the Water Act and identifying roles and responsibilities of designated Competent Authorities and other relevant organizations. |
| National Forest Policy of Bhutan 2011 | Aimed at sustainable management of resources and biodiversity for the benefit of all citizens and the natural environment, maintaining a minimum of 60% of the land under forest cover. |
| National Irrigation Policy of Bhutan (revised 2012) | Providing policy direction in the irrigation sub-sector to address its current and future issues. It provides clear direction on the measures that need to be adopted to increase the irrigated area and to improve irrigation water management and optimal utilization of national water resources for crop production. |

**E. Conformity to national technical standards.**

The implementing entities are fully dedicated to adhering to all legislation and applicable environmental and social requirements. The overall project activities will be conducted in accordance with the mandates of the National Environment Protection Act 2007. Additional compliance requirements, specific to each project component, are described below:

To achieve the intended goals of the enhancing resilience of ecosystems through restoration plantations, the provision in the following acts and guidelines will be followed:

- Forest and Nature Conservation Act of Bhutan, 2023
- Forest and Nature Conservation Rules and Regulations of Bhutan 2023
- Forest and Nature Conservation Code of Best Management Practices 2020
- Bhutan Water Act 2011
- Water Regulation of Bhutan 2014
- Bhutan Drinking Water Quality Standards 2016

For all EbA and SLM interventions, the following guidelines and modalities will be followed:

- Norms and Standard for Nursery and Plantation (revised version 2020, Ministry of Agriculture and Forests (MoAF)
- Rapid Watershed classification guidelines
- Watershed Management Guidelines
- Six-step protocol for spring shed revival

Regarding the infrastructure development for improved access to drinking and irrigation water, larger-scale constructions will require environmental and social clearance, starting with an Initial Environmental Examination (IEE) submitted to the competent authority prior to the execution of the proposed activity.

Furthermore, water resource extraction must align with the Water Act of Bhutan 2011 and water regulations, which define environmental flow requirements and BDWQS 2016. The proposed irrigation activities will be in line with the National Irrigation Plan and the National Water Flagship Programme.

Activities aimed at promoting sustainable management of water resources and enhancing water governance will be aligned with the following:

- The Constitution of the Kingdom of Bhutan 200*8*, which mandates every Bhutanese citizen to act as a trustee of the country's natural resources and environment for the benefit of present and future generations.
- Land Act 2007, which manages, regulates, and administers land ownership and use for socio-economic development and environmental well-being through efficient land administration and ecosystem conservation.
- Agriculture and Land Development Guideline 2017, which establishes a common approach and practices for Agriculture Land Development (ALD) and assists stakeholders in planning, implementing, monitoring, and evaluating ALD programs and activities.
- National Environment Protection Act 2007, providing for the conservation and protection of the environment through the National Environment Commission or its successors, with designated competent authorities and advisory committees ensuring sustainable development.

The project's main objective of building resilience to climate change and enhancing adaptive capacity for water-stressed communities in Thimphu aligns with all relevant water-related regulations, policies, and guidelines.

Throughout the project implementation, the implementing entity and other executing entities must adhere to the standards of the implementing agency. The project fully complies with various laws related to its activities, including environmental, agricultural, and water resource acts, and relevant laws. The direct involvement of related line ministries and local authorities further strengthens compliance and alignment with national laws, policies, and guidelines.

Line agencies have been consulted during project concept design and development through consultations to ensure that activities comply with relevant national standards. Additionally, all project activities related to infrastructure development will undergo environmental and social clearance. The project will receive guidance or required authorizations, clearances, and licenses through different agencies at the local government level or central agencies, as per the established delegation of power for environmental clearance. These clearances will come with conditions to ensure environmental and social safeguards."

**F. Duplication with other funding sources**

The Ministry of Finance (MoF) serves as the central planning and coordination body of the Royal Government of Bhutan (RGoB). Its primary responsibility is to ensure that all development activities within the country align with the government's priorities and avoid any duplication between project interventions. Regardless of the implementing agencies involved, any external or internal funding directed towards Bhutan must pass through the MoF.

This proposed project complements some of the ongoing and forthcoming projects funded through the Green Climate Fund (GCF), Global Environment Facility (GEF), and GEF Least Developed Countries

Fund (GEF-LDCF).

The Ministry of Finance (MOF) acts as the central coordinating agency, ensuring effective collaboration and non-duplication between projects by utilizing existing practices like the national and annual implementation performance agreements of various agencies. As the National Designated Authority (NDA) and Designated Authority (DA) to the Green Climate Fund (GCF) and Adaptation Fund (AF) respectively, MOF ensured systematic coordination of projects, primarily through the Project Management Unit (PMU) coordination. This approach facilitated enhanced cooperation and minimized redundancy across the projects.

| **Name of project / programme** | **Details of the project** | **Date project started / planned start date** | **Details of synergy/Type of partnership** | **Mitigation methods to prevent duplication** |
|---|---|---|---|---|
| Supporting Climate Resilience and Transformational Change in the Agriculture Sector project | Supports resilient agricultural practices in 8 Dzongkhags of Dagana, Tsirang, Sarpang, Punakha, Wangdue, Zhemgang, Trongsa and Samtse. | 2020 | Knowledge sharing | Project site is different. |
| Securing Ecological Connectivity of High Conservation Value Areas (HCVAs)in South-Western Bhutan | The programme secures biodiversity and ecosystem services in South-Western Bhutan (includes Thimphu District) outside the protected area system. It supports the government at national and sub-national level in identifying High Conservation Values (HCVs) in the programme landscape and promotes their integration in official land use plans. It addresses two key challenges for the livelihoods of local communities: Securing water resources/ water supply and mitigating human wildlife conflicts. | 2020 | Collaboration & Knowledge sharing | The proposed activities and sites are different. |
| Bhutan For Life | Covers a wide range of projects across all sectors such as environmental conservation, human wildlife conflict, enhancing community livelihoods, and climate change adaptation and mitigation. The Bhutan for Life Program covers 10 Protected Network Areas (PAs), and 8 Biological Corridors BCs) with a total of 51.4 % forest cover in Bhutan. | 2019 | Collaboration & Knowledge sharing | No duplication of activities |

## G. Learning and knowledge management

The project recognizes the significance of knowledge management in ensuring the long-term success of climate change adaptation goals. It aims to document and share valuable information and knowledge gathered throughout its implementation to facilitate broader communication and dissemination of project lessons and experiences. This sharing will support the replication and scaling-up of successful project outcomes.

To achieve this, the project will establish and enhance the existing knowledge management system and implement appropriate communication models to disseminate information on climate change adaptation. Key lessons learned and best practices will be well-documented for wider dissemination through various platforms, including meetings, social media, and publications.

The project will promote knowledge exchange mechanisms through study visits among communities and organizations, fostering capacity building to enhance understanding and implementation of adaptation measures. The potential outputs of this knowledge management endeavor encompass evaluation materials, improved data management, enhanced interpretation and dissemination capacity, policy information sharing and mainstreaming, cross-cutting capacity building, and success stories.

Through systematic documentation, the project aims to make accumulated information and knowledge easily accessible to future project implementers, facilitating the replication of successful experiences in similar projects. Furthermore, case studies and technical reports will be compiled to capture the lessons learned and best practices, making them available for national and international meetings.

The project will develop a targeted communication strategy to publish and share functional achievements emanating from project activities and knowledge-sharing events. Social media, the official website, and government portals will be used as platforms for dissemination. Local people at the grassroots level will be involved to enhance the transfer of technical knowledge from experts to the community, meeting future skill requirements for project maintenance.

Key lessons learned from past and ongoing Sustainable Land Management (SLM)/Ecosystem based solutions projects have been considered during project design and will be adopted during implementation. These include the use of participatory EbA & SLM action planning to enhance community ownership and commitment, the implementation of EbA & SLM measures through group approaches to leverage labor resources and generate social co-benefits, and the adoption of a focused approach rather than spreading resources too thinly to achieve impactful results.

Additionally, the project will support long-term SLM/Ecosystem based Solutions interventions with short-term benefits to mitigate opportunity costs for landowners and resource-poor farmers, ensuring tangible benefits are experienced during the project period.

## H. Consultative processes

The project's concept was carefully crafted through extensive engagement with relevant stakeholders and partners. The National Implementing Entity (NIE), BTFEC collaborated with the Bhutan Ecological Society to form a Core working group for the AF-LLA Concept proposal development. The Core Working Group presented the draft project concept to the Department of Macro Fiscal and Development Finance (DMDF), Ministry of Finance, Designated Authority to further refine the interventions necessary to address urgent adaptation needs and align with the 13th FYP. A concept note was developed after consultation with

the DA. The three components were aligned with the National Key Result Areas of the 13th Five Year Plan (FYP).

The details of the consultative process and events are highlighted below and in following Table:

→ **31st June 2023: Initial discussion on the LLA funds with National Implementing Entity (NIE) - BTFEC**
- Initiate discussion on BES support for project co-design with BTFEC
- Availability of EDA(LLA) funds for Bhutan
- Discussion on Climate resilient agriculture and Small Holder farmers in Bhutan concept
- Draft project concept on enhancing water security in Thimphu District

→ **7th July 2023**: **AF-LLA-Core Group Meeting at the Bhutan Ecological Society, Thimphu**
- Update on the AF-EDA process by BTFEC
- Presentation of the project concept by Bhutan Ecological Society

→ **17th July 2023: Consultation with Designated Authority (DMDF), Ministry of Finance**
- Endorsement of the project draft concept
- Discussion regarding the Endorsement Letter
- Alignment of the project interventions with the 13th FYP and priority areas

→ **7th August 2023: Consultation among Designated Authority (DMDF), Ministry of Finance, National Implementing Entity (NIE), Bhutan Trust Fund for Environmental Conservation (BTFEC) & Executing Agency, Bhutan Ecological Society (BES)**
- Presentation of the project concept with project sites
- Finalization of the project intervention components
- Finalization of the project sites
- Further endorsement of the project concept

→ **11th August 2023: Consultation on LLA concept, implementation modality and formation of project Task force**

→ **15 August 2023: Debriefing to the Task force (led by NIE) - 15th August 2023**
- Approval to provide letter of endorsement by Designated Authority
- Finalization of concept note by executing entities, Designated Authority, National Implementing entity.
- Coordination arrangements for development of full-blown project proposals by BTFEC.

→ **16 August 2023: Task force consultation meeting to finalize the project concept note**

→ **29 November 2023: Meeting with Thimphu District, Department of Water, Department of Infrastructure & Development, Department of Agriculture and Department of Forest & Park Services**
- Discussed and finalized landscape as Thimphu District.
- Reviewed and finalized project components and activities.

→ **6th June 2024: Meeting between Adaptation Fund Board Secretariat and National Implementing**

**Entity Revision**

- Revision of EDA proposal and fit in the LLA template

→ **10 June 2024: Meeting with all the stakeholders of project among Local Communities, National Implementing Entities, Designated Authority and Executing Agencies**

- NIE presented on the outcome of June 6th meeting with Adaptation fund Board Secretariat Presented on the new LLA funding Window principles and process

→ **18 June 2024 Meeting with Local (Gewog) leaders and communities of four gewogs**

- Identifying activities derived from the process and principles of Locally Led Adaptation.
- Reviewed and finalized program and project components.
- Implementation arrangement
- Fund Flow Mechanism

→ **27 June 2024: Meeting among Bhutan Trust Fund for Environmental Conservation (NIE), Department of Marco fiscal and Development Finance (DA) and Bhutan Ecological Society (PMU)**

- Finalized project concept Note

| SL. # | Programme | Stakeholders | Date of consultation | Outcome of Consultation |
|---|---|---|---|---|
| 1 | AF-EDA-Core Group Meeting at the Bhutan Ecological Society | Bhutan Ecological Society and Bhutan Trust Fund for Environmental Conservation | 7th July 2023 | Project idea presented to NIE |
| 2 | Consultation with Designated Authority (DMDF) Ministry of Finance | Bhutan Ecological Society,Bhutan Trust Fund for Environmental Conservation and Department of Macro Fiscal and Development Finance | 17 July 2023 | Endorsement of the project draft concept |
| 3 | Writeshop for EDA Concept Note Development with stakeholders | Bhutan Ecological Society,Bhutan Trust Fund for Environmental Conservation and Department of Macro Fiscal and Development Finance | 7 August 2023 | Finalization of draft concept note |
| 4 | Consultation on EDA concept, implementation modality and formation of Project Task force | Bhutan Ecological Society,Bhutan Trust Fund for Environmental Conservation, Department of Macro Fiscal and Development Finance, Department of Water, Department of Agriculture, Department of Forest and Park Services,Department of Environment and Climate Change and Thimphu District | 11 August 2023 | Briefing and finalization of Project programme and activities by relevant stakeholders /executing entities |
| 5 | Task force consultation meeting to finalize the project concept note | Thimphu District, Bhutan Ecological Society, Department of Water, Department of Agriculture, Department of Forest and Park Services,Department of Environment and Climate Change,Department of Macro Fiscal and Development Finance | 16 August 2023 | Finalization of the project concept note |

| SL. # | Programme | Stakeholders | Date of consultation | Outcome of Consultation |
|---|---|---|---|---|
| 6 | Consultation with Stakeholders | Thimphu District, Department of Water, Department of Agriculture, Department of Forest and Park Services,Department of Environment and Climate Change and Department of Infrastructure and Development. | 29 November 2023 | Project landscape, activities and components finalized |
| 7 | Call between Adaptation Fund Board Secretariat and Bhutan Trust fund for environmental conservation | Adaptation Fund Board Secretariat and National Implementing Entity | 6th June 2024 | Revision of EDA proposal and fit in the LLA template |
| 8 | Presentation on LLA funding window and convey decisions of the 6th June 2024 virtual meeting with the Adaptation Fund Board Secretariat | Gups of 4 Gewogs (Local) communities, Thimphu District, Bhutan Ecological Society, Department of Water, Department of Agriculture, Department of Forest and Park Services,Department of Environment and Climate Change,Department of Macro Fiscal and Development Finance | 10th June 2024 | NIE presented the outcome to all the stakeholders of the June 6th meeting with Adaptation fund Board Secretariat and decided on a way forward to incorporate concept notes submitted under EDA to LLA. |
| 9 | Presentation and consultation on LLA principles and process and revision of EDA into LLA concept note | Gups of 4 Gewogs (Local) communities, Thimphu District, Bhutan Ecological Society, Department of Water, Department of Agriculture, Department of Forest and Park Services,Department of Environment and Climate Change,Department of Macro Fiscal and Development Finance | 18th June 2024 | Presented on the new LLA funding Window principles and process. Reviewed and finalized activities, outputs, components, fund flow mechanism and implementation modalities keeping in line with the LLA process |
| 10 | Finalization of LLA concept note | Gups of 4 Gewogs (Local) communities, Thimphu District, Bhutan Ecological Society, Department of Water, Department of Agriculture, Department of Forest and Park Services,Department of Environment and Climate | 27th June 2024 | LLA concept note finalized together with all local and central stakeholders. |

| SL. # | Programme | Stakeholders | Date of consultation | Outcome of Consultation |
|---|---|---|---|---|
| | | Change,Department of Macro Fiscal and Development Finance | | |

## I. Justification for funding requested

Bhutan is a land-locked country situated in the delicate mountainous terrain of the Eastern Himalayas. Owing to a combination of political, geographic, and social factors, Bhutan ranks as the 38th most vulnerable country and the 62nd most prepared country on the ND-GAIN Matrix.[92] This indicates that while Bhutan is on the path to effectively respond to climate change, its adaptation needs and the urgency to act are still significant. Various other international sources have also classified Bhutan as vulnerable to climate change.

Bhutan's economic size is relatively small, with a GDP of only USD 2.2 billion. The financial market is underdeveloped, and the country's access to global financial markets is limited due to its small economy. The COVID-19 pandemic has further exacerbated the situation, leading to a sharp decline in domestic revenue, with further declines projected for the next two fiscal years (2022-23). The GDP growth has also significantly declined, reaching negative 10.08%, and the fiscal deficit is projected to be negative 8.59% of GDP in 2021-22. Bhutan's debt as a percentage of GDP has increased in recent years, from 114.2% in 2018-2019 to 138.8% in 2020-2021[93].

The limited government revenue hampers potential government investment, and Bhutan heavily relies on external grants, which are expected to decrease sharply due to front-loading. The export of hydroelectricity to India accounts for 20% of Bhutan's GDP and has played a significant role in its economic achievements. However, around 77% of Bhutan's external debt is associated with hydropower projects, raising concerns about the sustainability of these projects.[94]

Being a small country with a small market and population, Bhutan faces challenges in accessing various sources of finance, particularly private sector finance, due to perceived high risks for private investments. The government's budget for addressing climate change and energy-related challenges is limited, and the country's financial markets are not mature enough to attract significant private investments.

While Bhutan prioritizes climate efforts and progresses, it faces constraints in terms of cost and technology. Funding for softer climate change programs involving capacity building, institutional strengthening, and technical assistance for policy or strategy development is more accessible. However, securing adequate financial support for the implementation of these programs, policies, and strategies remains a serious challenge.

In this context, the EDA grant can play a crucial role in addressing these challenges and facilitating further

[92] https://gain-new.crc.nd.edu/country/bhutan

[93] *Bhutan - Country Partnership Framework for the Period FY2021-24 (English).* Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/620541608337280651/Bhutan-Country-Partnership-Framework-for-the-Period-FY2021-24

[94] Namgyel, T, Gebreyes, BY and Tenzing, J (2018) From global ambition to country action: Bhutan steps towards low carbon climate resilient development. IIED, London. http://pubs.iied.org/10195IIED.

investments in climate change adaptation.

**J. Sustainability of the project**

The long-term sustainability of project outcomes will be ensured based on the following:

The project activities will be integrated into existing systems by aligning the activities with the 13th Five-Year Plan (FYP) objectives and the Water Flagship Programme. Additionally, in accordance with the Water Act of Bhutan 2011, the formation/strengthening of Water User Associations (WUAs) is proposed as part of the project to ensure the sustainability of the scheme. After project finalization, the operation and maintenance aspects of the scheme will be integrated into local government plans, thus institutionalizing the WUAs' role.

Different collaborating agencies from the national level, local governments and CSOs are responsible for managing various project components as they possess qualified and capable human resources for executing the tasks. These agencies have robust governance and financial systems in place, and thorough due diligence will be exercised to manage the project effectively.

**RGoB Commitment and Ownership**: The Ministry of Energy, Environment and Natural Resources (MoENR) is the Competent Authority for irrigation, watershed, and wetland management and the Ministry of Infrastructure and Transport for the water supply schemes through providing technical backstopping such as designs and cost estimation. The Department of Forests and Park Services (DoFPS), collaborates with stakeholders to categorize and develop management plans for watersheds and spearheads formation of the Community based Forest Fire Management Groups.

Similarly, the Ministry of Energy, Environment and Natural Resources (MoENR) and Ministry of Infrastructure and Transport oversees the planning and management of drinking water supply and wastewater infrastructure in coordination with local governments. Both ministries are mandated to secure adequate budgets for the maintenance and recurring costs of irrigation and drinking water supply schemes including technical backstopping in design and costing.

**Institutional Sustainability**: The project's institutional arrangements are built upon existing RGoB systems, program management, fund flow, accounting, and reporting. It supports the strengthening of capacities and organizational structures within MoENR and MoIT to ensure the resilient ecosystems and uninterrupted supply of drinking and irrigation water.

**Participatory Action Planning and Community Ownership:** The project encourages participatory village-level action planning and implementation through farmers' groups and community involvement to foster ownership of project interventions. Capacity development investments ensure the achievement of project results and sustainability beyond the implementation period.

**Extension and Technical Support Services**: The Divisional Forest Offices and Regional agriculture research and development centers (ARDCs) and local governments provide extension and technical support services, promoting responsiveness to farmers' needs and increased accountability. The project enhances the capacity of relevant officials, enhancing in-house expertise.

**Financial Sustainability**: Infrastructure development and maintenance, including eco-restoration and EbA & SLM initiatives, will be mainstreamed into central and local government plans and programs. The

RGoB allocates budgets annually to agencies involved in eco-restoration and SLM activities, ensuring post-project sustainability and scalability.

**Community based WUA Engagement**: After project completion, the WUAs will take on the responsibility of the operation and minor maintenance activities, while major maintenance beyond their capacity will be supported by local governments through inclusion in the annual budgeting. Relevant agencies will continue to provide technical support to the WUAs.

By implementing the project on these sustainable bases, it aims to secure the long-term success and effectiveness of the interventions even after the project phases out.

## K. Environmental and social impacts and risks

| Checklist of environmental and social principles | No further assessment required for compliance | Potential impacts and risks – further assessment and management required for compliance |
|---|---|---|
| *Compliance with the Law* | ✓ | |
| *Access and Equity* | | Moderate Risk. Need further assessment on equitable sharing of project benefits. |
| *Marginalized and Vulnerable Groups* | ✓ | |
| *Human Rights* | ✓ | |
| *Gender Equality and Women's Empowerment* | | Moderate Risk. Need further assessment on ensuring women participation in project activities. |
| *Core Labour Rights* | | Moderate Risk. Need further assessment on ensuring compliance to labour rights. |
| *Indigenous Peoples* | ✓ | |
| *Involuntary Resettlement* | ✓ | |
| *Protection of Natural Habitats* | | Moderate Risk. Need further assessment to ensure that invasive alien species are not planted and only native species of plants are used for plantation. |
| *Conservation of Biological Diversity* | | Moderate Risk: Need further assessment to ensure e-flow in streams. |
| *Climate Change* | | Moderate Risk. Need assessment to ensure climate smart design and |

| | | |
|---|---|---|
| | | infrastructure. |
| *Pollution Prevention and Resource Efficiency* | | Moderate Risk. Need assessment to ensure compliance to provisions of the environmental clearance. |
| *Public Health* | | Moderate Risk. Need assessment to ensure adherence to occupational health and safety standards. |
| *Physical and Cultural Heritage* | ✓ | |
| *Lands and Soil Conservation* | | Moderate Risk. Need assessment to restore any exposed soil and prevent water pipe leakages due to project activities. |

## A. Record of endorsement on behalf of the government

| *(Enter Name, Position, Ministry)* | Date*: (Month, day, year)* |
|---|---|
| Mr. Tshering Dorji<br>Director, Department of Macro-fiscal and Development Finance<br>Ministry of Finance | ***June, 21,2024*** |

## B. Implementing Entity certification

*Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address.*

| |
|---|
| I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans -National Adaptation Plan,13th Five Year Plan of Royal Government of Bhutan and Adaptation Fund's New funding window of Locally Led Adaptation and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy and the Gender Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme. |

[6.] Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

| | |
|---|---|
| *Name & Signature: Dr. Karma Tshering, Managing Director*<br><br>Implementing Entity Coordinator  | |
| Date: *(Month, Day, Year)*<br><br>***June 27 2024*** | Tel. and email: karma@bhutantrustfund.bt |
| Project Contact Person: Kinley Tshering, Chief Program Officer | |
| Tel. And Email: kinley@bhutantrustfund.bt | |

**Annexure 1: Project Results Framework**

| *Table 1: Results Framework* | |
|---|---|
| **Project Objectives** | **Indicators** |
| 1.Increased resilience of ecosystems to ensure natural capacity for water infiltration, recharge and water buffering | 1.Area (Ha) of degraded ecosystems restored in vulnerable watersheds within Thimphu District |
| 2. Enhanced Sustainable Water Resource Management in vulnerable communities | 1.No. of villages with enhanced access to safe and clean drinking water and resilient irrigation systems |
| 3.Strengthened capacity of local communities to adapt to climate change in vulnerable watersheds in Thimphu district. | 1.Number of communities with improved climate-related planning and policy frameworks in place |

| | |
|---|---|
| **Outcome 1: Increased ecosystem resilience in response to climate change and variability-induced stress.** | |
| Output 1.1 Water Resource Management & Governance strengthened | No. of localized integrated water resource management plans developed. |
| Output 1.2 Ecosystem based solutions /SLM interventions to enhance watershed functions implemented | Area (Ha) of degraded watersheds restored through eco-restoration. |
| Output 1.3. Management of forest fire hazards by promoting integrated forest fire management | Number of Community Forest Fire Management groups (CFFMGs) established in Thimphu Dzongkhag |
| | Number of Post fire assessment and valuation tools developed and implemented. |
| **Outcome 2: Ensured access to irrigation and safe and reliable drinking water.** | |
| Output 2.1 Community-based climate resilient drinking water infrastructure established. | Number of resilient drinking water supply systems established. |
| Output 2.2 Community-based climate resilient irrigation infrastructure established & improved. | Number of irrigation infrastructures improved/established.<br>Area (Ha) of agricultural land with access to adequate water for irrigation. |
| **Outcome 3: Increased resilience of local communities to climate change through enhanced capacity in adaptation planning and implementation** | |
| Output 3.1 User groups in the community strengthened for effective management of irrigation and drinking water | No. of Water User Associations (WUAs) established and formalized. |
| Output 3.2 Capacity of local communities, local leaders and organizations enhanced on local adaptation planning and implementation. | No. of people (local communities /LG Leaders) trained on Adaptation Planning and Project Implementation |
| Output 3.3 Dissemination of Project Results and Lessons Learned | No.of/Knowledge Sharing and Learning Sessions/Workshops conducted. |

**Annexure 2: Activity details of proposed drinking water supply schemes and beneficiaries**

| Dzongkhag | Gewog/s | Proposed activity | Water Source Details | Village | No. of HH | Population | |
|---|---|---|---|---|---|---|---|
| | | | | | | Male | Female |
| Thimphu | Maedwang | Woluna Drinking Water Supply Scheme (Distribution System) | Pumola Base | Woluna | 30 | 20 | 30 |
| | Kawang | Construct Changtagang Water Supply | Chutaphu Rongchu, Begana | Changtagang | 83 | 150 | 180 |
| | Dagala | Construction of Helela Water supply at Chamgang | Helela | Chamgang Taed and Maed | 122 | 456 | 436 |
| | Chang | Construction of Rama Water Supply scheme | Kazhithang | Rama | 87 | 125 | 113 |
| | | | Total | | **322** | **751** | **759** |

**Annexure 3: Activity details of proposed irrigation schemes and beneficiaries under Thimphu District**

| Gewog/s | Proposed activity | Water Source Details | Village | No. of HH | Population | | Beneficiary agricultural areas (in Acres) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | M | F/M | Dryland | Wetland | Fallow Land | Total area |
| Maedwang | Pumula to Woluna Irrigation with Drinking Water Supply Scheme | Pumola Base/ Motithang | Woluna, Danglo top | 30 | 20 | 30 | 11.1 | 27.06 | 8.11 | 46.27 |
| | Construction of Khasakha Irrigation (6km) | Sisilum Stream | Khasakha, Lamdru | 60 | 130 | 170 | 127.51 | 63.49 | 15.05 | 206.05 |
| | Constrcution of Sigay Irrigation | Bjeme Rongchu | Sigay, Tsaphu | 25 | 40 | 60 | 7.81 | 18.5 | 1.5 | 27.81 |
| | Construction of Sisilung to Dalukha Irrigation | Sisilum | Dalukha | 14 | 68 | 102 | 80 | 30.57 | 13.8 | 124.37 |
| Chang | Rehabilitation of Hongtsho Toed Maed Irrigiation | Changkhaphu Stream | Hongtsho Taed, Hontsho Maed, Phentekha, Zhesar | 125 | 206 | 212 | 25 | 0 | 0 | 25.00 |
| | | **Total** | | **254** | **464** | **574** | **251.42** | **139.62** | **38.46** | **429.5** |

**Annexure 4: Endorsement Letter by NDA**


དངུལ་རྩིས་གཞུང་གཉེར།
Department of Macro-Fiscal and Development Finance
Ministry of Finance
Royal Government of Bhutan

BHUTAN
Believe


**MoF/DMDF/AF/2024/2777** **21 June, 2024**

The Adaptation Fund Board
C/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

**Re: Endorsement Letter – Securing Water & Enhancing Climate Resilience in Thimphu, Bhutan.**

Dear Sir(s)/Madam(s),

As the Designated Authority (DA) for the Adaptation Fund in Bhutan, I confirm that the above national project proposal aligns with the government's national priorities in implementing adaptation activities to mitigate the adverse impacts and risks posed by climate change in the country.

In this regard, I am pleased to endorse the above project proposal, soliciting support from the Adaptation Fund. If approved, the project will be implemented by the Bhutan Trust Fund for Environment Conservation (BTFEC) and executed by the national and local executing agencies.

Thank you for your continuous support and cooperation.

Sincerely,

(Tshering Dorji)
**DIRECTOR**


Thimphu, Bhutan. Phone no.: +975 2 330735