ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	Regular Project Concept Note
Country/ies:	Bhutan
Title of Project/Programme:	Adaptation to Climate-induced Water Stresses through Integrated Landscape Management in Bhutan
Type of Implementing Entity:	National Implementing Entity
Implementing Entity:	Bhutan Trust Fund for Environmental Conservation
Executing Entity/ies:	Department of Agriculture, Ministry of Agriculture and Forests Department of Engineering Services, Ministry of Works and Human Settlements Department of Local Governance, Ministry of Home and Cultural Affairs
Amount of Financing Requested:	9.951 million (in U.S Dollars Equivalent)

Acronyms

ADSS	Agro-met Decision Support System
AF	Adaptation Fund
ALDG	Agriculture Land Development Guidelines
ARED	Agriculture Research and Extension Division
BDWQS	Bhutan Drinking Water Quality Standards
BTFEC	Bhutan Trust Fund for Environmental Conservation
CCA	Climate Change Adaptation
CCP	Community Contracting Protocol
DES	Department of Engineering Services
DLG	Department Local Governance
DPA	Department of the Public Accounts
DRR	Disaster Risk Reduction
ESMP	Environment and Social Management Plan
FNCRR	Forest and Nature Conservation Rules and Regulations
FYP	Five Year Plan
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
HDPE	hydro-pressurized pipe
HKH	Hind Kush Himalaya
IEE	Initial Environmental Examination
IPCC	Inter-governmental Panel on Climate Change
KM	Knowledge Management
LDCF	Least Development Country Fund
LG	Local Government
MoAF	Ministry of Agriculture and Forests
MoHCA	Ministry of Home and Cultural Affairs
NAPA	National Adaptation Program of Action
NECS	National Integrated Water Resources Management Plan
NIMP	National Irrigation Master Plan
NKRA	National Key Result Areas
NWFP	Non-Wood Forest Products
PES	Payment for Ecosystem services
PHCB	Population and Housing Census of Bhutan
PRA	Participatory rural appraisals
RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resources
RWSS	Rural Water Supply Scheme
SAPA	Sector Adaptation Plan of Action
SLM	Sustainable Land Management
WMD	Water Management Division
WTP	Water Treatment Plant
WUA	Water Users Association

Project Background and Context:

General Country Information

The Himalayan Kingdom of Bhutan is a small land-locked country with a population of 727,145 (PHCB 2017[1]) and a geographic area of 38,394 km^2. The country is almost entirely mountainous with nearly 95 percent of the country being above 600 meters altitude[2]. The topography is rugged and steep, with elevation rising from under 200 m to above 7,500 m within a short south-north distance of some 170 kilometers (km). The country can be distinguished into three broad physiographic zones: the southern belt made up of the Himalayan foothills adjacent to a narrow belt of flatland along the Indian border; the inner Himalayas consisting of main river valleys and steep mountains; and the high Himalayas featuring alpine meadows and snow-capped mountains.

Administratively, the country is made up of 20 dzongkhags (districts, see Figure 1). Each dzongkhag consists of gewogs, which are a block of villages and represent the smallest unit of public administration. There are altogether 205 gewogs across the country. Some of the dzongkhags are broken down into dungkhags (sub-districts) to ease geographical and logistical constraints posed on public administration. Currently, there are 16 dungkhags. Major population centers are located in the west and south. The northern region is very sparsely populated. Sixty-two per cent of the population live in rural areas and predominantly subsist on a farming system, which integrates crop agriculture, livestock rearing and forest resource use.

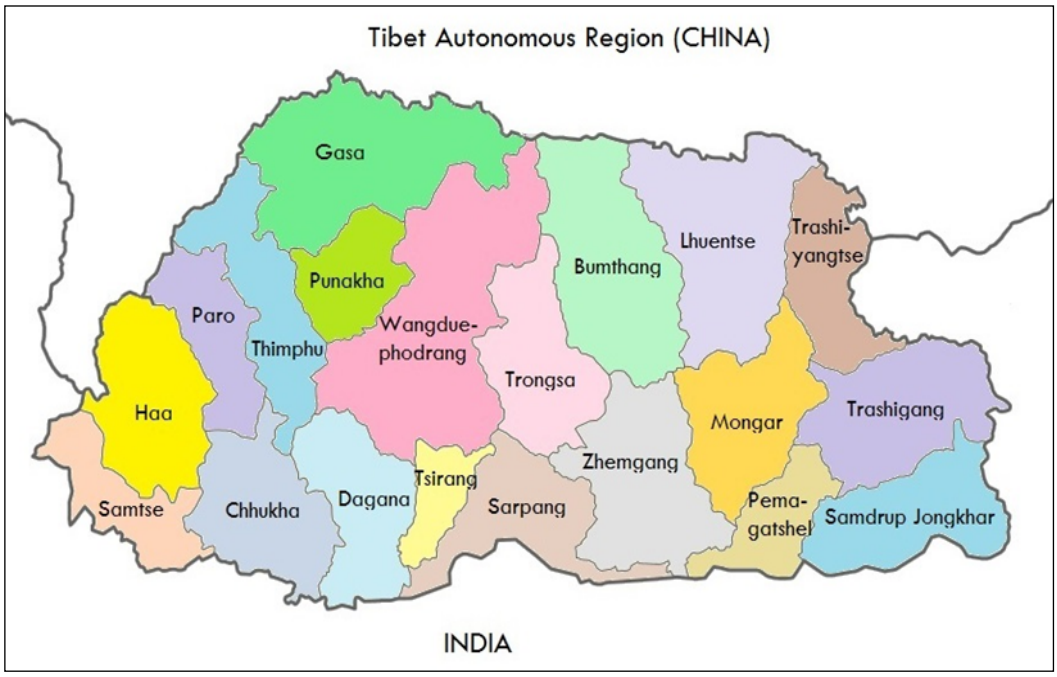


Figure 1: Administrative map of Bhutan showing the districts

[1] Population and Housing Census of Bhutan 2017, National Statistics Bureau, Royal Government of Bhutan
[2] Atlas of Bhutan: Land Cover and Area Statistics, 1997, Ministry of Agriculture, Royal Government of Bhutan

The advent of the Five-Year Plan (FYP) in 1961 marked the beginning of modern development. Since then, FYPs have served as the key strategic instrument for the implementation of national development policies and programs. The country is currently implementing the 12th FYP (July 2018-June 2023) with overall objective to create "a just, harmonious and sustainable society through enhanced decentralization." The national development process is guided by the overarching development philosophy of "Gross National Happiness". This philosophy is underpinned by the four central and mutually-reinforcing objectives of equitable socio-economic development, environmental sustainability, promotion and preservation of culture, and good governance.

Bhutan's economy is one of the smallest in the world but one that has seen impressive growth over the years. The country's Gross Domestic Product (GDP) has grown from Nu. 72,496.64 million (US$ 1,565.8 million) in 2010 to Nu. 167,326.82 million (US$ 2,464.3 million) in 2018, up by about 130 percent[3]. The key contributing economic sectors to the GDP are renewable natural resources, which includes agriculture, livestock rearing and forestry (15.89 percent), construction (14.2 percent) and electricity and water (11.72 percent)[4]. In terms of employment, the renewable natural resources sector remains the most important economic sector although its GDP share has been falling over the years. Tourism is another sector contributing significantly to the country's economy particularly in terms of foreign exchange and creation of jobs.

The country is endowed with an outstanding natural environment. It is dubbed as the 'crown jewel' of the Eastern Himalayas, a region recognized as a global biodiversity hotspot. Broadly speaking, the natural habitats range from the subtropical broadleaf forests and grasslands through temperate mountain forests to alpine meadows and scree interspersed with marshlands and various water bodies. The natural habitats are home to more than 5,600 species of vascular plants, about 200 species of mammals, 700 species of birds, and some 100 species of fish. To maintain the rich biodiversity, 42.7 percent of the country has been declared as protected areas, which include five national parks, four wildlife sanctuaries and a strict nature reserve. These protected areas are connected by biological corridors to ensure contiguousness of the natural habitats and allow wildlife movements between the protected habitats, expanding the network of natural areas under protection to more than 50 percent of the country.

Forests account for more than 70 percent of the country's land cover – one of the highest in the world. The Constitution mandates that at least 60 percent of the country is maintained under forest cover at all times. As a result of vast tracts of forest cover, low level of polluting industrial activity and almost all electricity generated from hydropower, Bhutan is perhaps the only country in the world with net greenhouse gas (GHG) emission in negative. The net GHG emission is estimated to be -4,750.04 Gigagram (Gg) of CO_2 equivalent based on 2000 data[5]. This, however, does not exempt the country from the impacts of global warming and climate change.

In fact, with a geologically fragile and young mountain ecosystem and as a least developed country, Bhutan is highly vulnerable to climate change and its impacts. Socio-economic development is hugely dependent on climate-sensitive sectors such as agriculture, hydropower, forestry, and road communication. Furthermore, as a mountainous country with a huge area of snow and glaciers and an intricate natural drainage system of several watersheds, water catchments, rivers, rivulets and streams, the country is intrinsically exposed to and impacted by multiple climate change hazards including glacial lake outburst floods, landslides, and flash floods. Reduced precipitation during winter over the recent

[3] National Accounts Report 2019. The USD conversions are based on historical USD-BTN exchange rates prevailing in 2010 and 2018 respectively (www1.oanda.com).

[4] The figures are for 2018 as cited in the National Accounts Report 2019.

[5] Second National Communication to the UNFCCC, November 2011. More recent data will be available in the Third National Communication, which is currently under preparation.

years has given rise to increased forest fire risks and seasonal water scarcity in many areas. Rainfall pattern is becoming increasingly erratic, posing huge adversities for farmers who largely practice rainfed agriculture. Severe events of windstorm are becoming increasingly recurrent and these have damaged numerous homes, schools, health facilities, government offices, and temples, as well as tons of crops.

Climate and Climate Change Scenarios

The climate varies considerably in Bhutan, due to its characteristic dramatic changes in topography. The southern foothills typically have subtropical climate with high humidity and heavy rainfall with several locations recording more than 4,000 mm annual rainfall. The temperature in the southern region ranges from 10°C to 25°C in winter and 20°C to 35°C in summer. The central mountains and valleys are characterized by cool winters and warm summers with temperature ranging from -5°C to 15°C in winter and 15°C to 25°C in summer. Rainfall in this region is moderate between 1,000-2,000 mm per year. The high alpine mountains and meadows have cold winters and cool summers with generally low precipitation of less than 500 mm per year primarily in the form of snow.

The summer monsoons endure from late June through late September. The moisture-laden clouds that originate in the Bay of Bengal travel north towards the Himalayas. When these clouds are blocked from traveling further by the high Himalayas, they bring heavy rainfall to the region. The monsoons play a critical role in the life of the people of this region. Most of the farmers are totally dependent on the monsoons for irrigation. The late onset of the monsoons can lead to drought in the region while excessive monsoon rains can result in flashflood and landslides.

The second (SAR 1990), third (TAR 2001), fourth (AR4 2007) and fifth (AR5 2014) assessment reports produced by the Inter-governmental Panel on Climate Change (IPCC) indicate that mountainous countries such as Bhutan, are likely to be among the countries most vulnerable to the adverse impacts of climate change. The IPCC and other climate based reports have identified a number of sources of vulnerabilities that mountainous countries will face in relation to climate change and variability, including their size and limited resource base, vulnerability to existing weather events such as heavy monsoonal rain, dry-season drought, tropical storms such as cyclones and restricted economic opportunities.

Simulated exercises using ECHAM5 and HadCM3Q0 climate models for projection of long-term climate scenarios, carried out as a part of the Second National Communication (2011), suggest the following:

- Change in temperature: Mean annual temperature for the 2010-2039 is projected to increase by ~0.8°C (ECHAM5/A1B scenario) to ~1.0 °C (HadCM3QO/A1B scenario) compared to the current (1980-2009) climate. There is little or no difference between the annual and seasonal (monsoon and winter) temperature changes according to the ECHAM5/A1B scenario whereas HadCM3QO/A1B scenario projects a slightly higher increase in mean winter seasonal temperature (~1.2°C) and a slightly lower increase in mean monsoon seasonal temperature (~0.8°C). For the 2040-2069 period, mean annual temperature is projected to increase by ~2.0°C (ECHAM5/A1B scenario) to ~2.4 °C (HadCM3QO/A1B scenario). Again, there is little or no difference between the annual and seasonal (monsoon and winter) temperature changes according to the ECHAM5/A1B scenario but HadCM3QO/A1B scenario projects a slightly higher increase in mean winter seasonal temperature (~2.8°C) and a slightly lower increase in mean monsoon seasonal temperature (~2.1°C).

- Change in precipitation: As for changes in mean annual precipitation, both ECHAM5/A1B and HadCM3Q0/A1B scenarios project a slight increase of ~6% for the 2010-2039 period. On a

seasonal basis, there is a slight decrease in winter precipitation (~2%) and an increase of 4-8% in the monsoon period. For the 2040-2069 period, the ECHAM5/A1B scenario projects an increase of ~25% in the mean total annual precipitation with generally higher increase in the monsoon compared to the winter season. The HadCM3Q0 also projects almost a similar scenario: an increase of ~21% with generally higher increase in the monsoon than in the winter season. The general projection is thus that the mean annual precipitation will see an increase over the next 30 to 60 years but with more intense and concentrated rainfall in the monsoon season and an in general drier winter season.

Climate Change Impacts on Water and Agriculture

As presented in the previous section, there is a projected increase in annual average rainfall in Bhutan. The additional rain, however, will mostly fall during the existing wet season of June to August when it is often not required to improve crop yields (though more evenly distributed rainfall within these months would likely reduce the incidences of yield declines due to dry spells during pollination of some crop species). Similarly, for aquifer recharge, the higher intensity of rainfall events generally leads to extra surface run-off rather than infiltration once the soil is saturated, limiting the benefits of the extra amount of projected precipitation. It is thus likely that the increases in rainfall projected between June and August by the climate models will only serve to exacerbate problems associated with erosion, landslides and floods.

Furthermore, the projected increases in rainfall variability can lead to decreases in precipitation for extended periods, causing water availability and access problems, which undermine current water distribution infrastructure and communities' abilities and rights to access water for household and agricultural requirements. Springs and small streams are the main water sources for the rural part of the country. But many of them are reportedly retreating. The updated National Adaptation Program of Action (NAPA 2012) therefore also prioritized water as a sector most likely to be severely affected by climate change, with far-reaching implications relating to drought, floods, access to water and water quality. The NAPA 2012 therefore includes actions for (g) Rainwater Harvesting and Drought Adaptation. The Government has also embarked on a water flagship program in the 12th FYP period to give impetus to addressing water problems including those caused by climate change.

Subsistence agriculture activities in Bhutan will be affected by the projected variability in rainfall patterns and intensity. Together with geological differences, climate variability and change will have a large influence on freshwater availability, notably whether water is guaranteed year-round or whether water sources dry up rapidly or gradually at the onset of the dry-season. From an agricultural perspective elevation, geology and pedology play a large role in determining whether farmers have a high risk of wet season crop failure and any opportunity of dry season cultivation. The vast majority of agriculture activities are rain-fed subsistence and cash crop production and irrigated rice crops. To sustain agriculture, new sources of water must be identified locally, tapped and invigorated, and innovation is required in water storage, including water harvesting, and usage. The feasibility of dams and reservoirs is not yet adequately assessed. However, the geological conditions in Bhutan with permeable unstable soils and rock will make it technically challenging in most instances.

During the community consultations for past CCA projects[6], communities have identified rainfall and water availability as the two principal environmental constraints on agricultural production. Many rural communities face dwindling access to water during the dry season when the largely natural springs that they rely on reduce considerably in flow or cease altogether. There is thus a clear recognition by communities of the importance of reliable water resources and for the potential increased stress that

[6] Reference is to GEF/LDCF-NAPA II and GEF/LDCF-NAPA III projects.

climate change poses for these water sources, and related livelihoods activities. Local differences in Bhutan manifest as different drought, land slide and erosion vulnerabilities throughout the country, with high spatial variability existing across the country.

Participatory rural appraisals (PRAs) of the environmental and climate change impacts on key local livelihoods resources and assets carried out in August-September 2011 in some of the poorest gewogs in the country through the Joint Support Program[7] also provide an insight on climate change vulnerabilities at the local level. The PRAs revealed that farmlands were the most vulnerable of all local livelihood resources/ assets, followed by water resources and supply systems, (see Figure 2). This connotes and confirms considerable climate change risks as the nation's socio-economic wellbeing is hugely dependent on agriculture and water resources.

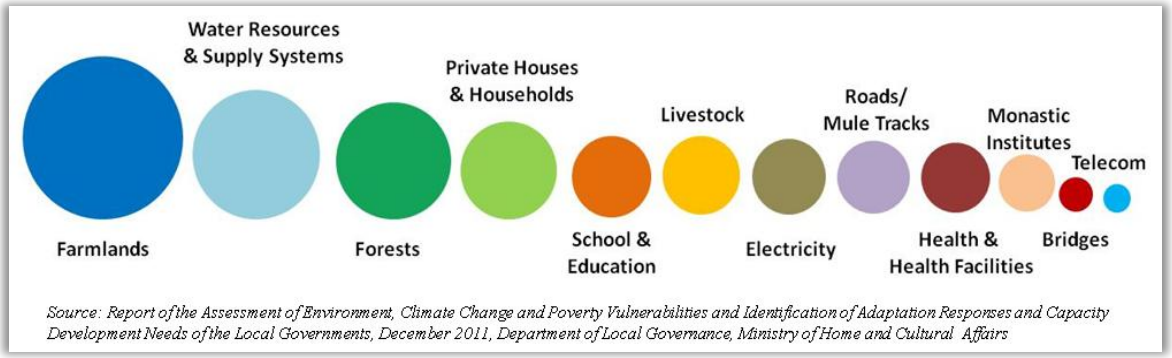


Figure 2: Proportional scale of environmental and climate vulnerabilities of local resources and assets

Climate Change and Gender

Climate change and its impacts are not gender neutral. Due to gender-differentiated traditional roles in society such as in agriculture, and health and nutrition of the family, women are amongst those who are likely to face the heaviest burdens from these changes and their impacts especially on agriculture and water availability. The gender assessment for the GEF/ LDCF-NAPA III project suggested that women are likely to be vulnerable in view of their roles in rural communities, which are largely confined to agricultural and domestic activities within the household while men go for off-farm non-agricultural work or conduct heavier tasks such as ploughing and firewood collection. At 54 percent, agriculture sector accounts for the highest employment. Of this, women constitute 63.2 percent[8], implying the importance of agricultural livelihoods for the development and well-being of Bhutanese women and, therefore, their vulnerability to climate change.

While a higher percentage of women are engaged in agriculture, surveys carried out for an in-depth assessment on climate change and gender[9] revealed that less women (69 percent) compared to men (84 percent) were aware of climate-smart and resilient agriculture initiatives. The assessment also highlighted that rural men and women viewed coping measures to climate change differently, thus implying the importance of gender mainstreaming in climate change adaptation strategies.

[7] Joint Support Programme, Capacity Development for Mainstreaming Environment, Climate Change and Poverty Concerns in National Policies and Programs. It was funded by the Government of Denmark, UNDP, UNEP and UNCDF.

[8] Bhutan Labor Force Survey Report 2018, National Statistics Bureau, Royal Government of Bhutan.

[9] The report of the assessment is currently a draft and its working title is "Gender and Climate Change in Bhutan: with emphasis on the NDC priority areas Agriculture, Energy and Waste." The assessment is supported by UNDP and the project partners are the National Commission for Women and Children and the National Environment Commission.

Climate Change and Local Governance

The Government is increasingly placing Local Governments at the center of the sustainable development agenda. The overall objective of the 12th FYP is to create a just, harmonious and sustainable society through enhanced decentralization. In keeping with this objective, in the 12th FYP, the capital resource allocation to the Local Governments make up 50% of the total budget outlay – a significant increase from the previous FYP where capital resource allocation made up 29% of the total budget outlay. The important role that the Local Governments have in climate change adaptation is highlighted below:

- CCA is often a highly localized matter. Different localities may experience different climate change challenges. Furthermore, climate change problems may differ between men and women, rich and poor, old and young, and between livelihoods. These local variations make climate change adaptation more suitable for Local Government actions. As formal institutions with the mandate for direct delivery of public goods and services at the grassroots level, LGs are best placed to help local communities adapt to the many consequences of climate change;
- Marginalization: mountainous communities can suffer from limited access to basic government, social and technical services including health care, education, and agricultural extension services. Hence the reinforced importance of LGs to ensure these services are available and provided;
- Given their proximity to the local communities, LGs have comparative advantages in terms of access to local knowledge, ability to mobilize local communities, and delivery of public goods and services to respond to climate change vulnerabilities;
- In the scenario of increased resource allocation to local governments, it is critical that the Local Governments have improved capacity to invest the increased resources in a sustainable manner. This among other things imply that in the current scenario of growing challenges of climate change, it is critical that local development investments sufficiently integrate climate change adaptation and gender measures.

Project Sites

The proposed AF project will be implemented in two dzongkhags, viz. Dagana and Paro (see Figure 3: map showing the location of the dzongkhags). It will cover all of the 14 gewogs in Dagana and five gewogs in Paro. These nineteen gewogs have been identified as priorities for intervention under the Government's "water flagship program." These gewogs, put together, have a total population of 40,986 and cover a total area of 2,142.5 km2 (both about 5.6 percent of the country's total population and area). There are altogether 278 irrigation schemes, covering over 600 km, and 342 rural water supply schemes (gewog-wise breakdown is given in Tables 1 and 2).

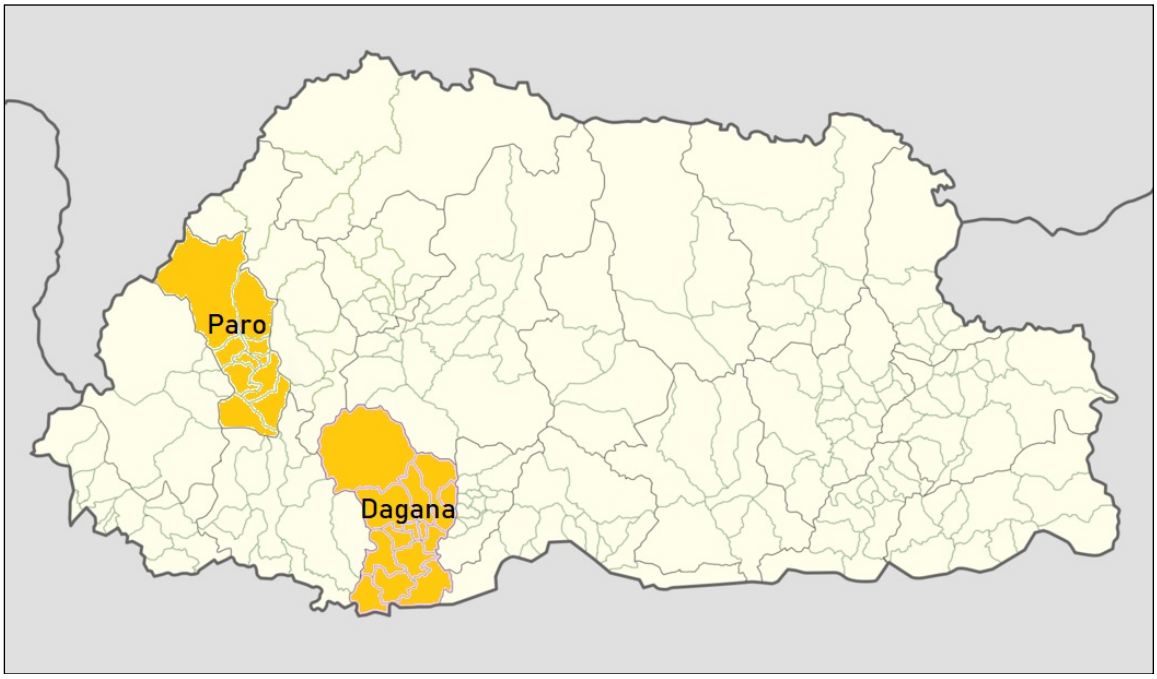


Figure 3: Map showing the location of Dagana and Paro dzongkhags

Dagana Dzongkhag

Encompassing a total area of 1,724.32 km^2, Dagana lies in the southwestern part of the country. The dzongkhag has a total population of 24,965 (12,956 male; 12,009 female). Of these, 81 percent make up the rural population. The mean annual household income is BTN 156,990 (USD 2,440 approx.) (GNH Survey 2015)[10]. Agriculture and livestock rearing are the key sources of income. Dagana is one of the major producers of orange and cardamom in the country. The table below provides relevant vital statistics of the gewogs in Dagana:

Gewog	Population			Area (km^2)	Irrigation Scheme		No. of RWSS
	Male	Female	Total		No.	Km	
Dorona	415	337	752	107.71	13	22.80	17
Drujeygang	965	977	1,942	58.30	37	31.81	22
Gesarling	933	730	1,663	38.82	5	11.00	6
Gozhi	1,256	1,251	2,507	22.14	19	38.68	20
Karmaling	785	539	1,324	92.12	4	6.10	8

[10] Cited in the 12th Five-Year Plan of Paro Dzongkhag.

Kana	1,271	1,239	2,510	191.28	40	79.40	21
Khebisa	597	618	1,215	95.92	16	60.00	32
Largyab	454	389	843	108.58	10	25.00	21
Lhamoizingkha	432	364	796	103.95	8	20.74	9
Nichula	242	192	434	136.90	3	5.50	6
Tashiding	843	844	1,687	39.53	17	37.50	22
Tseza	554	541	1,095	594.12	16	53.92	8
Tshangkha	838	817	1,655	37.38	18	61.00	17
Tshendagang	921	908	1,829	95.85	18	44.45	48
Total	10,506	9,746	20,252	1,722.60	224	497.90	257

Table 1: Dagana statistics (source: 12th Five-Year Plan of Dagana dzongkhag).

Paro Dzongkhag

Paro, situated in the northwestern part of the country, has a total area of 1,293 km^2. The population of the dzongkhag is 46,316 (23,941 male; 22,375 female). Rural communities constitute 74.3 percent of the population. The mean annual household income is BTN 201,823 (USD 3,140 approx) and major income sources include agriculture and livestock rearing, and in urban centers and peripheral areas they include tourism and small retail business.

The dzongkhag is divided into 10 gewogs; of which five will be covered by the project. The table below shows the five gewogs in Paro dzongkhag to be covered by the project with relevant vital statistics:

Gewog	Population			Area (km^2)	Irrigation Scheme		No. of RWSS
	Male	Female	Total		No.	Km	
Dhopshari	1,623	1,710	3,333	36.7	7	18.3	-
Dokar	1,116	1,211	2,327	106.2	6	3.5	23
Lamgong	2,972	2,874	5,846	48.8	20	28.0	15
Naja	1,664	1,623	3,287	151.8	3	11.0	32
Shaba	3,258	2,683	5,941	76.4	18	49.5	15
Total	10,633	10,101	20,734	419.9	54	110.3	85

Table 2: Paro statistics (source: 12th Five-Year Plan of Paro Dzongkhag, Gross National Happiness Commission, RGoB)

Project Objectives:

The objective of the project is to build resilience to climate change and adaptive capacity of water stressed communities in the dzongkhags of Paro and Dagana.

The project comprises four components are as follows:

Component 1: Adaptive management of watershed for enhancing resilience of community

Component 2: Climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation

Component 3: Climate-smart agriculture through sustainable land management and informed Agro-meteorological services

Component 4: Improved local Governance for effective Climate Change Adaptation (CCA) mainstreaming with focus on water management at the grassroots.

Project Components and Financing:

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
Component 1: Adaptive management of watersheds to enhance climate resilience of communities	Output 1.1: Watershed management action plans implemented Output 1.2: Payments-for-Ecosystem Services (PES) schemes scaled-up Output 1.3: Water sources' recharge interventions adopted Output 1.4: Wetland monitoring system for informed decision making established	Outcome 1: Increased watershed and ecosystem resilience in response to climate change and variability-induced stress	1,000,000
Component 2: Climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation	Output 2.1: Climate- and disaster-resilient drinking water infrastructure established Output 2.2: Climate and disaster resilient irrigation infrastructure established Output 2.3: Innovative technologies for tapping water adopted	Outcome 2: Improved access to irrigation and safe drinking water	5,071,000
Component 3: Climate-smart agriculture through sustainable land management and informed agro-meteorological services	Output 3.1: SLM in vulnerable and degraded areas implemented Output 3.2: Climate change information, products and services made available and accessible Output 3.3: Agricultural disaster risk reduction and management mainstreamed	Outcome 3: Improved food security and livelihoods	2,000,000
Component 4: Improved local governance for effective CCA mainstreaming with focus on water management at the grassroots	Output 4.1: Institutional mechanisms in Local Governments strengthened for CCA and gender mainstreaming Output 4.2: Local Governments and user groups in the community strengthened for effective management of irrigation and drinking water	Outcome 4: Improved sustainability through CCA mainstreaming and water governance at the local level	500,000
Project/Programme Execution cost			600,000
Total Project/Programme Cost			9,171,000
Project/Programme Cycle Management Fee charged by the Implementing Entity			779,535
Amount of Financing Requested			**9,950,535**

Projected Calendar:

Milestones	Expected Dates*
Start of Project/Programme Implementation	July 2020 or (January 2021)
Mid-term Review (if planned)	December 2022 or (June 2023)
Project/Programme Closing	June 2025 or (December 2025)
Terminal Evaluation	September 2025 or (February 2026)

* Based on the project approval, due dates apply

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Description of Project Components

The project for climate resilience building in water stressed communities in Bhutan proposes an articulated approach that will lead to healthier ecosystems and improved associated services, better management of water uses by human activities, improved information systems and decision making, and linking with the most relevant level of governance. The issues related to water availability and uses all along the watershed, the various components of sustainability (including at technical, financial and institutional level), and the participation of the beneficiaries are key aspects of the project.

Component 1: Adaptive management of watersheds to enhance climate resilience of communities

In general, the watersheds in Bhutan are pristine. The good ecosystem health and relatively low human pressure in the country has contributed in the overall health of the watersheds. The strong environmental policies and good practices have succeeded in maintaining, in average in all the country, a good forest cover, with available quality water resources with slow and steady economic growth. In the past decade, however, increased developmental activities across the country is posing serious threats to the fragile mountainous ecosystems. Watersheds in Bhutan show now various degrees of degradation, with some locations showing high levels of risk.

In the current state, the issues that deteriorate the watershed in Bhutan are forest degradation, drying up of water sources, grazing, soil erosion and landslides, infrastructure development and rapid urbanization. Some of the causes of these issues are forest fire, over extraction of forest resources, illegal harvesting, poor grazing management, and farm roads with poor drainage, inappropriate land use practices, infrastructure development along with climate-related hazards such as extreme rainfall events and prolonged dry season, unstable geology and steep terrain.

The degraded watersheds lack resilience and have limited ability to provide ecosystem goods and services let alone to withstand shocks associated with climate change . This in turn increases drudgery to women and children through various stresses such as shortage of water for drinking, sanitation and hygiene as well as water for agriculture. Further, the production of hydropower and nature-based tourism, which are the backbone of Bhutan's economy, is being jeopardized.

It has therefore become paramount to manage the natural resources and the livelihood of the people living within the watersheds. With more than 60% of the population still agrarian and sensitive to climate change, adaptation becomes ever more necessary, calling for more effective management and maintaining the overall health of their ecosystem services.

Integrated watershed management offers an holistic approach addressing these issues and enabling communities increase their resilience to climate change. Adequate watershed management is a cornerstone that allows other interventions of the project such as development of climate resilient infrastructures and water governance to be more successful.

Past experiences of integrated watershed approaches in Bhutan showed promising results. People's understanding on addressing water issues in a holistic and collaborative ways have been enhanced. The need for upstream and downstream linkages have been fostered and enabled adopting mechanisms like Payment for Ecosystem Services (PES) which not only provided viable option to finance watersheds management but also incentivized communities for their involvement in conservation activities. Currently there are four PES schemes in Bhutan focused on protection of water source areas. The recent report on "Review of PES Schemes in Bhutan", (WMD, 2019) indicated that

PES schemes have not only enhanced the watershed ecosystem services but also improved the community exchequer to support the community members to use these funds in time of need and support poor and vulnerable community members during dire need of money. The AF can support in upscaling PES schemes in the project dzongkhags to enable communities derive benefits for their conservation initiatives.

Along with watersheds, wetland management promoting wise use of wetlands and water source revival activities have also be initiated. Three wetlands have been declared as Ramsar sites and few wetlands of national importance were assessed. However, wetland management has not been carried out in the project dzongkhags. Further, 6,555 water sources which are currently tapped for drinking, irrigation and industrial use were inventoried and of these, 35 % (2,317 water sources) were found to be in the drying stage (figure 4 below) and there is need to investigate the causes of drying and intervene appropriately. Therefore, WMD is seeking AF to support upscale and strengthen these initiatives to enhance the adaptive capacities of the local communities without which wetlands and water sources in Bhutan will continue to deteriorate impacting the ecosystem and community livelihoods.

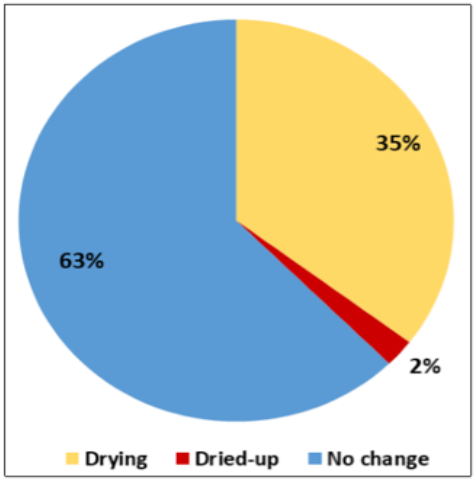


Figure 4: Status of water sources in Bhutan
(source: status of water sources in Bhutan, unpublished)

The proposed project interventions will include implementation of climate resilient activities that are expected to facilitate transformational change. This will be done by adopting an integrated approach, including the definition and implementation of robust watershed management plans, the scaling-up of community-managed Payments-for-Ecosystem Services (PES) schemes, the protection of principal water sources and management of critical ecosystems such as wetlands. Further, the strategic recharge zones will be managed through the use of appropriate technologies and interventions to revive water sources and enhance ecosystem services. All those interventions shall improve the climate resilience of communities.

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

Output 1.1: Watershed management action plans implemented
Output 1.2: Payments-for-Ecosystem Services (PES) schemes scaled-up
Output 1.3: Water sources' recharge interventions adopted
Output 1.4: Wetland monitoring system for informed decision making established

Output 1.1: Watershed management action plans implemented

In a context of highly fragile ecosystems, watershed management ensures an integrated approach leading to ensuring soil conservation, fodder/fuel wood production, vegetation control, infiltration and water recharge; but also improved access and equity for the communities.

The Water Act of Bhutan 2011 and The Water Regulation of Bhutan 2014 mandate the Ministry of Agriculture and Forests (MoAF) develop and implement watershed and wetland management plans. A "roadmap" to guide the implementation of strategies aimed at improving the management of the Bhutan's watersheds was developed in 2009 and adopted by Watershed Management Division (WMD) under MoAF in 2011. It includes a strategy to focus watershed management planning initially on those watersheds requiring urgent management interventions.

Using the Guideline for Classification of Watersheds, 2016, watersheds are assessed and classified in to pristine, normal, degraded or critical, with those classified as degraded or critical being scheduled for the development of management plans. WMD has undertaken the preliminary assessments of watersheds in Dagana and Paro dzongkhags and indicated communities' exposure and sensitivity to climate change while understanding on the same is limited. As such the need has been identified to carry out further assessments to comprehend the situation notably in the light of climate change and come up with appropriate interventions and measures to enhance the climate resilience of the local communities.

The prioritized project sites are Paro and Dagana dzongkhags. While Dagana has one watershed management plan developed, Paro does not have any management plans as of now. The project will carry out detail assessments of watersheds in the two dzongkhags and come up with prioritized watersheds for interventions by the midterm and implement at least two watershed action plans by the end of the project. An exhaustive list of appropriate interventions will be identified, consulted and implemented.

To achieve this output, the following activities will be undertaken:

Activity 1.1.1: Conduct community consultations and sensitizations
Activity 1.1.2: Training workshops and study visits
Activity 1.1.3: Conduct detailed watershed assessments in the project dzongkhags
Activity 1.1.4: Development watershed management action plan for the prioritized areas
Activity 1.1.5: Implementations of action plan activities

Output 1.2: Payments-for-Ecosystem Services (PES) schemes scaled-up

Payment for Ecosystem Services recognize the efforts done by upstream people that lead to the betterment of the lives of the downstream people in watersheds. Not only a PES establishes forms of collaborative management of natural resources and of the geographical space within a watershed, it also gives strong incentives towards the implementation of sustainable practices.

In Bhutan, PES initiative was started a decade ago in 2009 by WMD under Department of Forest and Park Services (DoFPS), and currently schemes are established in four dzongkhags: Paro, Tsriang, Chukha and Mongar. The main principle behind PES scheme is to bring the beneficiaries of ecosystem services into direct contractual agreement with local communities protecting and conserving watersheds by adopting practices that ensure continuous supply of the services which in the current context is drinking water.

The recent report on PES schemes in Bhutan highlighted the benefits of PES both for securing watershed services as well enhancing the communities' bank account. However, the report also indicated the need to provide further advocacy and sanitizations to strengthen PES mechanisms in the country.

This project provides an opportunity for improving stakeholders' awareness and knowledge (at all levels, including best resource management practices, financial management, decision making, …) in PES benefits supporting scaling up PES schemes in the potential sites within the project dzongkhags and strengthen communities' stewardship towards watershed conservation. This will entail transformational change in proper management of natural resources by empowering communities to take charge. Further, experiences in the current sites as listed above will ensure not only stewardship but also replenishment of adequate water resources to the end-users through payment system.

Paro dzongkhag currently has one PES scheme while there is none in Dagana dzongkhag. Through this project, one more PES scheme will be established in Paro and one or more will be explored in Dagana by the end of the project period.

Under this output, the following activities are foreseen for project implementation

Activity 1.2.1: Conduct community consultations and sensitizations
Activity 1.2.2: Hands-on training workshops in the management of PES schemes
Activity 1.2.3: Conduct detailed resource assessment and inventory
Activity 1.2.4: PES scheme development and implementation

Output 1.3: Water sources' recharge interventions adopted

According to State of the Environment Report of Bhutan (2016), water source drying is a country-wide phenomenon. Similarly, the issues were also recorded by WMD while carrying out watershed assessments and development of management plans. Subsequently, WMD carried out assessment of drying springs and lakes that are used as drinking water sources (Refer figures 5 and 6 below) under the SPCR project. The study found out that the drying of water sources is widespread and has detrimentally affected both rural and urban population limiting water supply for domestic consumption and irrigation.

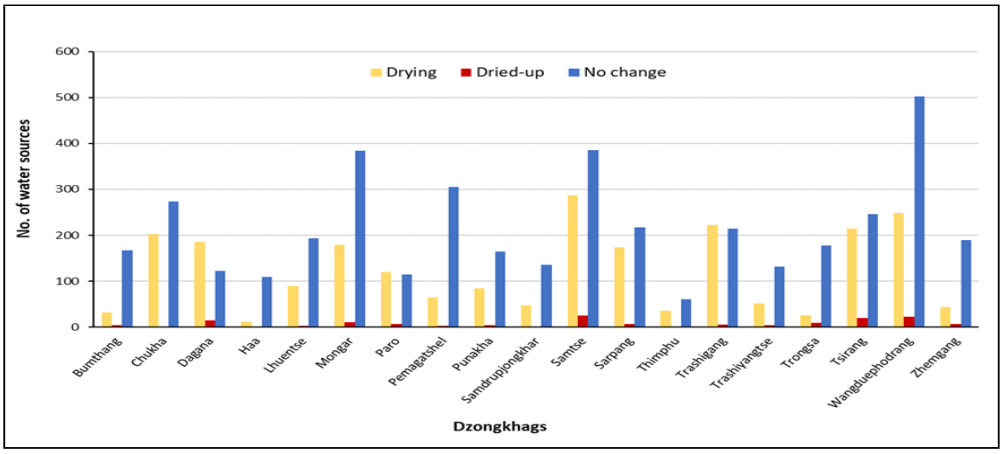


Figure 5: Status of Water Sources by Dzongkhags

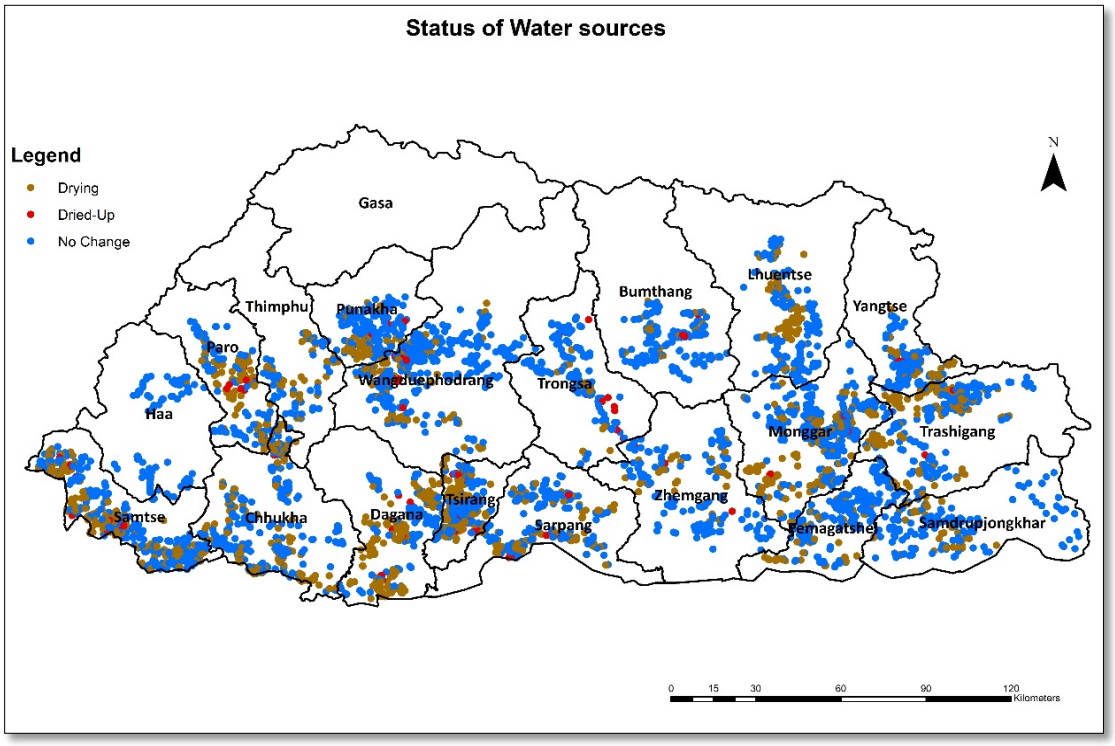


Figure 6: Map showing the location of various water sources and their status

However, at the present, there is no integrated and cross-sectorial approach to combat drying water sources in the country. It is often done in unsystematic ways. For instance, some has recommended fencing the water sources, others recommended building water storage tanks and tapping from alternative sources. Thus, the interventions create further complex unintended consequences, as there is lack of interdisciplinary approach to address the core problem.

In order to understand the issue further, WMD has initiated water source studies and revival activities in Lholing under Paro Dzongkhag using the spring-shed methodology through understanding of hydrogeology and climate impacts, and prescribing activities such as digging trenches, identifying protection areas, plantations, soil and land management activities and other bio-engineering activities.

The proposed project will seek to strengthen the existing revival site in Paro and replicate the same in at least three more areas in Dagana and Paro dzongkhags through the AF support which otherwise would remain at the pilot scale.

The proposed project will implement the following activities to achieve this output:

Activity 1.3.1: Conduct community consultations and sensitizations
Activity 1.3.2: Training workshops
Activity 1.3.3: Conduct field works
Activity 1.3.4: Development of intervention Action Plan for the prioritized areas
Activity 1.3.5: Implementations of intervention action plan activities
Activity 1.3.6: Monitoring and maintenance of conservation/restoration activities

Output 1.4: Wetland monitoring system for informed decision making established

The general type of wetlands in Bhutan includes lakes, rivers, springs, ponds, marshes, peat bogs and other predominantly waterlogged areas. Functional wetlands are critical segments of the watershed, as they support a high level of biological productivity and diversity. Wetlands are recognized to provide fundamental ecosystem services, such as water regulation, filtering and purification, as well as numerous scientific, cultural and recreational values. Thus, wetland ecosystems are important for the maintenance of the broader ecosystem health.

In the past, strong cultural and traditional ethos among the Bhutanese population and the lack of modern development technology (heavy dredging equipment and other land conversion technologies) had protected the wetlands. However, in the recent past, disappearance of the significant areas of wetlands was recorded especially in and around urban centers. The main drivers of change were fragmentation of large natural wetland and impacts of climate change. Concurrently number of complains on worsening quality and decrease in quantity of drinking water has seen significant rise.

WMD proposes to carryout inventory of wetlands in the selected two Dzongkhags. The wetlands inventory primarily will provide the tools in implementing the Forest and Nature Conservation Rules and Regulations (FNCRR) 2017, where there are specific clearance mechanisms established to stop the conversion of significant wetlands in the country to other land use. The wetland inventory is also expected to provide number and extent of wetlands requiring protection within the project site. The use of the inventory as a guide in forestry clearance processes will strengthen protection and management of critical wetland ecosystems and help in enhancing resilience of communities by protecting their water sources.

The AF support would assist in establishing reliable wetland monitoring system that would facilitate in developing plans and programs to address the vulnerability issues and maintain wetlands eco-system functions.

Activity 1.4.1: Training workshops for capacity building of field offices
Activity 1.4.2: Conduct mapping of wetlands for the project Dzongkhags using remote sensing
Activity 1.4.3: Field data collection and mapping
Activity 1.4.4: Data compilation and analysis, feeding decision making mechanisms

Component 2: Climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation

Drinking water

The very first element coming into picture is water which is affected by climate change. Daily rising inconsistency in temperature and precipitation has contributed to steep rise and drop in water availability in rivers and springs. It is crucial to adapt to these changes wherever possible to ensure continuous availability and/or accessibility of this vital resource.

Bhutan has high per capita availability of water when assessed at the level of basins with the total outflow of the rivers estimated to at 109,000 m³/capita/year (National Integrated Water Resources Management Plan, 2016, NECS). However, issues in water accessibility continue to persist due to insufficient source management, inadequate infrastructure development and issues in management and governance. Issues in water quality are also becoming pertinent. The issues in water quantity and quality are further exacerbated by increasing population and urbanization and climate change. The rugged terrain and altitudinal variations also create imbalance in water supply with some areas having abundant water while adjacent ones experience shortages. The abundant water is largely available in the form of major rivers and tributaries flowing in the low-lying river valleys and deep gorges, whereas most of the communities are located along slopes and depend on smaller streams, springs and lakes for drinking some of which are already drying. This issue of accessibility is clearly visible in some areas where rivers are freely flowing in the bottom of the valley, while houses on the hill sides remain facing shortages. Paro and Dagana are two such dzongkhags/districts in Bhutan being considered here for this adaptation proposal wherein, an integrated approach is adopted to address water related issues at the source, infrastructure, quality and management levels with consideration for economic, social and ecological components along with risk factors (such as climate change and increasing population).

The present status of the water supply scenario in the targeted areas in Paro and Dagana districts are below:

Dzongkhag	LAP/Area	Water Supply (Hrs/Day)	HH Units	Buildings	Metered/Non-metered Buildings	Storage Capacity (m^3)	Water Treatment Plant
Dagana	BHU,Core Town and Below School Area	24	851	93	93	360	Yes 1 is present and functional
	NHDC Colony,RBP and Dzong Area	14					
Total			851	93	93	360	

Table 3: Current Water Supply Scenario in targeted urban areas

Dzongkhag	No. of Villages	Total HHs in the Village	Total HHs with continuous flow (24*7) of water	Total HHs without continuous flow (24*7) of water	Coverage in terms of 24*7 water supply (%)
Dagana	43	2,992	1,354	1,638	45.25
Paro	103	3,453	1,114	2,339	32.26
Total	146	6,445	2,412	3,377	77.51

Table 4: Current Water Supply Scenario in targeted rural areas

In the context of Bhutan, access to 24x7 water supply is considered as having adequate water for 24 hours from a tap, which may also be by means of storage facilities.

The common challenges faced by the Dzongkhag municipalities are lack of safe drinking water supply due to non-existence or poor functionality of water treatment plants as well as inadequate water supply systems along with instances of drying up of water sources. Some towns and extended areas under municipalities are still catered by RWS and are thus, supplied with untreated and unmetered water.

In the rural areas, transferring of scheme ownership to the beneficiaries and maintenance has been a major challenge after the construction of Rural Water Supply Scheme (RWSS). Differing interpretations of policies and strategies has led to conflicting, differing and rapidly changing priorities and practices in the sectors. Many beneficiaries still see the ownership and responsibility for major maintenance and rehabilitation of rural water supplies as being that of the Dzongkhag or RGoB. Many implementation procedures have actually contributed to a lack of beneficiary commitment to the self-management and maintenance of their own schemes.

The project is also intended to implement new innovative approaches (in the context of the two targeted districts) in order to take advantage of the climate change like ground water extraction and rain water harvesting. Other mitigations include strengthening the existing water transmission/ distribution lines to be more climate-resilient and durable. Also, new water supply infrastructures considered for this project will be built with adequately resilient materials to ensure long-time benefits. Furthermore, infrastructures like Water Treatment Plant (WTP) are also being considered (wherever necessary) to enhance the drinking quality standard.

Irrigation Water

Climate change induced by global warming poses significant risks to irrigated agriculture in general and water management in particular. Water availability and management is becoming challenging, with remote areas experiencing scarcity in dry areas and monsoon seasons experiencing high rainfall, flashfloods and landslides have damaged existing irrigation schemes. Climate change is already impacting spring systems across HKH region and Bhutan is not an exception. In the case of irrigated system, rice cultivation is mostly dependent on monsoon charged spring waters and streams fed by glacier melts. Slight delays or changes in the pattern of rainfall directly impacts both availability and amount of irrigation water. Given the seasonality of streams and spring waters and extreme events, a major focus in building climate resilient irrigation structures and improvements in water management practices remains crucial. These interventions would help in sustainably improving the farm productivity.

Most of the irrigation schemes in Bhutan were constructed as earthen canals with low efficiency and little resilience to extreme events – leading to blockages, water loss through seepage, water

conveyance loss and frequent damage by landslides. The current infrastructure is exposed to deterioration by even slight increases in river floods and landslides caused by climatic variability, mainly rainfall patterns and temperature. These systems are thus highly susceptible to climate change effects.

With less than 18% of cultivated agricultural land irrigated, agriculture is predominantly rain-fed and dependent on the changing monsoonal rain patterns. Water shortages have been more pronounced during the main cropping season, which coincides with the pre-monsoon season. During dry periods, drought has impacted cropland, as well as the small streams on which small scale irrigation depends, resulting in inadequate on-farm water supply, conflicts over water sharing, low labour productivity (e.g. due to time spent guarding against water theft) and low crop yields. In times of excess rainfall, flash floods and landslides block or damage irrigation schemes, disrupting flow of water to farmers through seepage-induced water loss and water conveyance losses. As a result, the climate change not only negatively impact rain-fed agriculture, but also irrigated agriculture production.

Despite the considerable investments made in water resource management, there has been limited explicit consideration of future climate change impacts in these investments. Climate change has also served to undermine several of these investments and jeopardize many of the gains made through past interventions. For instance, government's past investment in irrigation systems has not been climate resilient, causing irrigation systems susceptible to flood damage from heavy monsoon rain. Therefore, the project seeks to install climate proof infrastructure for drinking water and irrigation water supplies, thus enhancing and ensuring water security at every household in the two project sites. It is also expected to enhance food security through improvement in accessibility to water and channelling time saved into other income generating activities.

The project proposes to install or replicate successful irrigation systems such as hydro-pressurized pipe or HDPE pipe in Bhutan replacing the conventional conveyance system. Conventional irrigation system often losses huge amount of water to evapotranspiration and seepage and are vulnerable to extreme climate events like heavy rainfall. In addition, annual maintenance of long-distance irrigation canal require huge labour and expenses, which could otherwise be spend on income earning opportunities for a household. In order to develop climate resilient irrigation systems, the climate change components will be mainstreamed in the irrigation planning process.

Replicating successful irrigation systems such as hydro-pressurized pipe or HDPE pipe are also expected to minimize negative environmental effects such as landslides often due to poor maintenance of the open irrigation canal. Further, the proposed technology has improved water delivery to the end users through reduction of loss of water to evapotranspiration and seepage. The large sized HDPE pipes were used to deliver the water to end users and in most of the cases the pipes are buried under the soil. Thus vegetation cover will regain on those excavated sites and there is minimal effect on the arable land, as farmers can still cultivate crops with pipes running below.

The two Dzongkhags Dagana and Paro were specifically selected given their vulnerability to climate change and priority for the government. As per the National Irrigation Master Plan (NIMP), respectively 40 and 15 irrigation schemes have been prioritized for irrigation modernization in Dagana and Paro. Most of those irrigation schemes are partially damaged since those schemes were either constructed in early 90s and has received a very little government assistance ever since then. The irrigation schemes given in the table below were further prioritized in consultation with the respective Dzongkhags considering the Multi-criteria Analysis for the support under the proposed project.

Sl. No.	Dzongkhag	No. of schemes	Present gross area (ac)	Likely extension area (ac)
1	Dagana	40	4227	2253
2	Paro	15	2299	730

Table 5: The prioritized irrigation system for modernization
(modernization involves re-engineering of existing irrigation systems and their structures)

The proposed project will be built upon the experience and benefits of climate resilient technologies and practices demonstrated and key lessons learned from past irrigation support projects.

Output 2.1: Climate- and disaster-resilient drinking water infrastructure established

In the municipalities, it is of utmost importance that the water infrastructures be built with upgraded technology in order to make them potentially resilient to climate change. Today, resilience of many infrastructures has reduced drastically with time factored by excessive leakages and intermittent supply. Similarly, in rural Bhutan, it is very common to see drinking-water supplies being directly managed by households in an effort to have alternate supply of reliable water which is actually triggered by the failure of RWS schemes in supplying reliable water. In many cases, this is as a result of inadequate operation and maintenance of the RWS schemes due to lack of fund. These already substandard situations are at a high risk of being adversely affected by climate change owing to the increase in severity of challenges to the scheme managements.

While addressing the issues mentioned in the previous section, the project will construct new rural water supply schemes, rehabilitate/ renovate the existing schemes, and also tap new sources for a sustainable water solution. The infrastructure should look into the future needs of population growth, increasing demands and also the need to have structures designed adequately for lean flows in the winter and increased flood risks in the monsoons, to make them climate resilient. The project includes activities aimed towards reliable supply of drinking water such as source protection, extension of pipeline to a reliable source, and construction of water reservoirs to ensure continuous supply of water. As the supply of water becomes reliable, the need for temporary extractions of surface water from multiple places gets reduced and hence the vegetation of the districts is less disturbed.

One of the objectives of this project is to also ensure that the quality of the drinking water meets the standards set by the Bhutan Drinking Water Quality Standards (BDWQS) 2016 and thus development of Water Safety Plans is proposed. Water Safety Plan (WSP) is a water supply system risk management plan that addresses all steps in the water supply chain from catchment to consumer, ensuring the safety of drinking water. Although WSPs have been implemented in the past, many are not fully functional and thus, require reinforcement. Furthermore, in order to ensure sustained supply of good drinking water, periodic water quality testing need to be conducted which entails procurement of testing kits and reagents including training.

The activities foreseen for project implementation to achieve the output are as follows:

Activity 2.1.1: Construction and Rehabilitation of Drinking Water Supply Schemes:

Major portion of the infrastructures include the construction of rural water supply schemes which constitutes of constructing climate resilient; 1) intake structures, 2) water transmission mains, 3) water distribution network, and 4) water reservoir. The activities not just include construction of new structures, it also includes rehabilitation/ augmentation of the existing structures which is equally essential to ensure resilience against climate change and thereby ensuring 24x7 water supply.

Water infrastructures in urban areas also include similar types as mentioned for rural but in a bigger way owing to the sheer increase in the population as compared to the rural areas. In addition to the water intake, transmission, and distribution, there is a need of water treatment plants especially for the urban settlement as the quantity of water stored is relatively huge and hence there is greater chance of contamination.

Activity 2.1.2: Development of Water Inventory

At the end of the project, it is very essential to have a reliable inventory of the water source and water supply assets which will provide guiding/ monitoring data for future sustenance. At present, the quality of data in terms of water source and distribution is very weak which provides very minimal information regarding the water situation of the two districts. This project will ensure development of a reliable database of the complete water scheme, starting from the source till the end user which can even be replicated in other remaining districts of the country.

Activity 2.1.3: Capacity building of Engineers in Climate Resilient water supply infrastructures

First and foremost, it is necessary to establish the knowledgeable working group in order to execute any developmental activity. The concept of climate change is fairly new when it comes to water supply infrastructures in Bhutan. Most of the existing water supply works (especially rural schemes) executed are of conventional type. Although, it might be incorrect to say that these existing structures are not climate resilient, it is for sure guaranteed that these could be improved and made much more adaptive to climate change. Therefore, it is of utmost importance that the engineers executing these projects be educated in the concept of climate resilient structures. Through this project, the capacity of the engineers will be enhanced particularly in the concept of adaptation to climate change when it comes to water infrastructures including the complete conveyance (water source, transmission, treatment and distribution).

Output 2.2: Climate and disaster resilient irrigation infrastructure established

To enhance and ensure water security at every household, the adaptation funds will climate proof or strengthen the resilience of existing open earthen canal irrigation schemes against extreme events. With the planned improvement of the existing irrigation systems, much of the infrastructures that are of temporary nature will be replaced by a more robust, flexible and climate resilient structures.

The adaptation fund will also realign irrigation schemes towards reliable water sources to support farmers experiencing water scarcity during the dry season. Different types of water lifting devices may also be installed for the diversification of water sources for irrigation. The project will particularly focus more on combining water for both drinking and irrigation wherever feasible so that participation and ownership by beneficiaries are focused through formation of Water Users Association (WUA) with appropriate technological and institutional inputs. By combining both drinking and irrigation water, there will be no conflict over water tapping rights and will reduce the drudgery, maintenance cost as well as reduce the investment cost. Environmental impacts caused by overflow from open canal system and leakages from pipes will be reduced with the improvement of the systems through appropriate technology.

The project will also focus on dry land irrigation with appropriate technological and institutional inputs. Sprinklers and drip irrigation allows for efficient use of water and represent an adaptation strategy against scarcity of water. Accordingly, adaptation resources will also be used to upscale high efficiency

irrigation or water saving technologies such as sprinkler irrigation and drip irrigation for high value crops such as vegetables and horticulture crops in the two project sites.

The irrigation tail water management was not given much importance in Bhutan. However, due to increasing extreme events, the management of tail water is becoming more important in order to prevent negative environmental impacts it causes downstream of the command area. Accordingly, the adaptation fund will fund tail water management in each district on pilot basis to properly channel the irrigation tail water into the natural gullies.

The proposed activities under this output include:

Activity 2.2.1: Construction of pressurized/closed irrigation systems (gravity)
Activity 2.2.2: Re-engineering/rehabilitation or improvement of existing irrigation systems
Activity 2.2.3: Scale up micro-irrigation system (drip & sprinkler)
Activity 2.2.4: Tail water management

Output 2.3: Innovative technologies for tapping water adopted

Apart from the regular water supply works mentioned in output 2.1 above, the project will also focus on mitigating the effects of climate change on the hydrology of the targeted areas. With the increase in the seasonal variability of rainfall and the outflow of rivers on the increase, it is vital to tap-in the opportunity and make the best use of the situation. The project has identified two such measures to focus on collecting water, namely; 1) Ground water extraction, and 2) Rain water harvesting.

Ground Water Extraction: Some settlements in Paro district are located near the river bank but are deprived of the quality drinking water due to sheer unavailability/ drying of spring water. Even though the discharge in the river is on the rise every year due to glacier melt, the community residing on the valley have not explored the idea of ground water due to lack of knowledge and budget. Hence, this project will introduce the concept of extracting ground water which would prove to be very adaptive to the climate change impacts on the river discharge.

Rain Water Harvesting: Similarly, in Dagana some sites are identified for rain water harvesting. While climate change has brought a great variability in the intensity of rainfall in the region, it also has a scope of exploring the opportunity of harvesting the excess rainfall in summer seasons to be used during the dry seasons. Although, this concept is proven as very effective in many parts of the world, it is fairly new in Bhutan. This project would be an excellent opportunity to showcase the success of this concept in the country.

The project will promote and upscale different types of water lifting devices (Solar/electric/Hydraulic ram) essentially for the diversification of water sources for irrigation. The objective of diversification of water sources is to augment the amount of water supply for irrigation by tapping more reliable sources than the existing seasonal sources.

Adaptation resources will also build water harvesting through construction of small earthen check dams and ponds, and storage tanks as small scale reservoirs for irrigation water supply during dry periods. Water storage in Bhutan is clearly a necessity, to meet growing water needs of urban areas, as well as to supply irrigation water for agriculture (which is mostly rain fed at present). These needs are particularly evident in those areas where water is aplenty during monsoon but become completely dry during winter although the land is fertile. Low dry season flows in rivers already pose difficulties for different users. This is expected to worsen with climate change. Water storage will help sustain the use

of limited water during the dry season, thereby increasing the area irrigated during the dry season. The strategy is to build water storage to increase year-round reliability of water in the two project sites.

The proposed activities under this output include:

Activity 2.3.1: Promote and scale-up groundwater extraction schemes in Paro;
Activity 2.3.2: Promote and scale-up rainwater harvesting in Dagana;
Activity 2.3.3: Promote and scale up solar/electric/manual water pump for irrigation
Activity 2.3.4: Build water harvesting structures or small-scale reservoirs to tap water for irrigation.

Component 3: Climate-smart agriculture through sustainable land management and informed Agro-meteorological services

Only 7.8% of the country's total land area is arable and 2.93% is cultivated[11]. About 31% of agriculture land is situated on slopes more than 50%[12]. Farming is often carried out without any sustainable agriculture practices leading to annual soil loss of 3-21 t per hectare[13]. The loss of top soil poses a serious threat to food security as it significantly reduces the inherent soil fertility, soil organic matter and water retention capacity resulting in poor land productivity and crop yield. Furthermore, as agriculture is predominantly rain-fed and dependent on monsoon rainfall patterns, agriculture in Bhutan is highly sensitive and vulnerable to the impacts of climate change and climate variability[14].The Intergovernmental Panel on Climate Change[15], also warns that mountainous regions such as Bhutan will experience a crop yield decrease due to increase in water stress (either too much or too little) and land degradation.

The impacts of climate change on land and crop productivity are projected to continue in future with changing temperature and precipitation patterns (refer Project Background and Context, pages 4-5). In order to address the climate change impacts, the NAPA (2011) and the Renewable Natural Resources (RNR) Sector Adaptation Plan of Action (SAPA) 2016 have undertaken sector vulnerability assessments and identified a number of adaptation measures, which include the following:

(i) Develop and promote biotic and abiotic stress tolerant crops;
(ii) Improve traditional crops that have adapted to local climatic stress;
(iii) Diversify crop production & change cropping patterns;
(iv) Develop and pilot climate smart agriculture practices;
(v) Scale up of Sustainable Land Management (SLM) Technologies to promote soil and water conservation;
(vi) Improve weather and seasonal forecasting for farmers (Agro-meteorology)

As identified in the lists above, promotion of SLM technology has been one of the options that fit well in Bhutanese farming environment and proven very successful in reducing land degradation caused by anthropogenic activities. In fact, the implementation of SLM interventions, especially the contour grass hedgerows on sloppy agriculture land have found to reduce soil erosion by 50 percent[16] as compared to traditional farming practices.

[11] Land Cover Mapping Project (LCMP), 2011, National Soil Services Centre, DoA, MoAF
[12] National Action Program to Combat Land Degradation in Bhutan (NAP), 2014, National Soil Services Centre, DoA, MoAF
[13] Soil Erosion Report, 2010, National Soil Services Centre, DoA, MoAF
[14] National Adaptation Plan of Action (NAPA), 2011, National Environment Commission (NEC), RGoB
[15] Intergovernmental Panel on Climate Change (IPCC), 2007
[16] Soil Erosion Report 2010, National Soil Services Centre, DoA, MoAF

Similarly increasing climate variability and continuing climate change results in productivity losses in agriculture. Insect, pest and crop diseases are often associated with changes in weather patterns thereby incurring crop yield losses in addition to the damages caused by the extreme weather events. Critical adaptation measure to avert these losses mainly involves the generation of weather and climate information. Weather and climate information help farmers to make critical farm decisions and adapt to the changing climate.

The Agro-meteorology Program was established under the Department of Agriculture in 2019 to transform climate data into climate information in a way that responds to user needs and assists decision-making to reduce the impacts of climate-related hazards and increase benefits from favourable climatic conditions. To support the agro-met program, expansion of an agro-met decision support system (ADSS) is crucial for strengthening agro-met services in Bhutan as it would provide, real time monitoring, data analysis and comprehensive analytical tools and statistical information to support decision making across a range of temporal and spatial scales.The Agro-meteorology Program will also issue advisories and warnings against climate related disaster based on climate scenarios with better lead time. Early warnings against natural disasters not only help to save the crop by adopting quick strategic planning. Dissemination of such warnings to the end users on a real time basis with the help of electronic media can become a key factor for crop production and protection.

Therefore, this project component will focus its investment on SLM and Agro-meteorology to enhance resilience of the agriculture sector so that the livelihoods and the food security in the project areas are not put at risk. In particular, the component 3 will focus downstream section of the watershed, while the Components 1 and 2 will focus upstream i.e. the watershed management and water conveyance system, which is the overall design and approach of the project.

Output 3.1: SLM in vulnerable and degraded areas implemented

In order to enhance land productivity and make agriculture landscape more resilient to climate change, this project output will seek to scale up existing SLM practices and technologies that have been proven successful and effective in reducing land degradation especially soil erosion and landslides caused by rainfall variation. This will involve promoting two main types of SLM measures – Structural measures and Vegetative measures. The structural measures include: 1) Terracing - the construction of a series of level or nearly level strips (benches) running across a slope following the contour lines at certain vertical intervals to be used as chhuzhing, dryland or orchard terraces, 2) Check dam – a simple physical construction of stone or log to prevent the down-cutting of runoff water in gullies and to retain sediments behind the dam, 3) Contour stone bund - a construction of small bunds of stone along the contour lines to get rid of excess stone in the field and most importantly to help reduce soil erosion, conserve soil moisture and increase soil fertility. The vegetative measures include: 1) Contour hedgerow - plantation of Napier grass along the contour line to provide physical barrier, slowing and trapping soil and fast moving water down slopes and also provides added benefits of fodder to the livestock, 2) Orchard establishment - involves establishment of orchards or agro-forestry system using different fruit tree seedlings depending upon the feasibility and the market potential to diversify cash income source and provide vegetative cover, and 3) Plantation of bamboo and non-invasive tree species - done in degraded areas to stabilize the slopes.

Under this output, investments will also be made in the promotion of 1) crop varieties that are tolerant to diseases and water stress and 2) crop diversification, which is key to improving household food and nutrition security during the times of uncertain externalities. Further, traditional nutrient rich crops such as wheat, millet, buckwheat and other minor cereals that have been long adapted to local environmental conditions and often climate hardy will be encouraged. Other investment areas will include integrated

plant nutrient management, integrated pest management and water use efficient technologies such as drip irrigation and sprinklers which will be aligned with the component 2 of the project on climate resilient irrigation infrastructure and dryland irrigation. This output will also rely on climate and weather information, products and services from the following output 3.2 (Climate change information, products and services made available and accessible).

The output also recognizes the fact that most of the SLM interventions take a long time before its impact become tangible and start contributing to land user's livelihoods[17]. While this long "gestation period" is not a real constraint for those land users having large land holdings and adequate resources to depend for their livelihoods, for resource poor farmers, this is a serious problem as they are heavily dependent on their small landholding with no alternative sources of food and cash income. They are, in fact, more concerned about their immediate needs than the long term benefits that are likely to emerge from SLM interventions only years down the line. Recognizing this constraint, the project output will ensure to package or integrate SLM interventions with other activities aimed at incentivizing SLM adoption and also to build their adaptive capacity through knowledge and diversification of income sources.

Therefore, the following activities are proposed under this output:

Activity 3.1.1: Participatory SLM Action Planning to validate key SLM interventions and cash income generating activities that will help build adaptive capacity of the communities;

Activity 3.1.2: Implementation of SLM measures – terracing, contour hedgerows and stone bunds, orchard establishment;

Activity 3.1.3: Promote climate agriculture practices including integrated plant nutrient management and organic agriculture;

Activity 3.1.4: Promote climate resilient crop varieties (particularly resistant to diseases and water stress);

Activity 3.1.5: Technical assistance and support to communities on the implementation of SLM practices in the field;

Activity 3.1.6: Field-based and specialized training to farmers and agriculture extension staff respectively on SLM technologies to enable them to respond to climate change induced risks and impacts with more competence and knowledge;

Activity 3.1.7: Regular monitoring (twice annually) and data collection to ensure work progress and the sustainability of the investments made;

Activity 3.1.8: Documentation, Knowledge Management (KM) and experience sharing platforms

Output 3.2: Climate change information, products and services made available and accessible

This output will support the roadmap of agro-met services in Bhutan for better climate informed digital advisory services. The climate services will be produced appropriately in areas where other components are implemented so that activities of this project are packaged end to end. The project will mainly assist the up-scaling and improvement of the agro-met decision support system (ADSS).

The ADSS (www.agromet.gov.bt) will be launched by the Department of Agriculture soon. A Memorandum of Understanding (MoU) is in place between DoA and RIMES mainly to enhance the

[17] Documenting the land-Documenting the key lessons of Sustainable Land Management on Steep to Very Steep Slopes in Bhutan, 2011, National Soil Services Centre, DoA, MoAF

institutional and technical capacity of Department of Agriculture particularly Agriculture Research and Extension Division (ARED) to understand and provide improved agro-meteorological advisory and early warning services to ensure preparedness against weather extremes causing damage to various agricultural systems in Bhutan.

During the conceptualization of the ADSS, it was envisaged that the web based system will be scaled up in the remaining dzongkhags. The system needs to be upgraded and improved based on the first-hand experience. Currently the weather forecast at the dzongkhag level is integrated in the ADSS and will require the integration of gewog level weather forecast and incorporation of the cropping calendar in the system. The panel also should incorporate pest and disease forecasting and drought monitoring. The activities under the project will mainly entail providing of agro-advisories in major agriculture commodities mainly rice, maize, potato, chilli and citrus in the Adaptation Project sites.

The agro-met program will be strengthened further with the enhancement of ADSS through this project and rural communities using agro-met products and services (agro-advisories) will be enhanced.

Planned activities under this output include:

Activity 3.2.1: Improve and upscale ADSS;

Activity 3.2.2: Agro-met advisory bulletins appropriately packaged and disseminated timely;

Activity 3.2.3: Incorporation of area specific weather and crop data in ADSS;

Activity 3.2.4: Implementation of climate research using modelling and simulation;

Activity 3.2.5: Capacity building of agro-met focal points based in ARDCs and Central Programs;

Activity 3.2.6: Knowledge management and communication activities

Output 3.3: Agricultural disaster risk reduction and management mainstreamed

Agriculture in Bhutan is vulnerable to series of climate-induced disasters. Rural communities are often affected by floods, drought, windstorm, as well as occurrence of insect pest and diseases. Less than half of the rural household is irrigated, so the farming system is still dominated by dry-land farming. Localized drought is becoming increasingly apparent and significant. Late onset of monsoon induces agriculture drought and affects most of the farming communities especially rice and vegetable farming. The country on the other hand has recorded incidences of climate induced insect pest in the country. In 1996, rice farmers in high-altitude areas lost 80–90% of the crop production to rice blast disease. Turcicum leaf blight of maize in 2007 damaged more than 50% of the farmers' harvest. The outbreak of fall army worms affected 16 of the 20 districts in 2013. Also, in 2008, a severe windstorm destroyed all maize crops belonging to hundreds of households.

Disaster Risk Reduction (DRR) includes observing, detecting, monitoring, predicting and issuance of early warning of a wide range of weather, climate and water related hazards. Climate related risk or climate induced risked (drought, flood, windstorm, insect pest and diseases) needs to be mainstreamed into Bhutanese agriculture planning and decision making processes in order to avert the crop losses caused by extreme weather events. The Disaster Risk Management Strategy of Bhutan 2013 highlights strong need for integration of DRR and CCA efforts and to have environmental and natural resource management approaches as part of DRR strategies.

The following activities are foreseen for project implementation under this output:

Activity 3.3.1: Initiation of Climate/Farmer Field Schools to bring transformational change by enhancing response capacity to identified risk;

Activity 3.3.2: Sensitization, awareness and capacity development on agro-met services to researchers, extension and farmers;

Activity 3.3.3: Development of crop suitability and feasibility maps;

Activity 3.3.4: Pest and diseases forecasting;

Activity 3.3.5: Database agricultural damage using immediate information feed from field.

Component 4: Improved local governance for effective CCA mainstreaming with focus on water management at the grassroots

An integral aspect of advancing good governance in Bhutan has been the gradual process of democratic governance and decentralization, the beginning of which dates back to the establishment of the Tshogdu or National Assembly in 1953, followed by the Lodey Tshogde (Royal Advisory Council) in 1965, the High Court in 1967 and the Lhengye Zhungtshog (Cabinet) in 1972. Later the process of decentralization was enhanced to encompass local governance with the formation of Dzongkhag Yargye Tshogdu (DYT) or District Development Committee in 1981 and Gewog Yargye Tshogchung (GYT) or Block Development Committee in 1991, which resulted in the delegation of administrative and financial powers to the district and block level respectively.

Bhutan is made up of 20 Dzongkhags (Districts), 205 Gewogs (Block) and 1044 Chiwogs (Villages). In keeping with the Constitution, the Local Government Act of Bhutan 2009 provides for direct participation of the people in the development and management of their own social, economic and environmental well-being through decentralization and devolution of power and authority. The Act stipulates that local governments be established in each of the 20 Dzongkhags, comprising of: (a) Dzongkhag Tshogdu; (b) Gewog Tshogde; and (c) Thromde Tshogde. These are legislated to serve as the highest decision-making body respectively at Dzongkhag, Gewog and Thromde level, and are to be supported by Dzongkhag, Gewog and Thromde Administrations staffed by civil servants. It provides local governments with a set of administrative, regulatory, service delivery, and financial powers and functions for governance at the local level.

Component 4 will allow to increase to overall sustainability and coherence of the project by ensuring the involvement of most relevant governance institutions for climate resilience at the local level. It will also ensure the right adaptation activities are identified, prioritised and implemented with the communities, with primary focus on development and management of water resources and rural water infrastructure, specifically drinking water and agricultural irrigation schemes.

This component will specifically develop the capacity, in terms of knowledge and skills, of Local Governments to integrate climate change adaptation in local development investments; institute mechanisms for mainstreaming climate change along with other cross-cutting issues, viz. gender, environmental, disaster and poverty, in local development plans, programs and activities; institute mechanisms in Local Governments for CCA and gender mainstreaming; and strengthening Local Governments and user groups in the communities for effective management of irrigation and drinking water.

Output 4.1: Institutional mechanisms in Local Governments strengthened for CCA and gender mainstreaming

Strengthening Local Government institutions has been a key programme of the Royal Government of Bhutan since the commencement of decentralization process in 1981. In the new democratic system, the Local Government institutions have an increasingly important role as frontline agencies for sustainable development, facilitating direct participation of the local communities in the development and management of their own social, economic and environmental wellbeing. A robust system of local governance is also critical for the government's sustainable development policies and programmes to produce direct social, economic and environmental benefits for the local communities, especially the poor and vulnerable groups, and have a far-reaching impact.

This output will focus on strengthening the Institutional mechanisms at Local Government level for mainstreaming climate change adaptation and gender needs in local development plans, programs and activities especially those concerning rural water supply schemes, agricultural irrigation systems and sustainable land management. The respective LGs will play the role of appraising local development plans, programs and activities with the lens of gender and climate change adaptation and ensuring these two issues, wherever relevant, have been mainstreamed. Through the project, Gewog-level mainstreaming mechanism for CCA and gender will be strengthened. Local Governments and communities will be sensitized and capacitated on mainstreaming CCA and gender in local development plans, programs and activities related to drinking water, irrigation and sustainable land management among others. Capacity development training for LGs on CCA tools, frameworks and approaches and M&E of CCA and gender mainstreaming in the plans, programs and activities of the respective LGs will be conducted.

The following activities are proposed to achieve this output:

Activity 4.1.1: Conduct sensitization workshop for LGs and communities on mainstreaming CCA and gender in local development plans, programs and activities related to drinking water, irrigation and SLM;

Activity 4.1.2: Conduct capacity development training for LGs on CCA investment and mainstreaming tools, frameworks and approaches;

Activity 4.1.3: Carry out M&E of CCA and gender mainstreaming in their plans, programs and activities;

Output 4.2: Local Governments and user groups in the community strengthened for effective management of irrigation and drinking water

While the Constitution of Bhutan mandates the Local Governments to encourage the involvement of communities and Community Groups in matters of local governance, formal structural-functional linkages supporting community engagement is either missing, weak or has not been established yet. In absence of such established mechanisms there has been series of reports highlighting failures of community groups in fulfilling their prescribed mandates. Similarly, limited sense of community ownerships over various public infrastructures and installations have repeatedly surfaced in the public domain often citing poor coordination among the communities themselves or between the concerned LGs and communities. The Department of Local Governance, Ministry of Home and Cultural Affairs has already formulated Community Contracting Protocol (CCP) which is also aimed at promoting community ownerships of various public infrastructures in the Gewogs and the communities.

While some sectors (farm roads and irrigation under MoAF) have already developed policy guidelines for the formation of community groups and their involvement in carrying out minor maintenance works there still exist a disconnect between LGs and such community groups, wherein involvement of LGs in management and organization of these community groups are not clearly spelt out. There is no clear line of distinction as to how LGs as duty bearers can engage community groups in the area of governance and similarly, how best these community groups as right holders can involve themselves in local governance. Therefore, such scenarios only present a picture of each sector functioning independently within their own area of interests. The situation so described clearly suggests the need for a clear policy guideline along with well-defined structural-functional linkages that encompass all sectors uniformly ensuring accountability among the stakeholders at different levels.

Besides formulation of policy guideline and establishment of clear structural-functional linkages, need based capacity building of all relevant stakeholders is equally important for effective implementation of these guidelines and operationalization of the linkages. To this end, through this project, user groups in the community to promote local ownership will be formed and strengthened. Building the capacity of the Community Groups through sensitization and training is another area that this project would like to address.

Through this project, study on local water resource sharing and water related dispute management mechanisms for improved water management will be conducted for documentation and replication of best practices applied by functional user groups in other LGs.

Rural to urban migration of the population is yet another persistent problem despite so many development activities taking place at the grassroots level. One of the main reasons often cited is non availability of the jobs in the remote areas coupled with poor basic amenities. The promotion of Community Groups along with strengthening of their capacities through this project is expected to attract educated youths and school dropouts to take up the roles of leading and managing these Community Groups.

Activities proposed under this output include:

Activity 4.2.1: Form and strengthen user groups in the community to promote local ownership and sustainability of rural water and irrigation schemes;

Activity 4.2.2: Conduct sensitization workshops for LGs and user groups in the community and provide training on management of rural water and irrigation schemes;

Activity 4.2.3: Conduct study on local water resource sharing, water related dispute management mechanisms for improved water management and community organization and their involvement in local governance and development;

Activity 4.2.4: Implement the recommendations of the study to empower community and inculcate in them the sense of ownership;

Activity 4.2.5: Document and replicate best practices applied by functional user groups in the Local Governments and communities;

Activity 4.2.6: Carry out capacity development and exchange program for LG functionaries and Community Groups on inclusive local governance and change management for engagement of the community organization in the local governance.

B. Describe how the project provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Bhutan is particularly vulnerable to climate change due to its geographic location and fragile mountainous terrain which invariably affect climate variability, including the frequency and intensity of rainfall, and changes in temperatures. According to the IPCC, climate change projections to 2100 for Bhutan in particular will lead to increases in average temperatures with relatively warmer weather at higher altitudes and during the dry season, increase in annual average precipitation, and continued spatial variation in temperatures and precipitation due to complex topography.

Expected climate change impacts will place additional stress on ecosystem-based livelihoods and on already vulnerable groups. As such, the project will focus on local level adaptation, increasing potential benefits for exposed or sensitive groups, and act as a force for change towards the foreseen improvements at different levels.

Environmental benefits

- The project is based on the recognition that resilient healthy ecosystems are at the basis of sustainable natural and human systems.
- The design and implementation of integrated watershed management plans will improve habitat quality and increase biological diversity mainly as a result of protection of the watersheds. In the long run, protection of watershed will reduce incidences of drying of water sources as a result of extreme climate events like droughts.
- The establishment of PES schemes shall increase collaboration between upstream and downstream communities, opening dialogue and leading to a stronger ownership and stewardship for natural environment.
- Similarly, the formalization of Water User Associations (WUAs) shall also improve efficient utilization and management of water resources both at the source and at the level of downstream users. WUAs will be enabled to perform systematic monitoring of the status of water availability, leading to better decision making towards the effective recharge of catchment areas.
- Replicating successful irrigation systems are also expected to minimize negative environmental effects such as landslides often due to poor maintenance of open irrigation canals.
- Further, proposed technologies including hydro-pressure pipes reduce water losses due to uncontrolled spill overs and evapotranspiration.
- Successful SLM and climate-smart agriculture will also reduce top soil erosion and combat land degradation, which in long run would enhance soil fertility and soil microbial biodiversity. In addition, SLM is also recorded to increase biodiversity in and around the cultivated lands.
- User-friendly climate information, products and services will also improve planning and prevent environmental disasters. For instance, work on steep slopes for any developmental

activities could be halted on the basis of objective information related to climate change and impacts on specific locations & watersheds.

- User-friendly climate information for the farmers would also increase crop productivity, which would consequently reduce demand for collection for non-wood forest products NWFPs, thereby reducing disturbance to natural habitats.
- Improved adaptation planning at LG level will improve the holistic vision of communities, on how they can build climate resilience by managing their surrounding natural resources.
- LG involvement will also strengthen the institutional channels to implement a coherent approach for the management of water all the way from source to end-users.

Economic benefits

- PES schemes are expected to provide additional income for upstream communities responsible for watershed management.
- Users will directly benefit as continuous supplies of water reduce the economic burden of seeking alternatives in case of erratic water supply. In the long run, it shall also reduce vulnerability of the users from the risk of water sources drying-up.
- Increased incomes, through PES schemes, collection of NWFP and increase in agriculture productivity, will have significant impact on reduction of poverty in vulnerable rural communities of across Bhutan.
- In addition, more stable income will also improve the capacity of poorer groups to take advantage of any positive impacts of warmer climate in their locality.
- In a near future (in a few years), habitat enrichment within managed watersheds can increase biological diversity translating into increase in provisioning ecosystem services, such as: increased availability of non-wood forest products (NWFP) like cane, bamboo, mushroom, fiddlehead ferns and many others which are commonly harvested to supplement household income generation.
- The installation of climate resilient irrigation water, SLM and climate-smart agricultural practices will increase crop productivity. By using proven technologies for terracing slopes of more than 25 degrees, sites will serve for demonstration purposes for replication by other farmers. These are among the proposed solutions for Bhutan to increase arable land, which is currently only less than three percent of total land area.
- Watershed management also intends to decrease downstream sediment load, which can decrease Bhutan's hydro-power dams efficiency and limit energy generation, which is one of the major export for Bhutan.

Social benefits

- Women are affected by their greater vulnerability to climate risks, linked to their greater dependence on natural resources. The proposed climate resilience interventions for agriculture and natural resources proposes various social protection measures for high priority groups including women and children.
- The proposed integrated water resources management both for drinking and irrigation is expected to increase water availability and dialogue among communities, reducing the number of disputes over water in the long run. There are numerous cases in Bhutan where irrigation and drinking water disputes between communities were being only resolved

through interventions of the court. These solutions only partially contribute to social wellbeing.

- Formalization of WUAs shall lead to equitable sharing of water resources among the community members and notably at the grassroots, and make significant contribution to the same goal.
- Active participation by the community members during watershed management, PES schemes and implementation of SLM is also expected to improve social capital of the community for instance through revitalization of traditional labour sharing during SLM implementation.
- The project will also assess current policies and work towards creating more inclusive and enabling policy environment for enhancing coordination and collaboration among stakeholders, including a stronger participation of those whose voices are usually less heard.
- Inclusive participation in adaptation planning will also throw a light to the needs of marginalized groups of people, including women, children, the elderly.
- As such, the local climate resilience interventions that will be planned at LG level will promote the protection of economic and social rights through vulnerability reduction and support for disaster risk reduction.

Avoidance / mitigation of potential negative impacts

The BTFEC is mandated to promoting environmentally sound and sustainable development in the full range of its activities. As such, the screening of projects for the identification of potential negative impacts is part of its internal processes and described in the following sections on Risk and also on Monitoring and Evaluation.

Due to the nature of the intervention, which is specifically based on the improvement of the environment and focusing on societal benefits, and to the mandatory compliance with national regulations and standards (see section E), no negative impacts are expected.

Yet, specific studies will be conducted, in each component, to better understand the potential effects of the proposed activities, with special emphasis at environmental and social level. Identified risks, even small, can then be associated to a mitigation proposal. This is important specially in a fragile environment with competing uses on natural resources.

For instance, the studies will improve knowledge of hydraulic dynamics between surface and groundwater, so as to guide decision making on their use. At the same time, environmental needs will be taken into consideration for the water resources management in each river basin.

As another example, SLM interventions such the establishment of contour grass hedgerow and stone bunds across the slopes will reduce soil erosion and enhance soil nutrient and soil moisture conservation. This will also help reduce sedimentation in the main river system thereby lowering the negative impacts on aquatic biodiversity and the settlements downstream.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project.

The proposed scope and approach were selected as they address the particular adaptation challenges that Bhutan is facing. The alternative “business as usual” scenario would be outclassed by the following points.

In the Bhutanese context, with natural resources being put at the centre of the society and of the economy, ecosystem based adaptation is the most sustainable and cost-effective way of enhancing resilience and reducing vulnerability to impacts of climate change. Not only ecosystem-based adaptation to give the basis for human systems to thrive, notably due to vigorous provisioning services, it is also expected to enhance resource management. In the case of water, sound EbA backed by an integrated watershed management approach will eventually reduce cost of water treatment processes at user ends.

The mountainous background also explains the importance of adopting an integrated watershed approach, as uphill/downhill resources are, despite the administrative boundaries that may exist between them, intimately related.

Water is a key sector for increasing agricultural productivity as well as improving public health and hygiene. Developing climate resilient infrastructure through the use of environmental friendly and durable infrastructure directly contributes to a transformational change for Bhutan, where more than 60 percent of population is still engaged in the agricultural sector.

In terms of irrigation technologies, the proposed interventions include automated climate-smart technology which in long run has minimal maintenance cost. Such interventions also have high efficiency level of water usage.

Sustainable Land Management (SLM) also offers an holistic approach which would not only improve the soil fertility but in long run it is proven to bring in numerous ecological benefits besides just increase in agricultural productivity.

In close relationship to SLM, the proposed value-chain assessment of essential vegetables is in line with the increasing trend in vegetable cultivation in Bhutan. The proposed studies are expected to diversify income generation for rural communities and at the same time food and nutritional security for all including women, children and the elderly.

The proposal also tackles the issue of knowledge and decision making. Often there is huge amount of climate data available, including for researchers and policy makers. However, it is not packaged in a useful way for a day-to-day use at the grassroots level, for instance, by the farmers. Thus, the project is expected to develop agro-meteorological services and products, which are user-friendly and easily accessible at grassroots level so that impacts of climate change and climate induced disasters can be significantly reduced.

Forming community-based groups such as Water Users Associations and formalizing such groups is also expected to increase project impact at the grassroots level. The project activities are expected to be mainstreamed as a key responsibility of such community-based organizations.

Further, the expected results are part of the targets set in the existing plans at national level. As an example, ensuring 24x7 safe drinking water supply for each and every household is the target set to be achieved by 2023. Yet, the available means are not sufficient to cover all needs in the country. This proposal intends to reach the set targets in two particularly needing Districts, independently of other sources of finance.

Last but not least, benefits will be produced beyond the project period as local ownership of natural resources management will be increased, notably through participatory approaches, sustainable practices put in place, equipment will be durable, and financial flows will remain through Payment-to-Ecosystem Services (PES) schemes.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

The proposed project is expected to contribute towards achievement of the five of the 17 National Key Result Areas (NKRA) of Bhutan's National Developmental Plan i.e. 12th Five Year Plan (2018 to 2023). Those five NKRAS are:

1. NKRA 3: Poverty eradicated and inequality reduced
2. NKRA 5: Health ecosystem services maintained
3. NKRA 6: Carbon neutral, climate and disaster resilient development enhanced
4. NKRA 8: Food and nutrition security ensured
5. NKRA 17: Sustainable water ensured

The NKRA is a development outcome at the national level that will contribute towards achieving the overall objective of the 12th Five Year Plan. In total the plan identified 17 NKRAs, which are all closely aligned to the Sustainable Development Goals with their targets and indicators integrated into the 12th Five Year Plan. All NKRAs are also aligned to domains of overall holistic developmental approach of Bhutan in maximizing Gross National Happiness (GNH).

Project Component	NKRAs (2018-23)	SDGs (2015-30)	9 GNH Domains (Long term)
Component 1 Component 3	NKRA 3: Poverty and inequality reduced	Goal 1: No poverty Goal 10: Reduced inequality	Living standard Good governance
Component 1	NKRA 5: Health ecosystem services maintained	Goal 11: Sustainable cities and communities Goal 15: Life on land	Ecological diversity and resilience Good governance
Component 1 Component 2 Component 3	NKRA 6: Carbon neutral, climate and disaster resilient development enhanced	Goal 7: Affordable and clean energy Goal 9: Industry, innovation and infrastructure	Ecological diversity and resilience Good governance
Component 2 Component 3	NKRA 8: Food and nutrition security ensured	Goal 2: Zero hunger	Living standard
Component 1 Component 2 Component 4	NKRA 17: Sustainable water ensured	Goal 6: Clean water and sanitation	Living standard Health Ecological diversity and resilience

The project is also expected to support the implementation of the Water Flagship Program, one of the priority programs under 12th Five Year Development Plan.

Result	Indicator	Baseline (2017)	Target (2023)	Frequency of measurement and update	Means of Verification	Definition
Outcome: Access to 24x7 Safe Drinking Water Ensured	% of households with access to 24 hours of drinking water	63%	100%	Biennial	Bhutan Living Standard Survey Reports	This indicator will measure the percentage of households with 24 hours of drinking water supply.

Flagship programs are time-bound high priority national level programs approved by the parliament, designed to accelerate achievement of the NKRAs. The flagship programs implement high impact activities and are subject to rigorous monitoring and evaluation with strong support from the Royal Government of Bhutan.

The focus on two Districts can be explained by the strategic choice to have a clear impact at local level, rather than to spread scarce financial resources across the country.

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The implementing entities are committed to complying with all legislation and applicable Environmental and Social requirements. . Overall the project activities will be within the context of requirements of National Environment protection Act 2007. Other compliance requirements with regulation are described in more detail at component level:

In order to achieve the foreseen related to the implementation of watershed management plan, scaling up of PES schemes and wetland management, activities shall be in line with the following:

- Forest and Nature Conservation Act 1995,
- Forest and Nature Conservation Rules and Regulations of Bhutan 2017,
- PES Framework for Bhutan 2015,
- Bhutan Drinking Water Quality Standards 2016 and Wetland Inventory Framework.

All the SLM interventions, particularly terracing will be done in line with the following guidelines and modalities.

- Agriculture Land Development Guidelines (ALDG) 2017 of the Ministry of Agriculture & Forests
- Implementation Modalities for Agriculture Land Development and Fallow Land Reversion, circulated to all the implementers vide letter No. DOA/ARED/Adm-01 /2019 dated 30thSeptember, 2019
- Soil Conservation Manual (SCM), 2019 of the National Soil Services Centre, Department of Agriculture, MoAF

As for infrastructure for improving access to drinking and irrigation water, larger scale constructions will require environmental and social clearance starting with an Initial Environmental Examination (IEE) to the competent authority.

Further, extraction of water resources has to be in line with Water Act of Bhutan 2011, and Bhutan Drinking Water Quality Standards 2016.

The proposed irrigation activities are in line with the National Irrigation Plan, and no more review is required in that sense.

Activities for the promotion of climate smart agricultural practices and improvement of water governance shall be aligned with:

- Land Act 2007,
- Bhutan Water Policy 2008
- Water Act of Bhutan 2011
- Water Regulation of Bhutan 2014.
- Agriculture and Land Development Guideline 2017.

F. Describe if there is duplication of project / programme with other funding sources, if any.

The DA, Gross National Happiness Commission (GNHC), the apex planning and coordination body of Royal Government of Bhutan, plays a key role in ensuring that any developmental activities in the country is in line with governments' priority as well as in ensuring no duplication of the project interventions. Any external or internal funding of any kind in Bhutan irrespective of implementing agencies has to be routed through the commission. Thus, GNHC has identified current proposal to be in line with national priority program 'Water Flagship Program Access to 24x7 Safe Drinking Water with Irrigation' for which there was huge resource gap for Bhutan.

The Adaptation Fund project proposal stems out of and therefore is fully aligned with the RGoB's national adaptation priorities as per the Nationally Determined Contributions. It is also in line with GCF, NAPA III and GEF-LDCF priorities.

The AF project proposal will be complementary with the projects mentioned above. It will also synergize with pre-approved projects. For instance, both AF and GCF projects require maintaining irrigation schemes and maintenance of watershed management. The governance component of the present project proposal will play a crucial role model on improving the coordination, planning and use of local and national budgets. Moreover, already approved and ongoing projects do not consider end-to-end approaches and are mostly specific to one thematic area, for instance water supply. However, this AF proposal through its 4 outcome groups takes an holistic, integrated approach, and makes a balance between agriculture, drinking water supply and livelihood components.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

Knowledge management will be an important part of the project to ensure the sustainability of climate change adaptation goals and also to allow the learning from the project are replicated in other areas in the future. The implementation of all project outputs will be based on participatory approach involving all the stakeholders and it will be geared towards knowledge management. This will ensure that the capacities of the parties involved are built as they participate in the implementation processes.

The project will seek to establish and strengthen existing knowledge management system and establish appropriate models of communications to disseminate information on climate change adaptation across areas of program implementation. The key lessons learnt and best practices will be documented for wider dissemination and policy mainstreaming. Eventually there will be an increased knowledge base on climate change adaptation for better decision making at all levels.

Further, the lessons learnt from the project will be documented and shared through meetings and publications with other communities for replication. Knowledge exchange mechanisms through study visits will be promoted among communities and organizations as well as capacity building to understand and implement adaptation measures will be fostered.

Potential outputs include:

- Evaluation material, disseminating lessons learned and key results of the project
- Improved data management
- Improved interpretation and dissemination capacity
- Policy information sharing and mainstreaming
- Cross-cutting capacity building (other capacity will have to be built into relevant components),
- Success stories or stories of change

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Under each of the component, lead agencies have conducted stakeholder consultations, including with the local government, community leaders and community groups. A number of far flung communities considered as vulnerable groups were also included. It is the government's priority that such groups are considered and benefit from any form of project. In most of the meetings, presence of women and youth were also ensured. Consultations were also the opportunity to confirm communities' sensitivity to environmental and social safeguards.

Details of consultative processes under each component are indicated below:

Component 1:

Preliminary watershed assessments were initiated in collaboration with all the stakeholders in the watershed of Paro and Dagana districts. Before the start of the detailed assessments to be performed under this proposal, courtesy visit is made to district administration to seek their support and apprise about the assessment and the need to carry out the same. Consultative workshop will

be held with all the relevant agencies at the district level to create awareness on the watershed management and to seek information on the watersheds in the district.

Similar workshops will be held at the block/village level comprising of representatives of agencies and communities to create awareness and get their understanding on the watershed status from the local perspective.

Training on the use of guideline for watershed classification will be provided to staff at the block level, who will carry out the assessments. They will be technically backstopped by relevant line agencies and supported by knowledgeable community representatives.

Participation of the various workshops and consultations often simply depends on availability in the locality irrespective of gender, but consultations will make sure to get the perspectives of both women and men while carrying out assessments.

Component 2:

As a part of the recent consultative process held during the formulation of the national priority programs for the 12th Five Year Plan, several villages were involved and their views were incorporated in the "Water Flagship Program Access to 24x7 Safe Drinking Water with Irrigation - 2019" on which Component 2 is based. Besides, the specific context (ground situation) and the difficulties faced by communities in terms of water for drinking and irrigation were also studied.

Component 3:

Under this component, consultations were performed according to the requirements as defined by the Ministry of Agriculture and Forest prior to this proposal formulation. The land use mapping conducted by the MoAF have clear indications of different aspects of land use and related challenges, including at social level.

Component 4:

In regard to formation of Water Users Associations (WUA), an in-depth consultation was held with the local government of Paro, one major project dzongkhag. Further detailed analysis of Environmental and Social Safeguards, and Gender analysis, shall be required according to local infrastructure to be set, in line with National regulation.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

The rationale of selecting only two dzongkhags is to deliberately create a critical mass of activities in the beneficiary areas, ensuring both focus and impact at the level of entire watersheds. The project size ensures that upscale at district level is feasible while also allowing activities to be financially independent from other sources of finance.

The "business as usual" situation can be described as follows.

Climate and meteorological changes are already affecting the regional ecosystems, as demonstrated by significant losses in the size and distribution of Himalayan glaciers and reduced availability of water for irrigation, agriculture, hydropower and domestic use. Climate related threats, which will increase in the coming decades, demonstrate the clear need for strategic planning and regional adaptation practices notably in rural areas and for the agricultural sector, particularly vulnerable to climate change.

With about 69% of the population employed in the agricultural sector restrained in less than 3% of the country suitable for agriculture, with water sources drying, there is a need for efficient and sustainable natural resource management. Many adaptation strategies for the agricultural sector are constrained by a lack of information on locally-specific climate change impacts.

Local Government officials have basic general understanding of climate change but lack the knowledge of the significance of climate change adaptation and how it can be implemented. As mainstreaming climate change adaptation involves additional initial costs, the current mindset of the Local Governments in general is to not mainstream climate change adaptation and gender needs in local development investments ignoring the fact the long-term costs of not mainstreaming are higher. Without the AF support to strengthen the capacity of Local Governments for CCA governance, Local Governments will continue to plan and implement local development investments without mainstreaming CCA and gender aspects. This will result in wasteful and unsustainable local development investments.

There are number of national policies, legislations and plans related to water resources management that need to be implemented at the local level. A coordinated approach is required to implement them. Furthermore, standards and guidelines are in place for development and management of RWSS and irrigation systems. The capacity of Local Governments and communities need to be developed to employ these standards and guidelines effectively. Finally, localized water scarcities have led to water disputes between communities and individuals. These water disputes are often referred to central government agencies due to lack of capacity within the Local Government to resolve them.

Further to the benefits considered in section B (social, environmental, economic) and C (cost effectiveness), each component show clear additionality.

Component 1: by addressing water issues from source to downstream users, the project ensures continuous availability of water resources. The approach is also expected to revive drying water sources and also protected water sources from degradation (business as usual case). As they regulate and filter water, wetland ecosystems need specific for ensuring continuous supply of quality water. The wetland inventory is expected to inform on the number and extent of wetlands that need protection within and outside the protected areas in Bhutan.

Component 2: Improving resilience of water related infrastructure is vital for delivering water from the source to the users. Component 2 will ensure delivery of water with required quality as a basic prerequisite for health, hygiene and human activity, including agriculture. Further, the proposed technical solutions is justified by low labour requirements for maintenance, which is adapted to the situation in rural Bhutan where there is already shortage of farm labour.

Component 3: The proposed land management and informed agrometeorological services are essential to agricultural activities within the watershed area. Indeed, implementation of sustainable land management practices in vulnerable and degrade areas are critical for increasing resilience of agricultural sector. In addition, making climate change information easily accessible through use-friendly products and services are key for reducing vulnerability and breaking down the climate data in useable forms by the grassroots communities.

Component 4: water governance can be improved through the formation of the Water User Associations (WUA) with the goal of strengthening community-based initiatives and improve community preparedness for adapting to climate change. Integration of adaptation issues in the planning enhance resilience prospects for the future.

Overall, the project offers an holistic adaptation approach at District level, that include multi-stakeholder dialogue, focusing on improving the status of natural resources and thereby ensuring quality ecosystem services, allowing productive sectors to have the means for efficiency and resilience, and giving the opportunity for communities to engage in meaningful development planning processes.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.

The project activities are all aligned with 12th Five Year Developmental Plan of Bhutan (2018 to 2023) and in particular aligned with Royal Government of Bhutan's priority program, Water Flagship Program Access to 24x7 Safe Drinking Water with Irrigation. Thus, all proposed activities are mainstreamed with into the existing system.

Different government and local government agencies are responsible to manage the components. There are set of qualified and capable human resources to execute the task. The agencies have strong governance and financial systems and adequate due diligence will be exercised to conduct the overall management of the project/programme.

The project will use the following bases to ensure long-term sustainability of outcomes:

RGoB commitment and ownership: The Royal Government of Bhutan (RGoB) through the Ministry of Agriculture & Forests (MoAF) has long recognized the importance of Sustainable Land Management (SLM) and Agriculture Land Development (ALD) to arrest the land degradation and improve land productivity. In line with this, ALD and SLM have been identified as one of the priority programmes in the 12th FYP (2018-2023) of the MoAF. Similarly, the MoAF has also recognized the importance of timely and user friendly weather and climate information. Weather and climate information help farmers to make critical farm decisions such as planting time, what to plant, when to harvest, fertilizer and pesticide applications. Therefore, the Agro-meteorology Program was established under the Department of Agriculture in 2019 to transform climate data into climate information in a way that responds to user needs and assists decision-making to reduce the impacts of climate-related hazards and increase benefits from favourable climatic conditions.

Institutional sustainability: The project's institutional arrangements are based on existing RGoB institutional systems, program management, flow of funds, and accounting and reporting. In particular, it will support RGoB's on-going efforts to strengthen capacity and organizational structures within the MoAF to systematically and effectively coordinate and better manage land degradation prevention activities and the generation of weather and climate information in Bhutan. In particular, the National Soil Services Centre (NSSC) and the Agro-meteorology program within the Department of Agriculture are mandated to look after ALD and weather information respectively both during the project period and beyond.

Participatory action planning and community ownership: The participatory village level action planning and implementation through farmers groups and community approach will stimulate ownership of the project interventions. Furthermore, the project investment in capacity development will ensure achievement of project results and the sustainability beyond the implementation period.

Extension and technical support services: Extension and technical support services from the regional agriculture research and development centres (ARDCs) and the local governments (Dzongkhags & gewogs) are designed to promote responsiveness to the real needs and increased accountability to the farmer clients.

Fiscal sustainability: The ALD and SLM activities are already mainstreamed into central and local government plans and programs. Every year, the RGoB allocates a certain budget (though limited) to ALD and SLM interventions. This ensures post-project sustainability as the government can take over project activities to scale up and replicate in other areas once the project phases out.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

The project was reviewed against the 15 Environmental and Social Principles of the Adaptation Fund. A short description of the main findings is described below.

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	✓	
Marginalized and Vulnerable Groups		✓
Human Rights	✓	
Gender Equity and Women's Empowerment		✓
Core Labour Rights	✓	
Indigenous Peoples	✓	
Involuntary Resettlement	✓	
Protection of Natural Habitats	✓	
Conservation of Biological Diversity	✓	
Climate Change	✓	
Pollution Prevention and Resource Efficiency	✓	
Public Health	✓	
Physical and Cultural Heritage	✓	
Lands and Soil Conservation	✓	

Environmental Risk
Tapping of natural sources for drinking and irrigation may reduce amount of water flowing in natural channels, thus negatively impacts wildlife and aquatic fauna. For instance, waterholes for wildlife may dry up and similarly recharge of groundwater may be reduced. Drying up of key waterholes for wildlife may have a negative cascading effect on the food chain.

Social Risk
Habitat improvement as a result of watershed management plans will increase wildlife population. Significant increase in population of wildlife species such as wild boar, sambar deer, primates, porcupines, common leopard and others may damage crops cultivated nearby the watershed areas. Crop damage and livestock predation by wildlife may reduce agricultural productivity.

In trying to support continuous supply of irrigation and drinking water, clear roles and responsibilities for water distribution needs to be put in place, or else it would result in water disputes. Conflicts may also arise in laying the water distribution lines.

Equal participation of men and women, inclusive of vulnerable and marginalized communities, needs to be ensured in decision making. Any participatory approach will ensure that those social power relations will be well studied and decision will be made on participatory basis. Equal participation will also be ensured during all kinds of capacity development opportunities. However, precautions will be taken not to increase burden on women by increasing additional responsibilities, for instance like heading a WUA.

Access to water 24/7 may also result in increase in water wastage, which would require robust regulations and awareness programs.

In case of implementation of SLM inability to adopt to new technologies especially SLM due to various constraining factors such small landholding size, farm labour shortage, ageing farming population and others were the fundamental challenges. Further benefits of SLM are long term which often discourages the farmers in adoption of SLM. Some of the issues will be addressed though offering short-term benefits, revitalizing traditional labour sharing and mechanisms.
Wherever possible incorporation of indigenous knowledge into the new technologies will be considered to ensure high level of success in new technology adoption in terms of SLM

Proposed mitigation measures

Type of risk	Mitigation measures
Marginalized and Vulnerable Groups	Identified vulnerable and marginalized groups in the project sites through consultation Ensured vulnerable and marginalized groups in the project sites benefit from the project through a development of an inclusive project implementation plan
Gender Equality and Women's Empowerment	Encourage women participation in the execution of project At least 30% of the decision making body at the community level are women Delegate responsibilities to women at all levels

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

As the NDA, the Gross National Happiness Commission will provide strategic directions and oversee the overall achievement of the project outcomes.

The Bhutan Trust Fund for Environmental Conservation, as NIE, will provide overall coordination and facilitate the implementation of the Project. Further, the NIE shall oversee the achievement of the project outputs in relation to address the vulnerable and marginalized section of the community as spelt out in the project.

The Project Steering Committee (PSC) under the umbrella of the NIE, will provide strategic technical and financial directions to the Project Coordination Unit and will be the decision-making body.

A Project Coordination Unit (PCU) housed in the NIE will coordinate with the Project Executing Entities for the smooth implementation of the project activities. The PCU will be responsible for the overall management of this Adaptation Fund Project.

The Project Executing Entities (one Entity for each of the four components) will execute the activities in collaboration with the local governments of the two dzongkhags. They will be responsible for the day-to-day execution of the project activities, their supervision and reporting.

The project beneficiaries (Two Dzongkhags) are at the local government level where the actual activities will be implemented. There will be active participation of the local government and community in the project implementation.

The responsible agencies for the components are the following:

Project Component	Executing Entity	Parent Organization
Component 1 Adaptive management of watershed for enhancing resilience of community	Watershed Management Division	Department of Forest and Park Services, Ministry of Agriculture and Forests
Component 2 Improve climate resilient water infrastructures for	Irrigation Division	Department of Agriculture, Ministry of Agriculture and Forests
	Department of Engineering Services	Ministry of Works and Human Settlements

uninterrupted supply of		
Component 3 Strengthen climate-smart agriculture through sustained land management and informed agrometeorological services	National Soil Service Centre	Department of Agriculture, Ministry of Agriculture and Forests
	Agro-meteorological Division	Department of Agriculture, Ministry of Agriculture and Forests
Component 4: Improved local governance for effective CCA mainstreaming with focus on water management at the grassroots	Department Local Governance	Ministry of Home and Cultural Affairs

All six Executing Entities under the four components shall have an agreement signed with the Bhutan Trust Fund for Environmental Conservation (NIE). The agreement will include administrative, legal, technical and financial clauses.

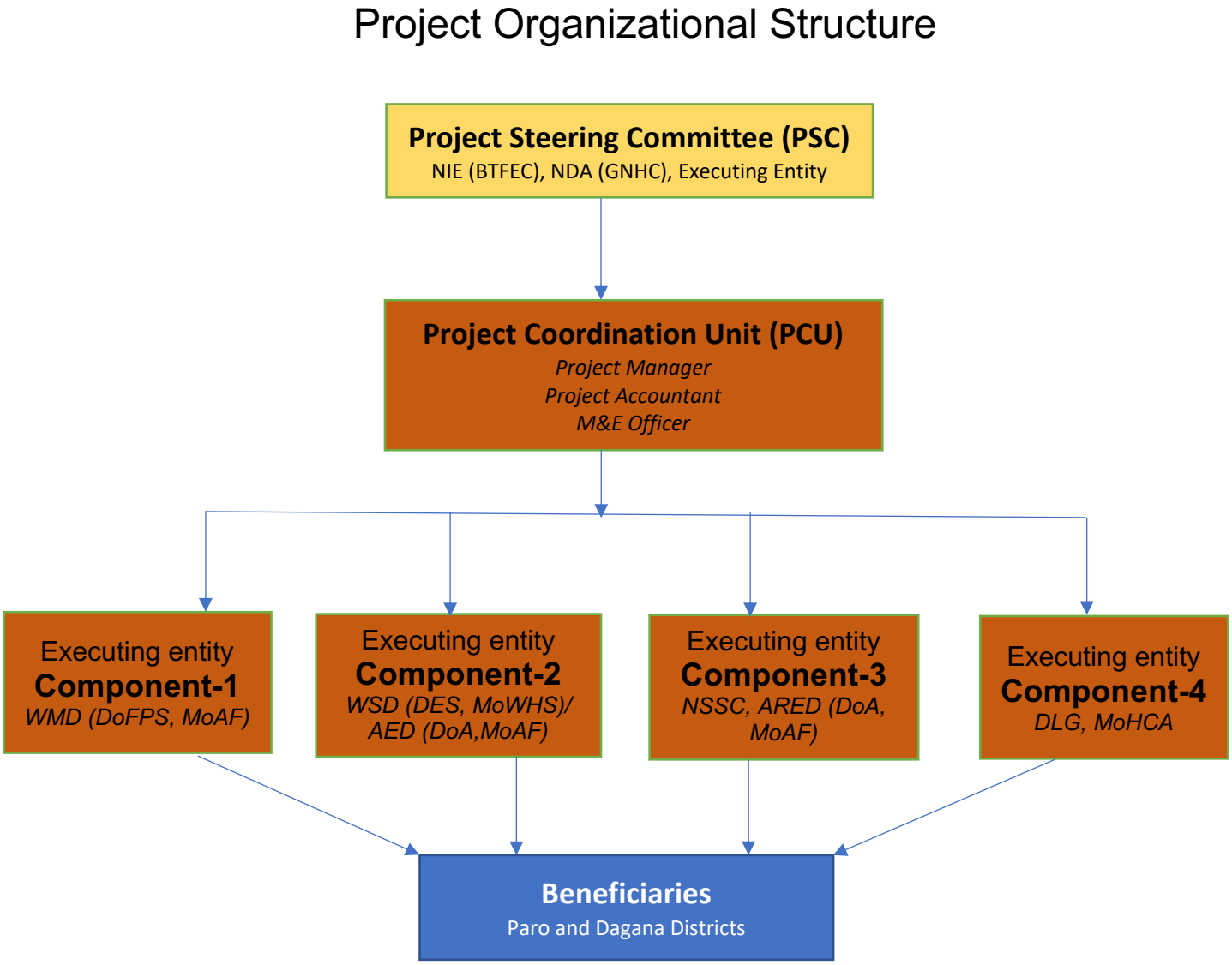


Figure 7: Project Organizational Structure

Roles and Responsibilities of Project Steering Committee

A Project Steering Committee comprising of membership from the four Executing Entities, Designated Authority, beneficiaries and the NIE shall be established.

1. Supervise all aspects of project implementation and disbursement of funds to the executing entities
2. Review and approve project activities for each executing entity
3. Review project and project status reports with the aim of ensuring activities are implemented as planned and that they achieve expected outcomes
4. Provide guidance on the use of project resources and take measures that ensure cost effectiveness in Adaptation Fund
5. Liaise with the Royal Government of Bhutan on project implementation and provide policy guidance to the project related to the national policies in Adaptation Fund

Roles and Responsibilities of Project Coordination Unit

The PCU's key functions will include but not be limited to:

1. Strategic planning, review, and coordination
2. Liaise with Executing Entities on the smooth implementation of activities
3. Monitor program performance and progress and use of funds
4. Consolidate technical and financial reports for submission to Adaptation Fund Secretariat
5. Provide program and financial support to Executing Entities
6. Knowledge management of Adaptation Fund project
7. Focal point for Adaptation Fund project

Roles and Responsibilities of Executing Entities

1. Coordinate Adaptation Fund project activities within their respective project sites
2. Prepare progress reports as per Adaptation Fund report submit to NIE
3. Liaise with the NIE/PCU on projects implementation
4. Be a transformational model for other regional Adaptation Fund projects by effectively implementing its specific project activities in effective ways
5. Ensure effective implementation of the projects activities
6. Manage capital and mobilize human resources towards achievements of the concrete outputs per project

Roles and Responsibilities of Beneficiaries

1. Provide feedback on the projects impacts
2. Where applicable provide human, physical and capital resources towards full implementation of the project
3. Full participation during project implementation
4. Disseminate information and create awareness on climate change adaptation and mitigation as per the implemented projects

Financial Management:

All executing entities shall maintain their financial records in the Royal Government of Bhutan's (RGoB) accounting system- ePEMS. As such, all executing entities are government agencies and all financial records shall be maintained in the ePEMS accounting software following RGoB's Budget, Finance & Accounting Manuals 2016 with distinct Project Letter of Credit (PLC) or Financing Item Code (FIC). The executing entities shall submit their periodic financial reports to the NIE.

At the Implementing Entity level, the BTFEC maintains its all financial records in a Sage ERP-Complete and Comprehensive Program for Accounting Control (Sage ERP ACCPAC) accounting software and all accounting records shall be maintained in the same software. Financial reports to be submitted to the AF shall be data generate by this software.

Fund Flow Mechanism:

Once the project is approved, based on the agreed disbursement schedule, the funds shall be transferred to the NIE's bank account maintained with Bhutan National Bank Limited, Thimphu Main Branch, via Royal Monetary Authority of Bhutan. Upon ensuring proper budget incorporation by respective implementing entities, the NIE shall disburse the fund to the Department of the Public Accounts (DPA), Ministry of Finance, Thimphu, Bhutan. The DPA, after fulfilling all the requirements, shall disburse the fund to the respective executing entities.

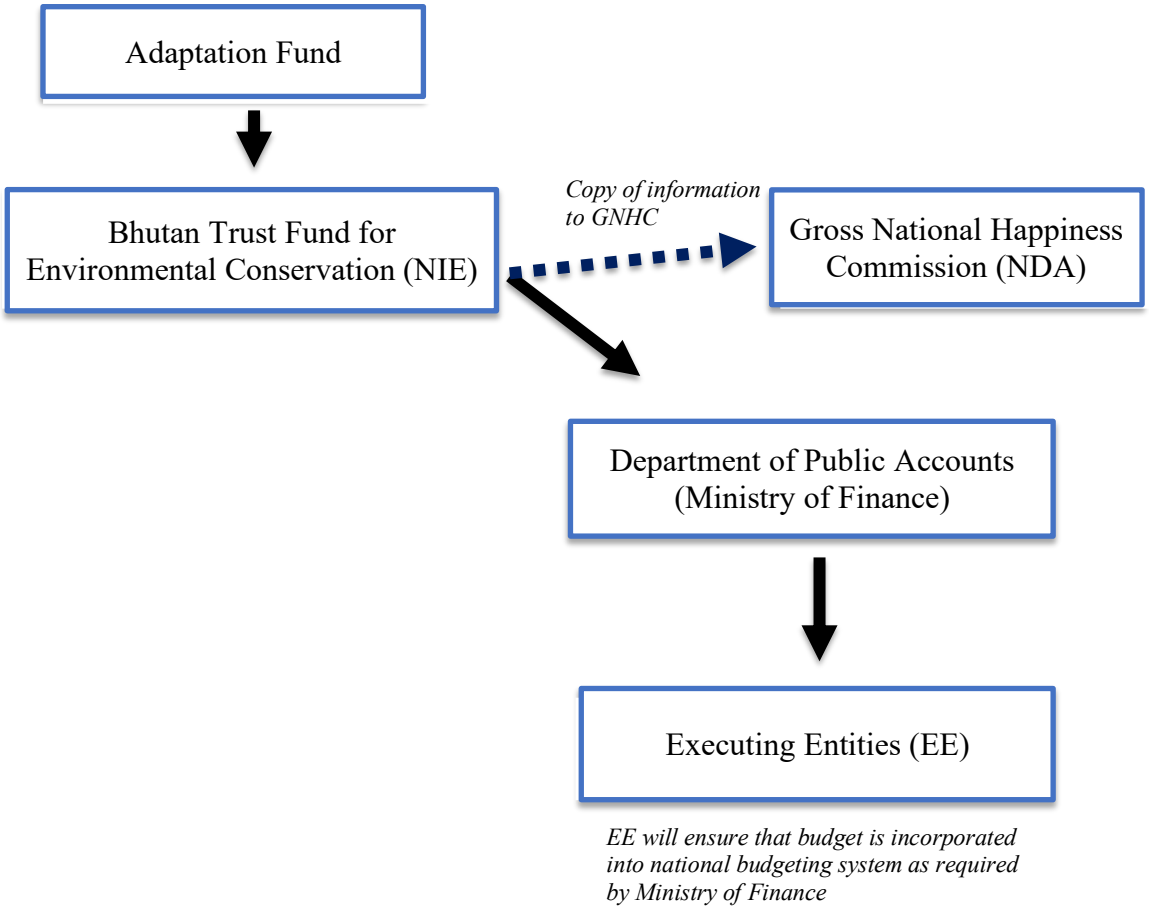


Figure 8: Flowchart Showing the Fund Flow

Procurement management

In order to manage all procurement activities, the NIE will act as the procurement coordinator for the project. All procurement pertaining to the executing entities shall follow RGoB procurement rules and guidelines while the NIE shall follow its (BTFEC) procurement rules and guidelines.

The executing entities and the NIE shall prepare procurement plan for the entire project period. However, during the implementation, the entities shall plan procurement on an annual basis and shall report on quarterly basis.

All procurements will be executed as per the norms of the internationally recognized procedures.

Periodic Progress Reporting:

The respective executing entities, using the NIE's prescribed reporting formats, shall submit periodic progress report (technical, financial and procurement) to the PCU. The PCU with endorsement from the NIE and NDA shall submit reports to Adaptation Fund Secretariat.

The grant agreements to be signed between the RGoB (GNHC on behalf of executing entities) shall specify all terms and conditions fulfilling all reporting standards.

Stakeholder engagement plans

Component 1

Output	Stakeholder	Type	Role in Project
Output 2.1 Watershed management plan implemented	Watershed Management Division	Government agency	Lead role in the facilitation and implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping.
	Department of Agriculture	Government Agency	Technical inputs and guidance for watershed management plan implementation.
	Department of Livestock	Government Agency	Technical inputs and guidance for watershed management plan implementation.
	Forestry Field Agencies (Territorial Divisions, Protected Areas)	Regional government agencies	Support in facilitation and implementation of the activities

Output	Stakeholder	Type	Role in Project
	Dzongkhag and Gewog Administrations	Local government agencies	Mobilization of local participation. Coordination of implementation of field activities in the identified areas
	Local communities/pvt sector	Individual/local group	Participation and provide feedbacks, supplies of tools/machineries
Output 2.2 Payments for Ecosystem Services schemes scaled-up	Watershed Management Division	Government agency	Lead role in the implementation of the activities foreseen for the output; PES sensitization of stakeholders; mediation between service providers and service beneficiaries; facilitation of PES process; guidance and coordination in development of PES agreements.
	Department of Agriculture	Government Agency	Technical inputs and guidance
	Department of Livestock	Government Agency	Technical inputs and guidance
	Dzongkhag and Gewog Administrations	local government agencies	Mobilization of local participation; local-level coordination and monitoring; local-level mediation, verifying activities implementation and facilitation of the PES process.
	Community Forest Management Group	Community group	Participate in PES process, ecosystem service provider; and implementation of terms and conditions as per PES agreement.
	water users and water user's association	Individuals/Local community group	Participation in PES process; Monitoring and verification of PES activities, provides PES incentives
Output 2.3 Water sources protected & recharge interventions adopted	Watershed Management Division	Government agency	Lead role in the facilitation and implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping.
	Department of Agriculture	Government Agency	Technical inputs and guidance

Output	Stakeholder	Type	Role in Project
	Department of Livestock	Government Agency	Technical inputs and guidance
	Department of Geology and Mines	Government Agency	Technical inputs and guidance
	National Center for Hydrology and Meteorology	Government Agency	Technical inputs and guidance
	Forestry Field Agencies (Territorial Divisions, Protected Areas)	Regional government agencies	Support in facilitation and implementation of the activities
	Dzongkhag and Gewog Administrations	Local government agencies	Mobilization of local participation. Coordination of implementation of field activities in the identified areas
	Local communities/pvt sector	Individual/local group	Participation and provide feedbacks, supplies of tools/machineries
Output 2.4 Wetland inventoried for informed decision making & its management	Watershed Management Division	Government agency	Lead role in the facilitation and implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping.
	Department of Agriculture	Government Agency	Technical inputs and guidance
	Department of Livestock	Government Agency	Technical inputs and guidance
	Forestry Field Agencies (Territorial Divisions, Protected Areas)	Regional government agencies	Support in facilitation and implementation of the activities
	Dzongkhag and Gewog Administrations	Local government agencies	Mobilization of local participation. Coordination of implementation of field activities in the identified areas
	Local communities/pvt sector	Individual/local group	Participation and provide feedbacks, supplies of tools/machineries

Component 2: Improve climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation

Output	Stakeholder	Type	Role in Project
Output 2.1: Climate and disaster resilient drinking water infrastructure established	Water and Sanitation Division, Department of Engineering Services	Government agency	Lead role in the implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping.
	Local Government (Paro & Dagana)	Sub-national/ local government authorities	Implementation of field activities in the identified areas
	Local Community	Beneficiaries	Participation in effective operation, maintenance and management of completed schemes
Output 2.2: Climate and disaster resilient irrigation infrastructures established	Agriculture Engineering Division, Department of Agriculture	Government agency	Lead role in the implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping. Initiating survey, design and implementation of major irrigation schemes.
	Agriculture Research Development Centres (ARDCs)	Regional Offices	Technical backstopping in survey & design, implementation and monitoring
	Local Government (Paro & Dagana)	Sub-national/ local government authorities	Mobilization of local participation; local-level coordination and monitoring; survey, design and implementation of small scale irrigation schemes.
	Local community	Beneficiaries	Participation in effective operation, maintenance and management of completed schemes
Output 2.3: Innovative technologies for tapping water adopted	Water and Sanitation Division, Department of Engineering Services	Government agency	Lead role in the implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping.
	Agriculture Engineering Division, Department of Agriculture	Government agency	Lead role in the implementation of the activities foreseen for the output; coordination with various relevant agencies; technical guidance and backstopping. Initiating survey, design and implementation of major irrigation schemes.
	Local Government (Paro & Dagana)	Sub-national/ local	Implementation of field activities in the identified areas

Output	Stakeholder	Type	Role in Project
		government authorities	
	Local Communities	Beneficiaries	Participation in effective operation, maintenance and management of completed schemes

Component 3: Strengthen Climate Smart Agriculture through Sustainable Land Management and Agro-meteorology Service

Output	Stakeholder	Type	Role in Project
Output 3.1: SLM in vulnerable and degraded areas implemented	National Soil Services Centre, Department of Agriculture (DoA), Ministry of Agriculture & Forests (MoAF)	Government agency	Lead role in the implementation of the activities planned for the output; coordination with various relevant agencies; technical guidance and backstopping on SLM
	Central Machinery Unit, Department of Agriculture, MoAF	Government agency	Prepare machine deployment plan and mobilize machines to the Dzongkhags for agriculture land development; timely monitoring and maintenance of machines
	Farm Machinery Corporation Limited	State Owned Enterprise	Hiring of machineries for agriculture land development (terracing)
	Private machine hiring agencies	Private enterprise	Hiring of machineries for agriculture land development (terracing)
	Agriculture Research and Development Centres, DoA, MoAF	Regional government research agencies	Technical inputs and guidance for implementation of SLM plan
	National Seed Centre, DoA, MoAF	Government agency	Arrange to supply climate resilient seeds and seedlings; Support community based seed production
	Private Nurseries	Private enterprise	Supply seeds and seedlings
	Local Governments (LG)	Local government authorities	Mobilization of local participation. Coordination of implementation of project activities in the identified areas
	Rural Communities	Beneficiary	Participation in actual implementation of project activities
Output 3.4: Climate change information, products and services made available and accessible	Agriculture Research & Extension Division (ARED), DoA, MoAF	Government agency	Lead agency for planning, coordination and implementation of agro-met plans; Generation of agro-advisories; Coordinate and implement climate research in agriculture using modeling and simulation tools; Be focal point for GIS and RS for the Department

Output	Stakeholder	Type	Role in Project
	National Centre for Hydrology and Meteorology (NCHM)	Government agency	Prepare and provide weather forecasts (24x7) information. Monitoring of extreme weather events. Coordinate National Climate Outlook Forums (NCOF), National Framework for Climate Services and WMO Climate Climate Services activities.
	Agriculture Research & Development Centres, DoA, MoAF	Regional government research agency	Liaise with ARED and NCHM in implementation of agro-met activities; Develop and validate crop calendar in the ADSS
	Central Programs (NSSC, NPPC), DoA, MoAF	Government agency	Liaise with ARED and NCHM in implementation of agro-met activities; Incorporate soil and plant protection data in the ADSS
	Local Governments	Local government authority	Facilitate Climate Field School; Validation of crop data; Communication of farm advisory to the users
	Rural Communities	Beneficiary	Participate in Climate Field School and actual use of climate and weather services
Output 3.5: Mainstreamed agricultural disaster risk reduction and management	Agriculture Research & Extension Division, DoA, MoAF	Government agency	Lead agency for planning, coordination and implementation of agro-met plans; Issuance of early warning system; Be the focal point for collection and management of crop damage data and come up with timely contingency plans
	Department of Disaster Management (DDM), MoHCA	Government agency	Lead agency for disaster risk reduction
	National Centre for Hydrology and Meteorology (NCHM)	Government agency	Prepare and provide weather forecast information; Integration of weather forecasting system in agriculture decision support system (ADSS); Provide seasonal outlook forum and early warning of extreme weather events
	Agriculture Research & Development Centres, DoA, MoAF	Regional government research agency	Liaise with ARED and NCHM in implementation of agro-met activities; Incorporate crop data in the ADSS
	Central Programs (NSSC, NPPC),DoA, MoAF	Government agency	Liaise with ARED and NCHM in implementation of agro-met activities; Incorporate soil and plant protection data in the ADSS

Output	Stakeholder	Type	Role in Project
	Local Governments	Local government authority	Facilitate Climate Field School; Validation of crop data; Communication of farm advisory to the users
	Rural Communities	Beneficiary	Participate in Climate Field School and actual use of climate and weather services

Component 4: Improved local governance for effective CCA mainstreaming with focus on water management at the grassroots.

Output	Stakeholder	Type	Role in Project
Output 4.1: Institutional mechanisms in Local Governments strengthened for CCA and gender mainstreaming	Department of Local Governance, MoHCA	Central government agency	Lead role in the implementation of the activities foreseen for the output; coordination with various relevant agencies; guidance and backstopping.
	Dzongkhag and Gewog Administrations	Sub-national/ local government authorities	Key beneficiaries; responsible for applying mainstreaming roles and responsibilities
	Central MRG/GNHC/NCWC	Inter-agency group/central government agency	Backstopping and guidance
Output 4.2: Local Governments and user groups in the community strengthened for effective management of irrigation and drinking water	Department of Local Governance, MoHCA	Government agency	Lead role in the implementation of the activities foreseen for the output; coordination with various relevant agencies; guidance and backstopping.
	Dzongkhag and Gewog Administrations	Sub-national/ local government authorities	Mobilization of local participation; local-level monitoring and backstopping; local-level mediation and facilitation of formation of WUAs.
	National Environment Commission	Central government agency	Policy and legislation-related guidance; legalization of WUAs
	Department of Agriculture, MoAF	Central government agency	Technical support and guidance in the formation of WUAs
	Department of Engineering Services, MoWHS	Central government agency	Technical support and guidance in the management of RWSS

Output	Stakeholder	Type	Role in Project
	Local communities/user groups	Communities	Key beneficiaries; participation in WUAs; maintenance of RWSS and irrigation systems

B. Describe the measures for financial and project / programme risk management.

NIE has been an autonomous grant making agency of Royal Government of Bhutan since 1996. NIE has also been executing entity for GEF/World Bank funded projects, and other global financing organizations such as Climate Investment Fund, Green Climate Fund's readiness grant, and so on. Thus, all financial and project management up to the international best practices as per the Program Operational Norms (PONs) of the NIE.

Basically, PONS lays out all required procedures of screening the project proposals against all operational and implementation risk including financial risks. For each of the risk identified during the project proposal development, a risk management plan will be developed including Environmental and Social Safeguards Management Plan.

Risk management is an essential element of good governance and an integral aspect of good management practice, and risk management is a shared responsibility. The NIE & EE are accountable for the overall implementation of the NIE's Risk Management Policy, and staff and managers are responsible for ensuring that risk management is integrated into all aspects of activities, including project design and implementation. The NIE's Risk Management Policy is design to build institutional capacity for risk management that applies to project oversight and implementation.

Roles and responsibilities for financial and project risk management are outlined below.

The National Implement Entity:

- promotes the development of a culture that supports effective risk management and innovation, and that encourages effective risk taking in line with DOE's risk appetite;
- integrates risk management into Programs, Projects and functions so that it is a fundamental part of how the DOE works;
- ensures that risks are managed effectively, which includes identifying, analysing, responding to, reviewing and reporting on risks;
- assigns accountability to staff for managing risks within their areas of responsibility, levels of authority and competence; and
- allows for the systematic review of risk management to ensure its effectiveness and adherence to DOE's risk appetite and project risk categorization.

Governance and Audit Committee: The Committee advises the Director and Management Team on the effectiveness of BTFEC's internal control systems, including risk management. Its terms of reference require it to ensure that the policy is working effectively and that risk is being properly managed. It also reviews internal and external audit reports, and provides advice on the independence, effectiveness and quality of BTFEC's internal audit functions.

The Secretariat: The Secretariat is responsible for ensuring that risks are managed effectively and reported. They are to ensure that responsibility is allocated for keeping risk registers up to date and

for taking appropriate mitigation actions. They are responsible for ensuring that risks related to their office's objectives are identified, analysed and appropriately addressed.

Project Management Unit (PMU): The PMU informs the NIE on risk and performance management, develops and updates Project and program risk management tools, coordinates risk management activities, facilitates the identification and evaluation of risks, and maintains NIE's risk management framework, ensuring that it is relevant and that it supports NIE's mandate.

Internal Auditor: The Internal Auditor provides assurance to management regarding the effectiveness of BTFEC's internal control systems, governance, risk management processes and on how well the BTFEC is meeting its objectives. It also contributes to the assessment of risk management processes, the effectiveness of risk responses and the completeness and accuracy of risk reporting.

External Audit: The Royal Audit Authority (RAA) as the Supreme Audit Institution (SAI) of Bhutan is responsible to audit and report on the economy, efficiency and effectiveness in the use of Public resources as per Article 25.1 of the Constitution of the Kingdom of Bhutan. Appointed by His Majesty the King on recommendation of the Prime Minister, the Chief Justice of Bhutan, the Speaker, the Chairperson of the National Council and the Leader of the Opposition Party, the Auditor General (AG) heads the Supreme Audit Institution for a period of five years or until attaining the age of sixty five years, whichever is earlier.

The RAA, as an external audit independently assess the effectiveness of risk management and risk identification and control processes, including mitigation actions. Evaluations inform all stakeholders about the quality and effectiveness of policies, strategies and operations, and the efficiency of their implementation.
Financial and project risks and management measures are identified below. However, a risk may be handled, the actions must be documented and kept on file. This is done via the Risk Register.

Areas of Risk	BTFEC's operational area	Description of Risk	Severity			Risk Management Measure	Indicator
			L	M	H		
Strategic risks							
-Overall economic environment	Finance & Investment	Total assurance of economic environment would still remain uncertain as the project intends to create resilience of communities through agricultural activities that is dependent on vagaries of climate and other allied natural phenomenon.		X		Community commitment to carryout agriculture will be enhanced by assured water supply for agriculture and drinking ensuring their economic activities are facilitated	No of agreements signed with communities for their commitment for agriculture based economic activities
- Political	Governance	All the executing agencies are government agencies and proposed plans are aligned with the existing 5-year plan. Therefore, the project will have full political support.	X			Ensure good coordination with all stakeholders including central agencies	Meetings, communications to stakeholders
-Governance	Governance	Poor efficiency in implementation due to difficulties in decision making or to a lack of formal authority.	X			The execution of all four components are spear-headed by mandated government agencies with established institutional human resources and capacity. Capacity building of the communities involved	Reports
-Investments	Investment	Failure to respond to needs of the intended beneficiaries.	X			All project activities are need based and aligned with the 12th FYP and thoroughly deliberated and planned.	FYP reports
- Corporate image	CRS	Shall the project receive a negative image, this would impact BTFEC reputation	X			The agreed methodology and participatory approach ensure project ownership	

						form the partner entities and the final beneficiaries	
Financial risks							
-Financial sustainability	Financial	Effective availability and use of financial resources during implementation. Running costs of supported activities over time.	X			During implementation, the government will ensure financial sustainability through annual budget allocation for maintenance and other recurrent costs. Most expansive items (notably, at irrigation level) are low maintenance. Users associations will be set in order to ensure local sustainability.	
- Cost escalations	Financial	Depending on inflation variation in the region, cost escalation could be foreseen, however, following the past trend of US$ appreciating against BTN (national currency), forex gain could offset	X				
Operational risks							
- Procurement (goods/services)	Procurement	NIE and executing agencies have well established procurement norms adapted as part of the World Bank procurement processes, therefore, no risk is foreseen	X				
- Disbursements	Financial	Delays in disbursements	X			NIE and executing agencies have well established service delivery schedule and standards to ensure timely disbursement, therefore, no risk is foreseen	Semi-annual work plan and budget and monitoring reports
-Communication	Communication	Lack of communication re: project activities and results	X			The NIE's communication with AF and as well with the project executing agencies	Communication activities

						can be well executed as the project will have a designated communication officer	
-Planning and reporting (stakeholder consultation)	Program Management	Lack of accountability internal systems	X			The NIE has an established periodic planning and reporting schedule through a designated focal person for each component. Further, the project has established stakeholder engagement plan defining specific roles and responsibilities of all stakeholders	Reports
Organizational							
-Technical capacity	Program management	All agencies involved have adequate and qualified human resources. Certain specific technical capacity may be required for enhancement of knowledge and skills for enhancement of project implementation	X			Capacity building programs will be put in place as part of the project, to reinforce specific aspects in terms of capacity.	
-Information Technology	Knowledge management	Lack of capacity related to poor IT systems	X			Both at NIE and Executing levels, the information technology facilities are well established	
-Legal identity	Administrative	Lack of determination of individuals, companies or government entities that participate in the Project may lead to impediments during implementation (e.g., delays in payments)	X			The NIE was established under the Royal Charter. The government as the executing agency, the project already has the legal identity and no issue is foreseen. All projects stakeholders need to demonstrate they operate under a recognized legal entity.	

Table 6: Initial draft for risk management matrix

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

The project is screened through NIE's Environment Social Safeguards (ESS) and Gender Screening tools which screens project in relation to all of the following ESS and Gender Standards:

1. Compliance with law
2. Access and equity
3. Marginalized and vulnerable group
4. Human rights
5. Gender equality and women empowerment
6. Core labour rights
7. Indigenous people
8. Involuntary resettlement
9. Protection of forests and natural habitats
10. Conservation of biological diversity
11. Climate change
12. Pollution prevention and resource efficiency
13. Public health
14. Physical and cultural resources/heritage
15. Land and soil conservation
16. Poverty alleviation
17. Disaster management capacity
18. Pest and disease management
19. Trans boundary issues

Those standards were in line with the best practices of ESS guidelines of Adaptation Fund and Green Climate Fund, to which NIE has aligned its project screening gender and ESS standards. Further the NIE has Gender Equality Strategy Framework, which is already being implemented since 2016.

Once project has been screened using the ESS screening tool, Environment and Social Management Plan (ESMP) will be generated which will then be monitored and evaluated during the course of project implementation in the matrix below:

Project Output/ Activity	E & S principles	Description of Project	Risk Category			Safeguard mitigation measures	Respon-sibilities	Status
			A	B	C			
	1.Compliance to legal and regulatory requirements							
	2. Protection of Forests and Natural Habitats							
	3.Conservation of Biological Diversity							
	4. Pollution Prevention							
	5. Resource Efficiency							
	6. Lands and Soil Conservation							
	7. Physical and Cultural Resources/Heritage							
	8. Indigenous Peoples							
	9. Involuntary Resettlement							
	10. Public Health							
	11. Access and Equity							
	12. Marginalized and Vulnerable Groups							
	13. Human Rights							
	14. Poverty alleviation							
	15. Disaster Management capability							
	16. Pests and disease management							
	17. Trans boundary issues							
	18.Project-level redressal system							

Table 7: Model of the summary table of the environmental and social management plan

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The Bhutan Trust Fund for Environmental conservation (BTFEC) approach to monitoring, reporting and evaluation is explained in its Monitoring and Evaluation Manual & Handbook. The results of M&E will be to provide project updates, risk assessments and any project change required. In summary, M&E will provide answers to questions, in a systematic way, on the progress and success of the project and its partners in achieving the desired outcomes and outputs.

The BTFEC shall hire M&E Officer, on contract, to be responsible for the data collection, compilation, and monitoring and reporting of the project, as well as operational support and additional assistance in the design and implementation throughout the project, adjusting project outcomes and activities according to a changing context. It is important to remain flexible to and learn from inevitable unforeseen changes in the operational landscape using an adaptive management approach.

Reporting will take place on a quarterly and annual basis in accordance with Adaptation Fund standards. The monitoring and reporting plan involves an iterative approach to collecting data and improving the project design. The project will commence following an inception workshop with local and national stakeholders, the NIE team and the M&E team assigning and clarifying the project purpose, project roles and responsibilities, and addressing any outstanding barriers to implementation.

The project's comprehensive M&E framework will meet and exceed GEF's Agency Minimum Standards on Environmental and Social Safeguards as defined in Policy PL/SD/03, the Adaptation Fund's policy, and drawing on the NIE's safeguards formalized under the Accreditation process.
Taking into account all existing standards, including but not limited to, M&E Manual, ESS and Gender Equity, the key outputs for Monitoring and Evaluation (M&E) are:

- Semi-annual M&E visited conducted
- Semi-annual M&E reported prepared
- External evaluator hired for conducting mid-term evaluation
- Terminal evaluation conducted by NIE and external evaluator

In addition, under the supervision of the NIE's Governance and Audit Committee (GAC), an internal auditor shall be contract to carry out the following tasks:

- Objectively assess IT and/or operational processes
- Assess the EE's risks and the efficacy of its risk management efforts
- Ensure that the EE is complying with relevant laws and statutes
- Evaluate internal control and make recommendations on how to improve
- Identifying shortfalls or gaps in processes
- Promote ethics and help identify improper conduct
- Assure safeguards
- Investigate fraud
- Communicate the findings and recommendations

On annual basis, an external audit shall be conducted by the RAA with an objective to:

- providing reasonable assurance that they are presented fairly and in conformity with applicable accounting principles/standards that they reflect true representation of the expenditure incurred and financial position.
- expressing an opinion on the effectiveness of the design and operation of project.
- reducing information risk that financial reports are biased, misleading, inaccurate, incomplete, and contain material misstatements.

E. Project Results Framework

Project Results	Indicator(s)	Baseline	Target(s)	Means of Verification	Risks and Assumptions
Project Objective: To build resilience to climate change and adaptive capacity of water stressed communities					
Component 1:	Adaptive management of watersheds for enhanced community resilience to climate change				
Outcome 1: Increased watershed and ecosystem resilience in response to climate change and variability-induced stress	Total land area brought under effective management				
Output 1.1: Watershed management action plans implemented	No of watershed management action plans	One watershed management plan in Dagana developed	Detail watershed assessments done in five gewogs in Paro and 14 gewogs in Dagana,	Record of watershed management action plans developed	Priority of field agencies in core activities
Output 1.2: Payments-for-Ecosystem Services (PES) schemes scaled-up	No of PES Schemes explored and established	one PES scheme established in Paro	One PES scheme renewed and two new schemes established	Field visits and reports	Willingness from communities or ecosystem services users to participate is there
Output 1.3: Water sources' recharge interventions adopted	No of water sources revived	One water source revival site operational in Paro	Interventions Strengthened and adopted in four sites	Field visits and reports	Limited technical knowledge, difficult terrain may escalate cost
Output 1.4: Wetlands monitoring system established for informed decision-making	No of significant wetlands inventoried and monitoring system put in place	N/A	One wetlands monitoring system in place	Record of monitoring system	Limited technical knowledge
Component 2:	Climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation				
Outcome 2: Improved access to irrigation and safe drinking water	No. of households connected with climate resilient 24x7	N/A N/A	500 households (drinking water)	Annual Progress Report	The baseline data provided by LGs are reliable; The local implementers

Project Results	Indicator(s)	Baseline	Target(s)	Means of Verification	Risks and Assumptions
	drinking and irrigation water		751 households (Irrigation)		(local governments and contractors) have the requisite capacity
Output 2.1: Climate- and disaster-resilient water infrastructure established	Number of climate smart and disaster resilient water system constructed	0	30 water supply schemes	Annual Progress Report	
Output 2.2: Climate- and disaster-resilient irrigation infrastructure established	Area under assured irrigation;	0	2200 acres	Annual Progress Report	
Output 2.3: Innovative technology for tapping water adopted	Total coverage area with climate-smart irrigation technology adopted; No. of households with climate-smart drinking water technology adopted	0 0	100 acres 100 household	Annual Progress Report	
Component 3:	Climate-smart agriculture (CSA) through sustainable land management and informed agrometeorological services				
Outcome 3: Improved food security and livelihoods	Percentage of target households with stable and climate resilient livelihood sources	NA	Target population report food and income availability improved by 20%	Sample household survey; Midterm and end of the project impact report	All project beneficiaries participate and adopt project interventions
Output 3.1: SLM in vulnerable and degraded areas implemented	Total area brought under SLM practices	290 acres (Dagana – 239 acres and Paro – 51 acres)	1500 acres	Annual project progress report; Mid-term and end of project report	Availability of appropriate machines for land development; Willingness of the beneficiaries to take up SLM;

Project Results	Indicator(s)	Baseline	Target(s)	Means of Verification	Risks and Assumptions
					No major landslide and flashfloods that would damage the investments made in SLM
Output 3.2: Climate change information, products and services made available and accessible	Percentage of population using agro-meteorological products and Services	NA	60% of project beneficiaries	Annual project report; Midterm and end of project report	Improved weather forecasting with better lead time made available by NCHM
Output 3.3: Agricultural disaster risk reduction and management mainstreamed	Timeline by which database on agricultural disasters developed	NA	2021	Database; Project report	DITT accords prior approval for database development
Component 4:	Improved local governance for effective CCA mainstreaming with focus on water management at the grassroots				
Outcome 4: Improved CCA mainstreaming and water governance at the local level	Number of Local Governments with improved capacity for CCA mainstreaming and water governance	Not known but can be said to very low			
Output 4.1: Institutional mechanisms in local governments strengthened for CCA and gender mainstreaming	Number of LGs effectively mainstreaming CCA and gender in local development investments	Basic awareness for CCA and gender mainstreaming exists among LGs but lack tools and training for effective mainstreaming	All 19 LGs in the project sites have effectively mainstreamed CCA and gender in their local annual development plan and upcoming FYP	Local annual development plans; Upcoming LG FYPs; Key informant interviews; Project progress reports.	High-level support, and central guidance and backstopping are available.
Output 4.2: Local Governments and user groups in the community strengthened for effective management of irrigation	Number of LGs with increased capacity for water governance; Number of water user groups that	Limited capacity	All 19 LGs in the project sites with increased capacity for water governance; All water user groups formed	Project progress reports; Training/ capacity building reports; End-of-project survey;	Local community groups show willingness and interest.

Project Results	Indicator(s)	Baseline	Target(s)	Means of Verification	Risks and Assumptions
and drinking water	have capacity for management of their irrigation and drinking water schemes		under the project have capacity for management of their irrigation and drinking water schemes	Interviews of LG officials.	

F. Alignment with the Results Framework of the Adaptation Fund

Project Outcomes	Project Outcome Indicators	AF Outcome	AF Outcome Indicators
Outcome 1: Increased watershed and ecosystem resilience in response to climate change and variability-induced stress		AF Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	AF Outcome Indicator 5: Ecosystem services and natural resource assets maintained or improved under climate change and variability-induced stress
Outcome 2: Improved access to irrigation and safe drinking water		AF Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	AF Outcome Indicator 4.2: Physical infrastructure improved to withstand climate change and variability-induced stress
Outcome 3: Improved food security and livelihoods		AF Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	AF Outcome Indicator 6.1: Percentage of households and communities having more secure access to livelihood assets AF Outcome Indicator 6.2: Percentage of targeted population with sustained climate-resilient alternative livelihoods
Outcome 4: Improved CCA mainstreaming and water governance at the local level		AF Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	AF Outcome Indicator 3.1: Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses AF Outcome Indicator 3.2: Percentage of targeted population applying appropriate adaptation responses
Project Outputs	Project Output Indicators	AF Outputs	AF Output Indicators
Output 1.1: Watershed management action plans implemented		AF Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability	AF Output Indicator 5.1: No. of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type and scale)
Output 1.2: Payments-for-Ecosystem Services (PES) schemes scaled-up		AF Output 5: Vulnerable ecosystem services and natural resource assets	AF Output Indicator 5.1: No. of natural resource assets created, maintained or improved

		strengthened in response to climate change impacts, including variability	to withstand conditions resulting from climate variability and change (by type and scale)
Output 1.3: Water sources' recharge interventions adopted		AF Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability	AF Output Indicator 5.1: No. of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type and scale)
Output 1.4: Wetland database established for informed decision-making			No of significant wetlands inventoried and monitoring system put in place
Output 2.1: Climate- and disaster-resilient drinking water infrastructure established			Number of climate smart and disaster resilient water system constructed
Output 2.2: Climate and disaster resilient irrigation infrastructure established			Area under assured irrigation
Output 2.3: Innovative technologies for tapping water adopted			Total coverage area with climate-smart irrigation technology adopted; No. of households with climate-smart drinking water technology adopted
Output 3.1: SLM in vulnerable and degraded areas implemented		AF Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	AF Output 6.1: No. and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies
Output 3.2: Agriculture productivity improved		AF Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	AF Output 6.1: No. and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies
Output 3.3: Income sources diversified		AF Output 6: Targeted individual and	AF Output 6.2: Type of income sources for

		community livelihood strategies strengthened in relation to climate change impacts, including variability	households generated under climate change scenario
Output 3.4: Climate change information, products and services made available and accessible		AF Output 2: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	AF Output 2.2: No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)
Output 4.1: Institutional mechanisms at local level strengthened for CCA mainstreaming in local development plans and activities related to drinking water, irrigation and sustainable land management			Number of LGs effectively mainstreaming CCA and gender in local development investments
Output 4.2: Capacity of local governments and communities strengthened for water governance			Number of LGs with increased capacity for water governance; Number of water user groups that have capacity for management of their irrigation and drinking water schemes

G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Detailed implementation budget per Component:

Output	Activities	Budget (USD)					
		Year 1	Year 2	Year 3	Year 4	Year 5	Total per Activity
Component 1: Adaptive management of watersheds to enhance climate resilience of communities							
Output 1.1 Watershed management action plans implemented	Activity 1.1.1 Conduct community consultations and sensitizations	15,000	-	-	-	-	15,000
	Activity 1.1.2 Training Workshops	10,000	10,000	-	-	-	20,000
	Activity 1.1.3 Conduct detailed watershed assessments in the project dzongkhags	10,000	12,000	-	-	-	22,000
	Activity 1.1.4 Development of watershed management Action Plan for the prioritized areas	-	-	30,000	-	-	30,000
	Activity 1.1.5 Implementations of action plan activities	-	-	-	343,000	-	343,000
	Sub-total Output 1.1	*35,000*	*22,000*	*30,000*	*343,000*	-	430,000
Output 1.2 Payments-for-Ecosystem Services (PES) schemes scaled-up	Activity 1.2.1 Conduct community consultations and sensitizations	16,000	-	-	-	-	16,000
	Activity 1.2.2 Hands-on training workshops in the implementation and management of PES schemes	-	14,000	-	-	-	14,000

	Activity 1.2.3 Conduct detailed resource assessment and inventory	-	30,000	-	-	-	30,000
	Activity 1.2.4 PES scheme development and implementation	-	-	30,000	12,000	-	42,000
	Sub_total Output 1.2.	16,000	44,000	30,000	12,000	-	102,000
Output 1.3 Water sources' recharge interventions adopted	Activity 1.3.1 Conduct community consultations and sensitizations	17,000	-	-	-	-	17,000
	Activity 1.3.2 Training Workshops and Study visits	11,000	24,000	-	-	-	35,000
	Activity 1.3.3 Development intervention Action Plan for the prioritized areas	-	11,000	-	-	-	11,000
	Activity 1.3.4 implementations of intervention action plan activities	-	-	252,000	-	-	252,000
	Activity 1.3.5 Monitoring and maintenance	-	-	-	25,000	25,000	50,000
	Sub_total Output 1.3.	*28,000*	*35,000*	*252,000*	*25,000*	*25,000*	*365,000*
Output 1.4 Wetland monitoring system established for informed decision-making	Activity 1.4.1 Training Workshops	15,000	-	-	-	-	15,000
	Activity 1.4.2 Conduct mapping of wetlands for the project Dzongkhags using remote sensing	-	20,000	-	-	-	20,000
	Activity 1.4.3 Field data collection and mapping	-	-	50,000	-	-	50,000
	Activity 1.4.4 Data compilation and analysis	-	-	-	18,000	-	18,000
	Sub-total output 1.4.	*15,000*	*20,000*	*50,000*	*18,000*	-	*103,000*
Total Component 1		**94,000**	**121,000**	**362,000**	**398,000**	**25,000**	**1,000,000**

Component 2: Climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation							
Output 2.1	Activity 2.1.1. Construction and Rehabilitation of Drinking Water Supply Schemes	1,300,000	1,000,000	-	-	-	2,300,000
	Activity 2.1.2. Dev of Water Inventory	-	-	20,000	-	-	20,000
	Activity 2.1.3. Capacity Building of Engineers in Climate Resilient Water Supply Infrastructures	50,000	-	-	-	-	50,000
	Sub-total Output 2.1	*1,350,000*	*1,000,000*	*20,000*	-	-	*2,370,000*
Output 2.2	Activity 2.2.1. Construction of closed /pressure irrigation systems (gravity)	120,000	165,000	165,000	126,000	120,000	696,000
	Activity 2.2.2. Re-engineering/ rehabilitation or improvement of existing irrigation systems	160,000	266,000	261,000	213,000	160,000	1,060,000
	Activity 2.2.3. Scale up micro-irrigation system (drip & sprinkler)	73,000	122,000	122,000	97,000	73,000	487,000
	Activity 2.2.4. Tail water management	-	-	14,000	14,000	-	28,000
	Sub-total Output 2.2	*353,000*	*553,000*	*562,000*	*450,000*	*353,000*	*2,271,000*
Output 2.3	Activity 2.3.1. Ground Water Extraction	100,000	-	-	-	-	100,000
	Activity 2.3.2. Rain Water Harvesting	30,000	-	-	-	-	30,000
	Activity 2.3.3. Scale up solar/electric/manual water pump for drinking and irrigation	24,000	41,000	40,000	32,000	24,000	161,000
	Activity 2.3.4. Construction of water harvesting structures or small scale reservoirs	21,000	35,000	35,000	28,000	20,000	139,000
	Sub-total Output 2.3	*175,000*	*76,000*	*75,000*	*60,000*	*44,000*	*430,000*
Total of Component 2		**1,878,000**	**1,629,000**	**657,000**	**510,000**	**397,000**	**5,071,000**

Component 3: Climate-smart agriculture through sustainable land management and informed agro-meteorological services							
Output 3.1 SLM in vulnerable and degraded areas implemented	Activity 3.1.1 Participatory SLM action planning to validate SLM interventions	10,000	-	-	-	-	10,000
	Activity 3.1.2 Implement Terracing	150,000	150,000	150,000	150,000	150,000	750,000
	Activity 3.1.3 Implement contour hedgerow establishment	7,500	7,500	7,500	7,500	7,500	37,500
	Activity 3.1.4 Implement contour stone bunds	5,000	5,000	5,000	5,000	5,000	25,000
	Activity 3.1.5 Implement orchard establishment	7,500	7,500	7,500	7,500	7,500	37,500
	Activity 3.1.6 Promote climate resilient agriculture practices including integrated plant nutrient management and organic agriculture	20,000	20,000	20,000	20,000	20,000	100,000
	Activity 3.1.6 Promote climate resilient crop varieties (diseases & water stress tolerant)	20,000	20,000	20,000	20,000	20,000	100,000
	Activity 3.1.7 Field based training to farmers on SLM	5,000	5,000	-	-	-	10,000
	Activity 3.1.8 Specialized training to Agriculture Extension staff on SLM & climate change adaptation	50,000	-	-	-	-	50,000
	Activity 3.1.9 Technical assistance and support to communities on the implementation of SLM in the field	5,000	5,000	5,000	5,000	5,000	25,000
	Activity 3.1.10 Regular monitoring of SLM activities in the field	5,000	5,000	5,000	5,000	5,000	25,000
	Activity 3.1.11 Documentation, Knowledge managemnt and experience sharing platforms	10,000	10,000	10,000	10,000	10,000	50,000
	Sub-total Output 3.1	*295,000*	*235,000*	*230,000*	*230,000*	*230,000*	1,220,000
	Activity 3.2.1 Improve and upscale ADSS	6,000	6,000	6,000	6,000	6,000	30,000

Output 3.2 Climate change information, products and services made available and accessible	Activity 3.2.2 Agro-met advisory bulletins appropirately packaged and disemminated timely	5,000	5,000	5,000	5,000	5,000	25,000
	Activity 3.2.3 Incorporation of area specific weather and crop data in ADSS	7,500	7,500	7,500	7,500	5,000	35,000
	Activity 3.2.4 Implementation of climate research using modelling and simulation	-	50,000	50,000	50,000	-	150,000
	Activity 3.2.5 Capacity building of agro-met focals based in ARDCs and Central Programs	50,000	-	50,000	-	-	100,000
	Activity 3.2.6 Knowledge management	-	5,000	-	5,000	5,000	15,000
	Sub-total Output 3.2	*68,500*	*73,500*	*118,500*	*73,500*	*21,000*	355,000
Output 3.3 Mainstreamed agricultural disaster risk reduction and management	Activity 3.3.1 Climate Field Schools involvement in season long participatory learning and experimentation	10,000	10,000	10,000	10,000	10,000	50,000
	Activity 3.3.2 Sensitization, awareness and capacity dev on agro-met services to researchers, extension and farmers	40,000	40,000	-	40,000	-	120,000
	Activity 3.3.3 Development of crop suitability and feasibility maps	-	20,000	-	20,000	20,000	60,000
	Activity 3.3.4 Pest and diseases forecasting	25,000	25,000	25,000	25,000	-	100,000
	Activity 3.3.5 Database agricultural damage using immediate information feed from field	25,000	25,000	-	25,000	20,000	95,000
	Sub-total Output 3.3	*100,000*	*120,000*	*35,000*	*120,000*	*50,000*	425,000
Total Component 3		**463,500**	**428,500**	**383,500**	**423,500**	**301,000**	**2,000,000**

Component 4: Improved local governance for effective CCA mainstreaming with focus on water management at the grassroots							
Output 4.1: Institutional mechanism in Local Governments strengthened for CCA and gender mainstreaming	Activity 4.1.1. Sensitization workshop for LGs on mainstreaming CCA and gender in local development plans, programs and activities (water, irrigation, SLM).	30,000	30,000	15,000	5,000	-	80,000
	Activity 4.1.2. Conduct capacity building for LGs on CCA tools, frameworks and approaches.	30,000	30,000	20,000	15,000	5,000	100,000
	Activity 4.1.3. Carry out M&E of CCA and gender mainstreaming in their plans, programs and activities.	10,000	20,000	10,000	10,000	5,000	55,000
	Sub-total Output 4.1	*70,000*	*80,000*	*45,000*	*30,000*	*10,000*	235,000
Output 4.2: Local Governments and user groups in the community strengthened for effective management of irrigation and drinking water	Activity 4.2.1. Form and strengthen user groups in the community to promote local ownership and sustainability of rural water and irrigation schemes.	5,000	10,000	10,000	5,000	-	30,000
	Activity 4.2.2. Conduct sensitization workshops for LGs and user groups in the community and provide training on management of rural water and irrigation schemes.	5,000	20,000	15,000	15,000	10,000	65,000
	Activity 4.2.3. Study on local water resource sharing & water related dispute management mechanisms	-	60,000	-	-	-	60,000
	Activity 4.2.4. Implement the recommendations of the study to empower community and inculcate in them the sense of ownership	-	-	25,000	20,000	-	45,000
	Activity 4.2.5. Documentation and replication of best practices applied by functional user groups in the Local Governments and communities	-	-	5,000	5,000	5,000	15,000

	Activity 4.2.6. Capacity development and exchange program for LG functionaries and Community Groups	5,000	10,000	15,000	15,000	5,000	50,000
	Sub-total Output 4.2	*15,000*	*100,000*	*70,000*	*60,000*	*20,000*	*265,000*
Total Component 4		**85,000**	**180,000**	**115,000**	**90,000**	**30,000**	**500,000**
Direct Cost		**2,520,500**	**2,358,500**	**1,517,500**	**1,421,500**	**753,000**	**8,571,000**
Project execution cost		120,000	120,000	120,000	120,000	120,000	600,000
Sub-total		2,640,500	2,478,500	1,637,500	1,541,500	873,000	9,171,000
PCM Fee charged by the Implementing Entity[(1)]		236,797	96,447	171,595	100,745	173,951	779,535
		2,877,297	**2,574,947**	**1,809,095**	**1,642,245**	**1,046,951**	**9,950,535**

[(1)] Please see detailed budget for PCM Fees

Budget Proposal for the PCM Fees of the NIE (US$)

Particulars		Year-1	Year-2	Year-3	Year-4	Year-5	Total
Project Manager	CO-II	14,806	15,464	16,122	16,780	17,439	80,611
M&E Officer	SO-I	13,075	13,657	14,239	14,821	15,423	71,215
Project Finance Officer	O-I	10,208	10,663	11,117	11,572	12,027	55,587
Administrative Officer	O-I	10,208	10,663	11,117	11,572	12,027	55,587
In-country Travel	lumpsum	12,000	12,000	12,000	12,000	12,000	60,000
Ex-country Travel	lumpsum	35,000	-	35,000	-	35,000	105,000
Project Steering Committee Meetings	lumpsum	1,500	1,500	1,500	1,500	1,500	7,500
Internal Audit (Semi-annual)	lumpsum	13,000	13,000	13,000	13,000	13,000	65,000
External Audit	lumpsum	2,500	2,500	2,500	2,500	2,500	12,500
Vehicle	Unit	65,000	-	-	-	-	65,000
Upgrade of the Accounting Software	Unit	25,000	-	-	-	-	25,000
Office Stationery	lumpsum	2,000	2,000	2,000	2,000	2,000	10,000
Office Equipment	lumpsum	10,000	-	5,000		1,500	16,500
Office Furniture	lumpsum	7,500	-	3,000		1,500	12,000
Mid-term Assessment	lumpsum	-	-	30,000	-	-	30,000
Terminal Independent Evaluation	lumpsum	-	-	-	-	33,035	33,035
Knowledge Management	lumpsum	15,000	15,000	15,000	15,000	15,000	75,000
Total Implementing Cost		**236,797**	**96,447**	**171,595**	**100,745**	**173,951**	**779,535**

H. Include a disbursement schedule with time-bound milestones.

Schedule date	Jul20/Jan 2021	Jul21/Jan 2022	Jul22/Jan 2023	Jul23/Jan24	Jul24/Jan25	Total
Direct cost	2,520,500	2,358,500	1,517,500	1,421,500	753,000	8,571,000
Execution cost	120,000	120,000	120,000	120,000	120,000	600,000
NIE cost	236,797	96,447	171,595	100,745	173,951	779,535
Total cost	**2,877,297**	**2,574,947**	**1,809,095**	**1,642,245**	**1,046,951**	**9,950,535**

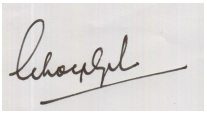
PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[18]

Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:

Mr. Rinchen Wangdi *Director, Gross National Happiness Secretariat*	Date: *April, 17, 2020*

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 (12th Five Year Plan, NDC and National Action Plan for 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 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.	
Dr. Pema Choephyel Implementing Entity Coordinator 	
Date: *April 17, 2020*	Tel. and email: *+975 1711 4026 & choephyel@bhutantrustfund.bt*
Project Contact Person (i):	*Mr. Ugyen Lhendup, Chief Program Officer*
Tel. And Email:	*+975 1760 3885 & email id: ulhendup@bhutantrustfund.bt*
Project Contact Person (ii):	*Mr. Singye Dorji, Chief Financial Officer*
Tel. And Email:	*+975 1799 9777 & email id: singye@bhutantrustfund.bt*

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.