

Advancing Climate Resilience of Water Sector in Bhutan (ACREWAS)

Part I: Project Information

GEF ID

10779

Project Type

FSP

Type of Trust Fund

LDCF

CBIT/NGI

CBIT No

NGI No

Project Title

Advancing Climate Resilience of Water Sector in Bhutan (ACREWAS)

Countries

Bhutan

Agency(ies)

UNDP

Other Executing Partner(s)

Ministry of Works and Human Settlement

Executing Partner Type

Government

GEF Focal Area

Climate Change

Taxonomy

Focal Areas, Climate Change, Climate Change Adaptation, Complementarity, Private sector, Adaptation Tech Transfer, Ecosystem-based Adaptation, Community-based adaptation, Climate resilience, Innovation, Influencing models, Deploy innovative financial instruments, Demonstrate innovative approach, Transform policy and regulatory environments, Strengthen institutional capacity and decision-making, Stakeholders, Local Communities, Civil Society, Community Based Organization, Non-Governmental Organization, Communications, Awareness Raising, Type of Engagement, Consultation, Partnership, Participation, Information Dissemination, Private Sector, Capital providers, Non-Grant Pilot, Individuals/Entrepreneurs, Large corporations, Beneficiaries, Gender Equality, Gender results areas, Access and control over natural resources, Participation and leadership, Capacity Development, Gender Mainstreaming, Gender-sensitive indicators, Sex-disaggregated indicators, Capacity, Knowledge and Research, Learning, Theory of change, Adaptive management, Indicators to measure change, Knowledge Exchange

Rio Markers

Climate Change Mitigation

Climate Change Mitigation 0

Climate Change Adaptation

Climate Change Adaptation 2

Duration

60 In Months

Agency Fee(\$)

848,580.00

Submission Date

4/23/2021

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
CCA-1	LDCF	8,932,420.00	25,190,600.00
	Total Project Cost (\$)	8,932,420.00	25,190,600.00

B. Indicative Project description summary

Project Objective

To enhance resilience and sustainable economic well-being of the people of Bhutan through climate adaptation of the water sector

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
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C1: Water governance and institutions	Technical Assistance	O1. Strengthened water governance, institutions, and financing mechanism in support of climate-resilient water management	<p>1.1 Agencies for water utilities at national, river basin, and local levels established and supported to fully factor water level and water shortage forecasting into the service provision.</p> <p>1.2 Relevant national and local policies and strategies aligned with sustainable and climate-resilient water management</p> <p>1.3 Institutional & community level capacity for climate-smart water and watershed management strengthened</p> <p>1.4 Innovative financing mechanisms for both watershed management and water infrastructure introduced</p>	LDC F	877,000.00	1,492,000.00
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C2: Nature-based solutions for sustainable and climate-resilient watersheds, and livelihood enhancement	Investment	O2. Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and their ecosystem conditions improved	2.1 Nature-based solutions for watershed restorations implemented aimed at yielding stable spring/stream flows.	LDC F	1,680,000.00	2,580,000.00
			2.2 Forest/Ground cover in catchment watersheds managed and maintained through the engagement of local communities and private/corporate sector			

C3: Efficient, adequate, and sustainable supply, distribution, and utilization of water	Investme nt	O3. Enhanced adaptive capacity of water infrastructure to climate-induced water shortages and quality deterioration through climate-proofing, private sector engagement, and technology deployment	3.1 Climate proofing measures implemented in multi-purpose storage, conveyance, and distribution network of drinking and irrigation water	LDC F	5,400,067.00	18,065,000.00
			3.2 Efficient drought-resilient water management technology tested and upscaled through private sector (youth- based start-up enterprises)			

C4: Knowledge manage ment	Technical Assistan ce	<p>O4. Strengthened awareness and knowledge sharing mechanism established</p> <p>[note: Included in Component 4 is the indicative M & E budget is USD 173,200 with government co-financing of USD 788,600). The activities will include inception workshop, annual workplan preparation and monitoring, implementation review of gender action plan and other safeguard plan, conduct of midterm and terminal review, including other important M and E activities. The indicative M&E budget is in Annex D.]</p> <p>Included in Component 4 is the indicative M & E budget is USD 173,200 with government co-financing of USD 788,600). The activities will include inception workshop, annual workplan preparation and monitoring, implementation review of gender action plan and other safeguard plan, conduct of midterm and terminal review, including other important M and E activities. The indicative M&E budget is in Annex D.</p>	<p>4.1 Communication strategy developed and implemented on water conservation and sustainable management developed and implemented</p> <p>4.2 Publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin institutionalized</p>	LDC F	550,000.00	1,565,000.00
Sub Total (\$)					8,507,067.00	23,702,000.00
Project Management Cost (PMC)						
LDCF					425,353.00	1,488,600.00
Sub Total(\$)					425,353.00	1,488,600.00
Total Project Cost(\$)					8,932,420.00	25,190,600.00

C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Recipient Country Government	RGOB	Grant	Investment mobilized	23,702,000.00
Recipient Country Government	RGOB	In-kind	Recurrent expenditures	1,488,600.00
			Total Project Cost(\$)	25,190,600.00

Describe how any "Investment Mobilized" was identified

Initial investment mobilization has been conducted as part of consultations during the PIF stage in September 2020 with the country offices of UNFAO, UNDP, and with the Gross National Happiness Commission. The following stakeholders were consulted during the PIF and were identified as potential sources of co-financing investment. Their contributions will be validated during PPG.

Recipient Government – This co-financing will be in terms of upscaling in dzongkhags that are beyond the project landscape and for PMU and for regular maintenance of existing infrastructure on which climate-proofing will be an additional cost. The RGOB co-financing in recurrent costs will cater to operational costs such as project period manpower and other PMU costs. The amount for this will be detailed out during the PPG phase.

Private Sector – The collaboration with Druk Holding and Investment Ltd. (DHI) is expected to mobilize start-up enterprises to take up the on-boarding of IT-based water management solutions. Additional funding in the form of start-up investments from DHI is expected to create social capital in enabling climate-resilient operation and management of water management systems. Further discussion and consultation with DHI will be carried out to determine the full scope of partnership including co-financing contribution. Co-financing from DHI will be activity-based. The DHI co-financing will be included in Table C upon assessment based on activities that will be identified during the PPG phase. Co-financing from DHI will be activity based. The DHI co-financing will be included in Table C upon assessment based on activities that will be identified during the PPG phase.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNDP	LDCF	Bhutan	Climate Change	NA	8,932,420	848,580	9,781,000.00
Total GEF Resources(\$)					8,932,420.00	848,580.00	9,781,000.00

E. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount (\$)

200,000

PPG Agency Fee (\$)

19,000

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNDP	LDCF	Bhutan	Climate Change	NA	200,000	19,000	219,000.00
Total Project Costs(\$)					200,000.00	19,000.00	219,000.00

Core Indicators

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Refer to CC–A core indicators in Annex B.

Part II. Project Justification

1a. Project Description

Country profile

1. Bhutan is a small, landlocked country with an area of 38,394 km² in the Eastern Himalayas located between China in the north and India in the south, east, and west. The dominant topographic features consist of the high Himalayas in the north with snowcapped peaks and alpine pastures; deep north-south valleys and hills created by fast-flowing rivers forming watersheds with temperate forests in the mid-range; and foothills alluvial plains with broad river valleys and sub-tropical forests in the southern part. With about 50% of the geographical area under slopes greater than 50% and about 52.45% of the land area lying above 2600 meters above mean sea level (RNR Statistics, 2019), Bhutan's topography is almost entirely mountainous and rugged. The mountainous landscape also makes the delivery of infrastructure and services difficult and expensive. Due to its fragile mountainous ecosystem, the country is highly vulnerable to impacts of climate change and extreme weather events. The situation is further worsened by the country's low adaptive capacity, poor economic status constrained by limited financial, technical, and human capacity.

2. It is one of the least populated countries in mainland Asia with a total population of 727,145 with a growth rate of 1.3% out of which 47.7% and 56.71% of the population under the age of 29 (PHCB, 2017). About 70.77 % of the total land area is under forest cover and 51.44% of the total area is designated as protected areas comprising of national parks, four wildlife sanctuaries, a strict nature reserve, biological Corridors, and a botanical park (FRMD 2017). The Constitution of the Kingdom of Bhutan (2008) mandates 60% of the country to remain under forest cover for all times to come. Some of the rarest flora and fauna on earth flourish within its high forest cover and pristine environment supported by strong conservation efforts and a good network of Protected Areas. The country's biodiversity includes 15 vulnerable, 20 endangered, and 13 critically endangered seed plants; 13 vulnerable, 11 endangered, and two critically endangered mammal species; 22 vulnerable, four endangered, and four critically endangered bird species; eight vulnerable and three endangered fish species; 11 vulnerable, five endangered and two critically endangered amphibians, and one vulnerable butterfly (MoAF, 2018).

3. Agriculture is a very important economic activity for Bhutan. The agriculture sector comprises of farming, livestock, and forestry which continues to be a major player in the country's economy. With only 2.75% of the total land area used for agriculture, the sector accounted for 15.89% of GDP in 2018 and employs about 48.63% of the total economically active population. With the majority of the population relying on agriculture, the sector is highly vulnerable to climate change. Also, characterized by remoteness and inaccessibility, marketing and large-scale commercialization are significant challenges for Bhutan. About 56% of the economically active population engaged in agriculture are female rendering women more vulnerable to impacts of water shortages in agriculture (RNR Statistics, 2019). Hydropower and tourism are the other key economic drivers.

4. The proposed project will intervene in four Dzongkhags (districts) that form a major part of Punatsangchhu river basin, one of the five main river basin management units in Bhutan as well as the largest in terms of geographical area and among the most climate-vulnerable watersheds in the country. The project area covering 883,080 Hectares comprising 23 percent of the total land cover of Bhutan, and 22 percent of all water bodies in the country. The project area covers 16,693 hectares or 16 percent of cultivated area in Bhutan (Agriculture Statistics, 2019). The majority of the population within the project Dzongkhags are engaged in agriculture. Overall, the agriculture sector has engaged 47 percent of the total employed population in the project area comprising 67.71 percent of the female population and 34.34 percent of the male population. Other major sectors of employment include construction which engages 13 percent of the population and electricity/gas/water which engages 10.72 percent of the population. These two sectors employ only 2.5 percent of the female

population and 19.4 percent and 15.7 percent of the male population respectively. Agriculture, the main sector of employment in the project area is dominated by women. The project areas have a total population of 97,254 comprising 45.5 percent females. The population of the project area constitutes 13.4 percent of the national population (PHCB, 2017). The Dzongkhags in the project areas include Gasa, Punakha, Wangduephodrang and Tsirang.

5. *Gasa Dzongkhag* is spread from elevations between 1,500 and 4,500 meters above sea level. The Dzongkhag experiences extremely long and hard winters and short summers. The Dzongkhag has four Gewogs namely Goenkhatoe, Goenkhamae, Laya and Lunana. The people of Laya and Lunana are mostly nomads. Over a hundred glacial lakes in the Dzongkhag feed some of the major river systems in the country, including the Phochhu and the Mochhu rivers which join further downstream to form the Punatsangchhu river basin. The whole Dzongkhag falls under the Jigme Dorji Wangchuck National Park. Dzongkhag is popular for its hot springs and series of other springs which are considered for their medicinal properties (Menchus). The region's high altitude and extreme climate make it difficult to practice agriculture but livestock is a mainstay, particularly the rearing of yaks.

6. *Punakha Dzongkhag* is located south of Gasa and is bordered with Wangduephodrang to the east and south and is part of the Punatsangchhu river basin. The Dzongkhag has eleven gewogs, namely Baarp, Chhubu, Dzomi, Goenshari, Guma, Kabjisa, Lingmukha, Shengana, Talo, Toepisa and Toedwang ranging from 1100 - 2500 m above sea level. Punakha is well known for rice, vegetables and fruits.

7. *Wangdue Phodrang* is one of the largest dzongkhags in Bhutan and has fifteen Gewogs which are Athang, Bjena, Daga, Dangchu, Gangtey, Gasetshogom, Gasetshowom, Kazhi, Nahi, Nysho, Phangyuel, Phobjkha, Ruebisa, Sephu, and Thedsho. The Dzongkhag ranges from 800 - 5800 m above sea level and has varied climatic conditions ranging from subtropical forests in the south to cool and snowy regions in the north. The Dzongkhag forms parts of Wangchuck Centennial Park in the north, Jigme Dorji Wangchuck National Park in northwestern pockets, and Jigme Singye Wangchuck National Park in the southeastern end. One of the most notable sites in the district is Phobjikha Valley which is the habitat of the rare and endangered black-necked cranes during winters. The Gewogs of Phangyuel & Ruebisa are included as part of the project area.

8. *Tsirang* is noted for its gentle slopes and mild climates suitable and well-known for agriculture as well as livestock products. It is one of the few dzongkhags without a protected area. The Dzongkhag has twelve gewogs which are Barshong, Dunglagang, Gosarling, Kikhorthang, Mendrelgang, Patshaling, Phuentsenchu, Rangthaling, Semjong, Sergithang, Tsholingkhar and Tsirangtoe.

The Problem;

9. As a result of climate change, summer months are predicted to become wetter and warmer while winter months are expected to be drier (See para 13, 14, 15, 16, and 17). These result in abundant availability of water in warmer months but decreased accessibility due to flooding and erosions exacerbated by the hostile terrain (See para 18, 19, and 21) and scarce availability and accessibility of water in winter months due to drying of water sources (See para 18). Therefore, despite being endowed with the highest per capita water availabilities, Bhutan suffers from chronic water shortages as follows. Water is a key determinant of people's vulnerability. Given the terrain climate-induced hazards like flashfloods, dry spells during winter, are likely to deteriorate the quality and quantity of water required to meet hygiene and sanitation needs. Inability to meet the demand is likely to further accentuate the impacts of climate change on the local communities. The COVID-19 pandemic reinforces the need for access to adequate and clean water for health as well as food and nutrition security. Frequent handwashing is widely recommended by WHO to stop the spread of COVID-19. Reliable water, sanitation, and hygiene (WASH) facilities are essential to containing the spread of the virus. The stocktaking for National Adaptation Plan (NAP) formulation process in Bhutan carried out in 2020 clearly recommends instituting indicators, among others, such as number of people permanently displaced from homes as a result of floods, dry spell or other climate events, number of surface water areas/ springs subject to declining water quality/quantity due to extreme temperatures. In an agrarian and

predominantly rural nature of the Bhutanese communities, inadequate access to water can further accentuate the vulnerability to climate change. Climate-smart and resilient agriculture is particularly dependent on adequate water. The project, by instituting and ensuring climate-resilient practices in the whole supply chain of water (sourcing, supply, maintenance, governance, and ownership), will address the current problems caused as results of climate change.

10. *Drinking water shortages and Degrading water quality:* A 2014 inventory of rural households carried out by the health ministry found that 17% of rural households (13,732) across the country faced drinking water problems and 18% of regular households (29,340) in Bhutan reported that the source of drinking water is unreliable[1]. According to the National Environment Commission's 2018 Water Security Index, more than 77.5% of households in the urban areas of Thimphu have resorted to portable water supply as the taps are running dry. Most of the urban areas have access to only intermittent water supply. The duration of supply generally ranges from 4 to 12 hours daily. More than 46% of the urban population have 8 to 12 hours and 11% have less than 8 hours of water supply. According to the National Water Flagship Program, 58 rural communities comprising 751 households in the country have no water source, and 49 villages comprising 1,051 households have inadequate water source. These households depend on water harvested during rainy days. Dried up sources have also been reported in 29 communities, comprising 527 households where the Rural Water Supply Schemes have been implemented. Drying up of water sources is attributed to the extended period of the drier winter season with high evaporative demand. The Water Act of Bhutan, 2011 and as well as the Bhutan Water Policy, 2003 consider water for drinking and sanitation for human survival as the first order of priority in water allocation.

11. Water contamination is considered to occur at water sources due to seepage from agriculture and household effluents as well as due to lack of standard water treatment and quality assurance leading to poor water quality levels across the country, particularly in urban areas. As agriculture expands upstream, farm runoff could become a consideration for water quality downstream. About 50% of the geographical area of Bhutan is under slopes greater than 50% (RNR Statistics, 2019). The predominant mountainous and rugged topographic features render the country highly vulnerable to climate change-induced disasters, mainly in the form of landslides, erosions, and siltation which also seriously impact on water availability and quality. Climate change, through erratic rainfall and flooding in steep slopes, exacerbates water quality as running streams and rivulets tend to become muddy affecting drinking water quality. A rapid assessment of rural drinking water quality in 2012 indicates that 17% of the stream water sources and 28% of the spring water sources are safe for consumption (RCDC, 2012). The test is conducted through the assessment of microbiological parameters. Domestic sewage and improper disposal of waste oil and other vehicle effluents from workshops located close to rivers are also a serious environmental concern, especially in places like Thimphu and Phuentsholing. While the use of pesticides and herbicides is also a potential source of water pollution, RGOB has a dedicated program on organic agriculture which is expected to address this in the long run while also improving agro-ecosystems. Further, the COVID-19 pandemic reinforces the need for access to adequate and clean water for health as well as food and nutrition security. Frequent handwash is widely recommended by WHO to stop the spread of COVID-19. Reliable WASH facilities are essential to containing the spread of the virus.

12. *Irrigation water shortages:* Of the 900 schemes surveyed at the national level, only 372 schemes have an abundance of water, 272 schemes got adequate irrigation water. About 27% of the total schemes suffer from either "inadequate" or "acute shortage" of irrigation water[2]. Assessment has shown that water shortages for agriculture, and hence even for drinking, is likely to become critical, as historical data clearly demonstrate that the evaporative demand of the atmosphere has been significantly increasing, decreasing the amount of rainfall available for growing crops during both in the months of December to February (DJF) and March to April (MAM). The assessment also shows that it will likely no longer be feasible to plant rice, a staple crop, without supplemental irrigation during DJF. The findings reinforce and validate the reported water shortages noted by farmers during the dry season. These climatic changes during the dry season are expected to continue and are consistent with climate change projections, reinforcing that it will become increasingly difficult for farmers to grow crops without suitable adaptation measures.

13. According to RNR Statistics (2019), of the 976 irrigation schemes across the nation, 88% are functional, 2% are semi-functional and 10% are non-functional. This is largely attributed to damage to the infrastructure due to landslides and flooding due to extreme weather events. A study in Punakha, Wangdue, Tzirang, Paro, Sarpang, and Samtse carried out from March-May in 2019 indicated that the most important consequence of climate change impacts on crop production was the drying of irrigation water sources[3]. The farming communities reported on experiencing significant frequency and severity of

extreme weather events in the form of untimely rain and drought. The farmers in the study districts felt that the irrigation sources were affected the most as a consequence of climate change impacts. The study also documents data over last over the last 20 years (1996–2017) in the study area which shows a decreasing rainfall and an increase in temperature.

14. *The COVID -19 Pandemic;* COVID-19 pandemic has affected Bhutan like any other country. The science-based response measures and early recognition of its impact have managed to contain without major health impact on the Bhutanese. However, the economic repercussion continues to be severe. For a country, that relies heavily on the importation of essential goods such as food items and fuels, prices have risen by manifolds. In particular, the COVID-19 pandemic has seriously constrained food imports. (Imported food accounts for 16.0 percent of total imported value amounting to Nu. 66.92 billion in the year 2017[4]). It disrupted supply chains due to higher transport costs caused by the reduced volume of imports and establishment of additional safety protocols through supply chains. COVID-19 has also triggered reverse urban-rural migration, where urban dwellers have started to move to rural homesteads to pursue agriculture resulting in further pressure on irrigation water needs in rural agriculture areas. The pandemic reinforces the need for access to adequate and clean water for health as well as food and nutrition security. Frequent handwash is widely recommended by WHO to stop the spread of COVID-19. Reliable, WASH facilities are essential to containing the spread of the virus. Further, the challenge posed by the pandemic has underscored the need to build a resilient domestic and local agriculture system with a shorter supply chain, efficient water management and irrigation system, etc to adapt to the impending crisis of climate change.

Root causes

Climate change:

15. Bhutan is highly vulnerable to the adverse impacts of climate change. In addition to being a landlocked and least developed country with a fragile mountainous environment, high dependence of the population on agriculture and the significant role of hydropower for economic development increase the vulnerability. The country also faces increasing threats from climate hazards and extremes events such as flash floods, glacial lake outburst floods, windstorms, forest fires, landslides, and the drying-up of streams and rivulets.

16. Climate projections for Bhutan indicate increases in temperature and monsoonal rainfall, as well as extreme temperatures and increasing frequencies of extreme rainfall. Changes in the seasonal distribution are also projected, with a decrease in winter and an increase in monsoon rainfall. Observations show that annual average temperatures have been increasing between 1996 and 2018 and are expected to continue to increase. IPCC's fifth assessment report states that over the mid-term (2046-2065), an increase of 2-4°C is projected for the South Asia region with the warmest temperatures concentrated in amongst others, Bhutan. The mean annual temperature in Bhutan is expected to increase by 0.8-1.0°C before 2039 and by 2.0-2.4°C before 2069. Rainfall, as the basis for water resources for agriculture during the winter to the summer period, is becoming scarcer. In the future, mean annual precipitation in Bhutan is projected to increase by ~6% in the 2010-2039 period, with an increasing amount of rainfall during the monsoon season. The upward trend and projected increase for monsoon rainfall are significantly more pronounced when compared to winter and annual rainfall trends, indicating that the majority of the increased precipitation will occur during the monsoon season[5].

17. TNC (draft 2020) confirms trends and projections as stated above. In summary, summer months are predicted to become wetter and warmer while winter months are expected to be drier and warmer. The latest information from the Third National Communications of Bhutan, including the projected consequences on the water resource sector is presented below:

Projections reported in the TNC of Bhutan, 2020 based on historical climate and climate projections for Bhutan (NCHMS)

Area of projections	Under RCP 4.5 (intermediate emission) of IPCC AR5	Under RCP 8.5 (high emission) of IPCC AR5	Remarks
Projected change in temperature	Increase of about 0.8 C – 1.6 C during 2021-2050 and about 1.6°C – 2.8°C towards the end of the century (2070-2099). Overall, increase in about 0.8 C – 2.8 C during 2021-2100	Increase of about 0.8 C – 2.0 C during 2021-2050 and increase of about 3.2 C towards the end of the century (2070-2099)	Stable increase in temperature across the country under both RCPs More significant warming during Spring (March, April, May) and Winter (December, January, February) seasons The country as a whole is expected to experience an increase in temperature with a larger increase projected in the highlands
Projected change in mean annual rainfall	Increase by about 10% to 30%, with a 5% to 15% increase in summer rainfall/ monsoon.	Increase by about 10- 20% between 2021 and 2050. More than 30% increase all over Bhutan towards the end of the century	Mean annual rainfall over Bhutan is likely to increase in the future under both RCPs Increasing rainfall during the summer, the winter season is likely to receive a decrease in rainfall in some parts of the country, particularly in the north-western region of Bhutan.
Water resources-Projected change in river basins discharge	All river basins are projected to see the highest discharge in May, June, and July (14 to 43%)	Monthly average flow shows an increase from January to November	Increases in discharges concentrated more in the summer months, while the decreases are more apparent in the winter months - dry periods are expected to get drier and wet periods are expected to get wetter, making the overall system more vulnerable to the impacts of climate change in future

RCP= Representative Concentration Pathways; AR5 = Fifth Assessment Report; TNC=Third National Communication.

18. Consultations with communities carried out by UNDP in 2019 during the formulation of the GCF funded project - “Supporting Climate Resilience and Transformational Change in the Agriculture Sector in Bhutan”, captured the following perceptions of communities on observed changes in temperature and rainfall.

Climate factors	Observed change (%)			Decreased (%)			Increased (%)		
	Male	Female	M+F	Male	Female	M+F	Male	Female	M+F
Summer temperature	94.1	92.6	93.2	5.1	4.3	4.6	94.9	95.3	95.1
Winter temperature	84.0	86.3	85.4	51.0	32.9	39.8	49.0	67.1	60.2
Rainfall Patterns	82.9	82.3	82.5	40.6	33.7	36.4	59.4	66.3	63.6
Snowfall	46.5	65.9	58.4	98.9	94.4	95.8	1.1	5.6	4.2
Frost Patterns	25.1	36.8	32.3	97.9	90.0	92.4	2.1	10.0	7.6

The observations reported by communities indicate are fully in line with the findings of historical climate and climate projections for Bhutan, especially in relation to changes in temperature and snowfall critical for water runoff formation and the overall hydrological cycle.

19. These changes are expected to lead to an increase in the occurrence and magnitude of extreme events such as windstorms, flash floods, and landslides. In addition, increasing temperatures contribute to the drying up of water sources.

Declining drinking water availability and quality exacerbated by climate change.

20. Observed changes in temperature and precipitation patterns impacting water sources have been dominating national discussion since mid-term review consultation of the 10th Five Year Plan (March-May 2011), where representatives of almost all Dzongkhags raised acute water shortages for drinking (SNC, 2011). Dried up sources have also been reported in 29 communities, comprising 527 households where the Rural Water Supply Schemes have been implemented. Surveys on local perceptions have also reported that people have observed winter flows to be lower than normal in the past 10-20 years (NTG Biodiversity 2011, WWF & WCP 2011). Springs and small rivulets on the upstream hill slopes which are the main sources of drinking water dry up in winter and are increasingly unreliable. Out of the 65,555 water sources, about 35% (2,317) of water sources are in drying condition (WMD, 2019). The depletion of water sources and the minimal flow of water during the winter months have contributed to the surge in water shortages across the country. Also, about 50% of the geographical area of Bhutan is under slopes greater than 50%, and about 52.45 % of the land area lies above 2600 meters above mean sea level (RNR Statistics, 2019). The predominant mountainous and rugged topographic features render the country highly vulnerable to climate change-induced disasters, mainly in the form of landslides, erosions, and siltation which also seriously impact on water availability and quality. Given the terrain climate-induced hazards like flashfloods, dry spells during winter, are likely to deteriorate the quality and quantity of water required to meet hygiene and sanitation needs. Inability to meet the demand is likely to further accentuate the impacts of climate change on the local communities.

Declining irrigation water availability and quality exacerbated by climate change:

21. Increasing temperatures and declining rainfall and longer dry periods contribute to crop failures and/or decreased yields, as well as more land being left to fallow. As noted above water shortages will become more acute and key staple crops such as rice may not be possible to cultivate without supplemental irrigation.

22. Flash floods, landslides, triggered by Cyclone Aila in 2009 affected 17 Dzongkhags and caused losses worth Nu.719 (about US\$ 10 million). Flash floods caused by Jichurong-chhu due to heavy rainfall in 2013 affected 5 villages in Kabisa gewogs in Punakha filling over 14 acres of agricultural land with debris. Landslides in 2016 affected 19 Dzongkhags causing damage to houses, cultural monuments, water supply tanks, irrigation channels, farm roads, and roadblocks. Also, in 2016 heavy rainfall and flooding affected 13 Dzongkhags damaging river protection walls and washed away riverbanks, washed away bridges and roads, damaged agricultural lands, water supply plants, and irrigation channels. In 2017, landslides affected 6 dzongkhags causing loss to properties, roadblocks, and damaging irrigation channels. Changes in climatic conditions across the rugged terrain have been a cause of the intensification of flooding, erosions, and landslides. The table below summaries major extreme events.

Extreme Weather Events, Hazard and Damages caused to infrastructure (project areas indicated in italics)[6]

Year (2009-2016 only)	Event	Date/ month	River basin/ Sub-basin	Dzongkhag Village/ Geog	Reported damage
2009	Incessant rain due to Cyclone Aila	May	Nationwide	<i>Nationwide</i>	damaged and/or destroyed government buildings, private houses, and irrigation and drinking water supply lines, blocked or washed away several highways, feeder roads, and farm roads, and inundated forest plantations and agricultural fields (NAP, 2014)
2010	Flash flood	August 27	Sarpang river	Sarpang Sarpang town	2012 June 3 am Fash flood Gasa Damji Damaged paddy fields, irrigation channels, farm roads, drinking water supply schemes, and crops (Kuensel).
2012	landslides, landslips and flooding	June	Damji, under Gasa Dzongkhags	<i>Damji, under Gasa Dzongkhags</i>	Washed away the arable fields & roads, caused siltation, and completely damaged the irrigation canal networks. Caused by Low intensity and prolonged rainfall followed by an extremely high downpour (about 170 mm in four hours).
2013	Flash flood	June	Swelling str	<i>Punakha Kabj</i>	Flash flood damages 6 acres including paddy fields

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2014	flash flood	June 17	Sengphug Rongchu	Trashiyangtse Toetshogewog	Destroyed between 600 and 700 acres of paddy fields
2015	Flood or GLOF	June 28	Lemthang Tsho outburst	<i>Gasa Laya leading to Punakha-wangdue valley</i>	The two drinking water pipes connecting Bajo town that was washed away.
	Flash flood	August 8	Nahi stream.	<i>Wangdue</i>	Washed away drinking water sources for Rinchen gang. Washed away several irrigation sources for Nahi, Rinchen gang, and Gaselo
2016	Flash flood	July 24	Setikharay seasonal stream	Gelephu (Pelritang)	Submerged water treatment plant
2016	Flash flood	July 26	Setikharay stream. Gelephu	Gelephu gewog, Ghaden chuwog	More than 60 acres of cultivated paddy land was damaged by Taklai river and eroded 2 acres of cardamom field in Jimicholing gewog.
2019	Flash Floods	7th August	Phangruchhu stream in Jarogang	<i>Kamichu area, Wangdue Phodrang</i>	Swelling of Punatsangchhu and submerging of roads due to swollen Phangruchhu stream Damaged the irrigation water channel of twenty households, drinking water supply of four households, and about twenty acres of paddy field under Jarogang-Dzawo chiwog in Athang Gewog.

23. *The proposed alternative:* In the face of water scarcity there are opportunities to enable adequate, clean, and assured water supply to the population and increase climate resilience of rural and urban communities. The RGOB has prepared a water flagship program to provide assured drinking and irrigation water for the country in the face of changing climate. This proposed intervention will form a core part of the national plan to provide integrated water supply for four Dzongkhags. The project interventions will enable adequate, clean, and assured water supply to the population of four Dzongkhags of Gasa, Punakha, Wangduephodrang (two gewogs of Phangyuel and Rupisa), and Tsirang. These four Dzongkhags from major parts of the upper catchments of Punatsangchhu river basin management unit. The project interventions will increase the climate resilience of rural and urban communities in these Dzongkhags. Considering the spatial interlinkages and dependencies between land use, ecosystem health, and underlying causes of vulnerability to climate change, this approach will ensure that targeted catchment watersheds are managed to protect and restore their capacity to provide sustainable ecosystem services and bring about efficiency and effectiveness and climate resilience of infrastructure network for drinking and irrigation water supplies. The Project will support critical

catchment protection by adopting climate-resilient watershed management principles. Such practices are anticipated to reduce threats from climate-induced hazards such as floods, landslides, and dry spells and overall improvement of the adaptive capacity of the project beneficiaries. Additionally, these measures will also mean the downstream climate-resilient infrastructure development works are in tandem with upstream catchment protection. However, there are several barriers.

Barriers

24. *Unclear and overlapping jurisdictions for water resources and water services:* Overlapping responsibilities, unclear jurisdictions and silos of water resources and water services development across relevant sectors and agencies have given rise to a lack of organized development and management of water resources and services. Strengthening of water governance and coordination systems, therefore are hampered by institutional, coordination, and planning bottlenecks. The water mandates and resources for water management are fragmented across ministries and agencies. For instance, the Ministry of Works and Human Settlements have the responsibility for urban drinking water and the Ministry of Agriculture for irrigation water. At the local levels, the Dzongkhag Engineering Divisions are responsible for infrastructure within the Dzongkhags including those for water management (See table on Matrix of agencies and their associated watershed-related responsibilities). The approach to management thus far, has largely been sector-based, leading to the issue of multisectoral coordination. The Water Act of 2011 empowers NEC with the responsibility of coordinating the efforts of line agencies in managing the water resources of the country. The line agencies work in silos in pursuing their own agendas and priorities for the use and management of water, often resulting in duplication of effort and government resources. The current level of coordination is not adequate to fulfill the requirements of the Water Act. In addition, at the district level, the coordination between the local governments and the central agencies is weak and often unclear leading to poor planning and management. Recognizing the issue of multisectoral coordination, the government established a water board, later replaced by the Water Resources Technical Advisory Committee comprising of senior officials from various relevant agencies to foster coordination. However, the Committee has failed to make any significant impact within the water sector.

Matrix of agencies and their associated watershed-related responsibilities

Responsibilities & jurisdictions	M o W H S	D o A/ M O A F	D o F S/ M o A F	N E C S	N C H M S	M o H	D o L/ M O A F	M o E A	BE A & hy dr op o w er ag en ci es	M o E	D o n g k h a g s	M u n i c i p a l i t i e s	R B M C s	C o m p e t e n t A u t h o r i t y	M o H C A	C S O s & M e d i a
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Fisheries																	
water resources issues in the schools and institutions																	
Therapeutical waters																	
River Basin Management Plans																	
Research & Technology																	
Coordination of disaster preparedness and mitigation related to water																	
Assisting in prevention of water pollution and sustainable use of water resources through education, public awareness, and promoting Public Private Partnership (PPP)																	

NEC=National Environment Commission; MoWHS=Ministry of Works and Human Settlement; MoH = Ministry of Health; DoFPS = Department of Forests & Parks Services; MoAF = Ministry of Agriculture and Forests; DoA = Department of Agriculture; MoEA = Ministry of Economic Affairs; MoHCA = Ministry of Home and Cultural Affairs; BEA=Bhutan Electricity Authority; MOE = Ministry of Education; CSO = Civil Society Organizations; RBMC=River Basin Management Committee; NCHMS = National Center for Hydromet Services.

25. *Degradation of watershed conditions and inadequate management:* In an area of abundant rainfall and ample sources of freshwater, such shortages point both to imbalances between water demand, supply and distribution systems as well as in appropriate management of catchment watersheds. The Water Flagship Program document, 2020 recognizes that Bhutan’s scenario of abundant water availability but low accessibility is largely due to insufficient source management, inadequate infrastructure development and maintenance, and issues in governance and sector-based systems which are worsened by the impacts of climate change. The degrading health of watershed catchment areas has become a cause of concern as land and forest degradation has become a threat to water availability. Around 1,923 hectares of Sate Reserved Forests are estimated to be allotted for developmental activities such as agriculture, hydropower, roads, mining, and transmission lines which are the major drivers of deforestation in the country. The annual deforestation and loss of forest land are about 5,798 hectares[7]. Between 2015 to 2017 about 136 fire incidences were recorded, which destroyed approximately 19,992 hectares of forests. With climate projections indicating increased temperatures coupled with the country’s rugged terrain making fire control very difficult, it is estimated that about 93,800 ha of forest would be subjected to fires by 2030 based on the past annual average area of areas lost to forest fires[8]. Hence, changes in temperatures regimes that indicate a higher level of warming rates at higher elevations, changes in land use practices, the rugged terrain, land degradation, forest fires & high surface run-off; soil erosions, flash floods, landslides have contributed to drying up upstream water sources and reduced/erratic downstream water availability. Further, the reduced precipitation and extended dry season is likely to reduce watershed recharge capacity. Watershed management plans are prepared by the WMD, DOFPS. but without due factoring of climate change risks and projected changes in watershed recharge capacity.

26. *Climate inefficient infrastructure and management – an additional cost:* Based on a supply and demand analysis carried out for 2014 and 2030, the capacity of existing infrastructure is adequate to cater to the demand of some of the urban centers till 2030 provided the infrastructure is rehabilitated. In addition to the inadequacy of infrastructure, a public survey on access to 24x7 safe drinking commissioned by MoWHS in 2018 indicated water pipe leakages, tank overflow illegal tapping of waterlines increased demand lack of water treatment as issues related to water infrastructure. Similarly the National

Irrigation Master Plan (NIMP), 2016 assessed canal seepage, wetting, and drying of canals, leakage at canals, and management inefficiency as major problems with water infrastructure. Accordingly, conveyance and distribution efficiency are considered to be at 75% and field application efficiency at 70% with the overall irrigation system efficiency at 39%. Extreme weather events have been reported annually in Bhutan. These extreme weather events cause significant damage to property and lives. The following table shows a list of reported events that have caused damage to drinking water and irrigation infrastructure indicating vulnerability and climate in-efficient design of such infrastructure.

27. Landslides, flash floods, landslips are key challenges having an impact on irrigation and drinking water infrastructure by damaging climate in-efficient structures including water intake structure, water conveyance, and distribution structures. Such events add to reducing access to and security of sufficient and timely water reduced water quality through upstream land degradation linked triggered by extreme weather events. Most of the open gravity-fed irrigation systems in Bhutan were constructed many years ago and have low technical efficiency as many are earthen canals. This leads to water loss through seepage, vulnerability to frequent damage due to blockages, and water conveyance loss. Distribution networks are poorly designed resulting in the mismanagement of water and users conflict. Water shortages are more pronounced during the main cropping season, which coincides with the pre-monsoon season. Most of the existing irrigation systems are run-of-the-river types. They draw water from the second or third-order tributary rivers whose flows depend almost exclusively on monsoon rains. Their earthen and open canal infrastructure designs are subject to leakage, exposure to a higher level of transpiration loss, and vulnerable to damage by frequent landslides. These systems are thus highly susceptible to changes in rainfall as irrigation infrastructure was not designed to withstand extreme floods and landslides. Landslides along the channel cause damages and block the drains, often leading to water insecurity on the farm as farmers are not able to deal with major damages[9]. The climate inefficient designs are mostly implemented on account of cheaper cost for such infrastructure rendering them vulnerable to deterioration by even slight increases in stream/river floods and landslides caused by climatic variability, mainly rainfall patterns[10]. Engineers estimate the climate-resilient structures would cost 4 to 5 times higher (more precise estimates will be worked out during the PPG) than the designs that are being implemented in a business-as-usual scenario in Bhutan. The investments required for ensuring adequate and sustained water supply for all are huge. The water flagship program for the ten Dzongkhags initiated by RGOB is estimated to cost about Nu. 5000 million (US\$ 71 million) for which there is still a financing gap of around US\$ 40 million, This is a big gap for an economy that has been severely affected by the COVID 19 pandemic to negative 6.8 percent in 2020 (Ministry of Finance). Although the problems call for an urgent and immediate need to finance adaptation interventions for all Dzongkhags, mobilizing resources for the remaining ten Dzongkhags remains an as serious challenge.

28. *Capacity Constraints and knowledge gap:* Several national policies on water including the water flagship program recognize that capacity of technical staff across government, private sector as well as communities is an issue that has been a cause of inadequacies in water resource management, establishing appropriate technologies and in adopting appropriate designs of water infrastructure. The technical people engaged in water sector require specific competency in order to carry out their functions efficiently and effectively. However, there is shortage of water engineers in the country. Therefore, most of the engineers/technicians implementing water projects/activities do not have the right skills and require technical training in climate efficient designs, contraction, and management of water infrastructure. Further, there are limited awareness programs, data & capacity development on climate-resilient water/watershed management practices and climate-smart operation and maintenance of water supply systems.

Baseline scenario and any associated baseline projects

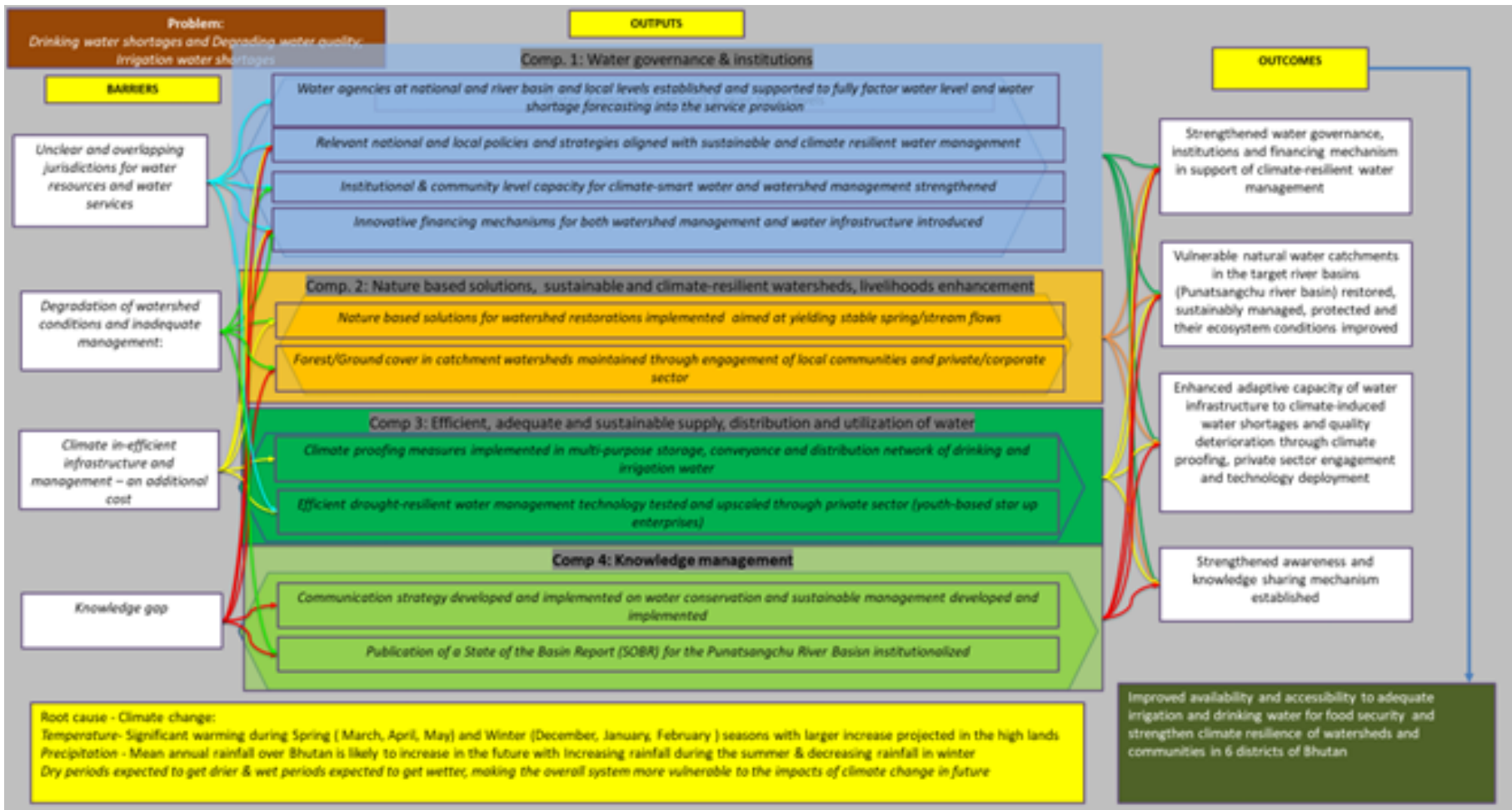
29. The RGOB has recognized the importance of water sector as a key driver of an inclusive, equitable, and sustainable socio-economic development, more so in the context of providing assured drinking and irrigation water to the population and in enabling the health of watershed to provide a sustained supply of water. Considering the issue of water as one of the top priorities, RGoB has come up with the Water Flagship Program (WFP) to provide access to 24x7 safe drinking water and irrigation to both rural and urban households. Strategies within this program include 1) Declaration and protection of critical watersheds; 2) Development of adequate and climate-resilient infrastructure; 3) Improvement of drinking water quality surveillance; and 4) Better implementation of water legislation and governance.

30. The GCF financed UNDP project on Supporting Climate Resilience and Transformational Change in the Agriculture Sector in Bhutan supports resilient agricultural practices, interventions to integrate climate change risks into water and land management practices that affect smallholders and in reducing the risk and impact of climate change induced landslides during extreme events that disrupt market access. The project picks up water supply for 8 Dzongkhags of Dagana, Tsirang, Sarpang, Punakha, Wangdue, Zhemgang, Trongsa and Samtse. The total grant financing for the project is USD 25,347,194 over its implementation timeline from 2016 to 2025

Proposed alternative scenario and -expected outcomes and components of the proposed project

31. The proposed project interventions will enable adequate, clean, and uninterrupted water supply to the population of four Dzongkhags of Gasa, Punakha, Wangduephodrang (two gewogs of Phangyuel and Rupisa), and Tsirang. These four Dzongkhags form major parts of the upper catchments of Punatsangchhu river basin management unit. The project interventions will increase climate resilience of rural and urban communities in these Dzongkhags. Considering the spatial interlinkages and dependencies between land use, ecosystem health and underlying causes of vulnerability to climate change, this approach will ensure that targeted catchment watersheds are managed to protect and restore their capacity to provide sustainable ecosystem services and bring about efficiency and effectiveness and climate resilience of infrastructure network for drinking and irrigation water supplies. The Project will support critical catchment protection by adopting climate-resilient watershed management principles. Such practices are anticipated to reduce threats from climate-induced hazards such as floods, landslides and dry spells and overall improvement of the adaptive capacity of the project beneficiaries. Additionally, these measures will also mean the downstream climate-resilient infrastructure development works are in tandem with upstream catchment protection.

32. The Theory of Change (refer to diagram below) outlines the problem the project will address and the causal logic that has informed the project design to ensure that the objective is achieved. This can be summarized as follows: In order to address the serious threats to drying up of sources of water/ springs/ upper streams in catchment areas and consequently, reduced/erratic downstream water availability, the project will improve ecosystem services of critical water catchments and enhance resilience of vulnerable mountain communities to cope with the impacts of climate change.



33. Project will have four components comprising of;

- 1) Water governance and institutions
- 2) Nature-based solutions for sustainable and climate-resilient watersheds, and livelihood enhancement
- 3) Efficient, adequate and sustainable supply, distribution and utilization of water
- 4) Knowledge management

Outcome one: Strengthened water governance, institutions and financing mechanism in support of climate-resilient water management

In order to address the issues related to institutional and governance structure on water resource management, services and its associated barriers, the project will aim to strengthen climate resilient water governance and coordination systems including the establishment of an agency for water utilities and one that will pursue integrated water sector development, management and provision of water related utility services. Based on an Institutional and analysis including feasibility assessment of the proposed national agency during PPG phase, the establishment of such an agency will be proposed with clear mandates, organizational structure and clarified linkages with the NECS, competent authorities and local governments.

Further, the component will also support institutional arrangements to enable establishment of River Basin Management Committees (RBMCs), Dzongkhag Water Management Committees (DWMCs) and Water User Associations (WUAs).

Through this, the project will support clarifying on policies, regulations & planning processes as well as on financing of operations of RBMCs and DWMCs as it relates to water sector planning, development and management, promoting community participation, monitoring and reporting and resolving cross-sectoral issues to fully embed climate risk considerations. The project support will include review of the Water Act of 2011 to incorporate the changes in the mandate and institutional setup within the water sector that will enable climate risk management policies and functions across mandated institutions. It will support integration of Key Results Areas (KRAs) for water security and Key Performance Indicators (KPIs) based on national Integrated Water Resources Management Plan (IWRMP) in the national and local planning guidelines with appropriate responsibility and accountability frameworks so that NIWRMP and RBMPs can be mainstreamed into sectoral and local development plans. Through this, the project will support enabling appropriate institutions and clarify on policies, regulations & planning processes as well as on financing of operations of RBMCs and DWMCs as it relates to water sector development and management, promoting community participation,

The lack of capacity for climate-smart operation and maintenance of water supply systems, water conservation/efficiency technologies, and adoption of IWRM approaches have been bottlenecks in building resilience in the water sector. To overcome the barriers related to limited capacity on climate-resilient water/watershed management this component will support effective capacity for climate-resilient water and watershed management as well as for taking forward the concept of IWRM at various levels including institutional & community level capacity.

The project will also test and demonstrate financing instruments or models engaging private sector through PPP and PES to embed sustainability dimensions in watershed and water infrastructure management. To promote water conservation as an adaptation mechanism and reduce overconsumption and water, a water pricing policy will be supported.

The main deliverables under this outcome will include:

- Support to the Government's priority to establish an autonomous national government agency for water to provide access to adequate, safe, affordable and sustainable water for drinking, sanitation, waste water and irrigation services considering climate change impacts on hydrological systems. The agency will operate and function on a corporate mode and will sustain its operations on service fee/tariff on water utilities and services in the long term on Government budgetary support in the short term. The project support in this will include the design of the organizational set up and capacity building to ensure that the new agency has organizational profile and human resources competency to consider climate change impacts on hydrological systems. Clear mandates, organizational structure and clarified linkages with the NECS, competent authorities and local governments for planning, development, coordination and management of water utilities and services. The water agency will be a corporate entity owned by the government, sustaining on government grant initially and on service fee/tariff on water utilities and services in the longer term. The Government contribution in this will include establishment of the agency and provide operational mandate, resources, and legitimacy.
- Entities that represent the stakeholders to be engaged actively in the development of watershed management plans through RBCs, DWMCs and WUAs.
- Adequate and gender-balanced human capacity and skills available for climate-resilient water resources and water management at central, local, community levels including the private sector.
- A revised water act, water policy and regulations supported and policy environment for sustainable and climate-resilient water management

While climate change clearly impacts the supply-side affecting availability of water resources. Human demands for water also interact with climate change to exacerbate the pressures on the water supply. In order to rationalize water use and reduce the demand-side pressures on water, the project will promote water thrifting as an adaptation mechanism

ver consumption and reflect the actual cost of production including ecological costs. It will also consider appropriate pricing for rural households and lower-income households in urban areas.

Conducive environment for corporate and private sector engagement, enterprise development, and public-private partnerships demonstrated. Private sector participation in drinking water and irrigation management initiated in at least 4 water infrastructure operations and maintenance. Green Bhutan Corporation Limited (GBCL) engaged in plantation and agroforestry activities with support from the project establishing a modality for GBCL to collaborate with the Druk Green Power Corporation (DGPC). Post project, the DGPC will support plantation activities of GBCL for watershed restorations.

Beneficiaries/users of ecosystem services pay to the provider of services contributing to sustainable watershed management and sustenance of ecosystem services. The project results will include establishment of PES schemes contributing to sustainable watershed management in water catchment areas.

Outcome two: Vulnerable natural water catchments in the four target river basins restored, sustainably managed, protected and their ecosystem conditions improved

This outcome will support participatory assessment, identification & declaration of critical water sheds/catchment areas/spring recharge areas. The project will support soil & water conservation interventions, bio-corridors/setbacks and wetlands/spring augmentation activities for water catchment /spring recharge areas including soil/moisture retaining agro-practices and climate-resilient crops in settlements near catchments. These interventions will aim to restore and improve ecosystem conditions of vulnerable natural water catchments.

Further, implementation of afforestation, reforestation and agroforestry interventions will improve forest and/or ground cover and enhance water infiltration in catchments. Overall, this component will address the problem related to drying up upstream water sources and reduced/erratic downstream water availability by improving the catchment watershed conditions and enabling sustainable and resilient watersheds yielding stable spring/stream flows.

the main deliverables under this outcome will include:

- Improved water security as and biodiversity/ecosystems safeguards with additional co-benefits in carbon sequestration and storage, improved soil fertility, biodiversity conservation, and improved community livelihoods. Catchment watersheds restored with vegetation to enhance infiltration, reduce run-off and peak flows, and stabilize slopes, soil fertility improved over 37,530 hectares of forest land/watersheds
- Improved ecosystem conditions of 42 watershed areas as well as 147 spring sources to improve water availability and quality at source.
- Local sites for nature-based solutions identified and at least 12 start-up enterprises on based solutions promoted to incentivize and enhance watershed conservation such as fodder development, catch and release fishing, water sports, tourism, hot stone bath, etc. These enterprises can operate as per the framework developed through the GEF ecotourism project and provide concessions for these nature-based enterprises (private sector) to participate in watershed management activities.

Outcome three: Enhanced adaptive capacity of water infrastructure to climate-induced water shortages and quality deterioration through climate proofing, private sector engagement and technology deployment

This outcome will address barriers related to inefficient and inadequate surface water storage and distribution, breakage and leakage of water pipelines and tank overflows, illegal tapping of waterlines and breakdown of pumps and blackout of electricity during summer, lack of standard water treatment and quality assurance in drinking water supply systems and water contamination are major issues leading to irrigation and drinking water shortages as well as poor water quality. The component will focus on establishment and demonstration of adequate climate-smart and efficient water infrastructure. The water tapping, storage, and distribution system under this component will integrate multi-purpose water storage and distribution to the extent possible. In order to improve monitoring of infrastructure failures for both volume and quality of water supplies, the project will support onboarding of new/improved technologies to be deployed so that vulnerability of the infrastructure to failures due to climate-induced hazards or through man-made disturbances on the system are detected and solutions provided in a timely manner. The project support under this component will include supporting startups to install and manage efficient technologies in the operation and management of the infrastructure. The collaboration with the DRIVE center of the InnoTech Department of the Druk Holding & Investments Ltd (DHI[11]) will be leveraged to promote private start-up enterprises with IT-based solutions for water management (See box below). Overall, the outcome through this output will enable efficient, adequate, and sustainable supply and distribution of water.

Flooding and erosion due to hostile terrain exacerbated by climate change in the form of landslides, erosions and siltation seriously impact on water availability and quality. For drinking water, the project will aim to improve water quality as affected by water pollution through flooding and siltation and enable meet in Bhutan Drinking Water Quality Standard, 2016 and WHO guidelines for drinking water quality.

The main deliverables under this outcome will include:

- Community resilience improved covering 2,567 households with access to adequate irrigation water and be able to bring about additional area of 559.9 Hectares of agriculture land under sustainable agriculture production.
- Source of water supply would have extended beyond surface water to include ground water and rainwater enhancing resilience of water sources and human hygiene and sanitation improved covering 7,435 households with access to 24x7 drinking water of quality that meet Bhutan Drinking Water Quality Standard, 2016 and WHO guidelines for drinking water quality.

Outcome four: Strengthened awareness and knowledge sharing mechanism established

The limitations in public awareness on the impacts of climate change on water resources, communities and on overall climate-resilient water/watershed management practices are a concern. To overcome the barriers related to limited awareness programs and lack of data on climate-resilient water/watershed management practices, the project support under this component will include documentation and sharing of knowledge and practices as well as effective capacity for climate-resilient water and watershed management. A Communication strategy developed and implemented on water conservation and sustainable management developed and implemented which will lead to publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin. This component will enable meeting the requirements of the National Environment Protection Act and the Water Act of Bhutan to regularly publish information on the environment, including periodic state of the environment reports and to provide access to water and watershed-related information. The publication of a State of the Basin report (SOBR) for the five river basins at the national level. The SOBR will include;

- Overall situation of river basin in terms of its ecological health and the social and economic circumstances including water security index and impact of climate change on water sector in Bhutan
- Highlight of key issues faced in establishment and functioning of the agency for water utilities at national level, River Basin Management Committees (RBMCs), Dzongkhag Water Management Committees (DWMCs) and Water User Associations (WUAs)
- Establish gaps and needs for the development of relevant River Basin Management plans and its effective implementing

Alignment with GEF focal area and/or Impact Program strategies;

34. The proposed project responds to priorities and actions identified in the NAPA document of Bhutan which identifies water as a vulnerable sector within which increased sedimentation of rivers, water reservoirs and distribution network, affecting notably irrigation schemes' productivity/ agricultural crop yields; reduced ability of catchment areas to retain water/increased runoffs with enhanced soil erosion (deterioration of environment) and deterioration of (drinking) water quality are considered key vulnerabilities. Within the water sector, the document identifies raising community awareness on sustainable use of water resources; improving land use planning in degraded water catchment areas to promote afforestation; improve watershed management; extending, improving and maintaining water supply infrastructure as urgent adaptation needs. The project is designed in consistency with the GEF/LDCF Climate Change Adaptation Focal Area 1: *Reduce vulnerability and increase resilience through innovation and technology transfer for climate change adaptation*. The project will focus on strengthening climate-resilient water governance and coordination systems; enabling sustainable and resilient watersheds to yield stable spring/stream flows; demonstrating efficient, adequate and sustainable supply and distribution of water and in developing effective capacity for climate-resilient water management practices and knowledge. Through the promotion of innovation and entrepreneurship and targeted private sector engagement, the project seeks to engage private start-ups in on-boarding technology-based water management solutions and contribute to resilience building in communities. The proposed set of interventions under the project, are fully aligned with the GEF's comparative advantage and updated LDCF Programming Strategy (2018-2022). Through the watershed management interventions, the project also provides opportunities for creating synergies across GEF focal areas of climate change, biodiversity and land degradation.

Baseline	Alternative to be put in place	<i>Incremental/additional cost reasoning</i>
<i>Outcome 1: Strengthened water governance, institutions and financing mechanism in support of climate-resilient water management</i>		
<i>Output 1.1: Water agencies at national and river basin and local levels established and supported to fully factor water level and water shortage forecasting into the service provision</i>		
<p>Overlapping responsibilities, unclear jurisdictions for water resources and water services development across relevant sectors and agencies have given rise to lack of organized development and management of water resources. Mandates and resources for water management are fragmented across multiple ministries and agencies. Hence management of water is largely sector-based, leading to issue of multisectoral coordination and inefficiencies in resource utilization and door delivery of water-related services.</p> <p>The Water Act 2011 empowers NEC with the responsibility of coordinating the efforts of line agencies in managing the water resources of the country. The line agencies work in silos in pursuing their own agendas and priorities for use and management of water, often resulting in duplication of effort and government resources. In addition, at the district level, the coordination between the Local Governments and the central agencies is weak and often unclear leading to poor planning and management.</p> <p>Recognizing the issue of multisector</p>	<p>In support to the Government's priority, an autonomous national government agency for water utilities will be established to provide access to adequate, safe, affordable and sustainable water for drinking, sanitation, waste water and irrigation services. The agency will operate and function on a corporate mode and will sustain its operations on service fee/tariff on water utilities and services in the long term on Government budgetary support in the short term.</p>	<p>Organized climate scenario-based water sector planning, long-term forecasting of water demand, construction, operation and maintenance of water utilities and services across the country with focus on climate-resilient systems and services.</p> <p>Clear mandates, organizational structure and clarified linkages with the NECS, competent authorities and local governments for planning, development, coordination and management of water utilities and services. The water agency will be a corporate entity owned by the government, sustaining on government grant initially and on service fee/tariff on water utilities and services in the longer term.</p> <p>Due to the lack of capacity and skills related to climate-resilient water management, the project will support the design of the organizational setup and capacity building to ensure that the new agency has is organizational profile and human resources competency to consider climate change impacts on hydrological systems. This will be the additional cost that the project will support in addition to establishment and operational cost that the Government will support</p>

blished a water board, later replaced by Water Resources Technical Advisory Committee comprising of senior officials from various relevant agencies to foster coordination. However, the Committee has failed to make any significant impact within the water sector.

The Water Act of Bhutan, 2011 requires development of Integrated Water Resources Management Plans. The National Integrated Water Resources Management Plan (NIWRMP) was prepared in 2016 with the formation of the five management basins. Each management basin is supposed to be operated by its designated River Basin Committee (RBC); however, no such body has been formed to date except Wangchhu Basin. The Water Act requires that a River Basin Management Plan (RBMP) is prepared for each basin and mandates the NEC, supported by the RBCs concerned, to prepare such plans. The NIWRMP also provides management framework for IWRM at basin level. The watershed management program of the MoAF in the 12 FYP includes watersheds assessments including assessment of drying water sources, preparation of Watershed and wetland management plans and climate-smart restoration of watershed. However, watershed management activities are often disconnected with major water users and hence users.

River basin and local level institutions established and appropriate capacity supported. The project will support establishment of RBC for the Punatsangchhu basin and support establishment of DWMCs in the four Dzongkhags of Gasa, Punakha, Wangdue and Tsirang as well as support. WUAs in the four Dzongkhags at Gewog levels with clear terms of reference, accountability and financing mechanisms.

Taking a holistic river basin approach to climate adaptation can bring many advantages when building resilience in natural and human systems and addressing conflicts that will increasingly arise as climate change advances. However, implementation of river basin approach involves understanding and addressing complexities in terms of identifying future water availability, climate and socio-economic scenarios, identification of relevant strategic priorities and creating appropriate institutional arrangements. While the government's commitment to adopt a river basin approach is spelled out by the Water Act and policy involves, capacity and cost constraints have made its implementation difficult. The project will address this issue and support establishment of local level institutions and address appropriate capacity needs.

<p>World Bank is carrying out a rapid assessment of NRW in the four Thromdeys of Thimphu, Phuntseholing, Gelphu and Samdrup Jongkhar, development of integrated online information system for the entire water sector, and assessment of existing institutional set up for water sector in Bhutan.</p>		<p>Entities that represent the stakeholders and will be engaged in development of watershed management plans that connect the water users to watersheds.</p>
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Output 1.2: Relevant national and local policies and strategies aligned with sustainable and climate resilient water management

<p>The Water Act of Bhutan defines roles and responsibilities in water resources management. In view of the changes that have taken place in the recent past such as transfer of mandates for rural water supply from the Ministry of Health to the Ministry of Works and human settlement; the creation of NCHMS and the felt need for a water utility agency, there is need for the Water Act and its regulations be reviewed</p> <p>The Bhutan Water Policy, 2011 identifies water pricing policy as effective tools for managing water demand. The Water Act of Bhutan 2011 and The Water Regulation of Bhutan 2014 mandate a competent authority to impose and collect water tariff for its maintenance and service costs. Such tariffs are not formally implemented except in urban areas with proper municipal governance structure</p>	<p>Review of the water act, water policy and regulations supported</p> <p>A water pricing policy that considers better access and equitable access, ecological costs, quality of water, reducing over consumption and water, actual cost of production with provisions for rural and lower-income households in urban areas.</p> <p>Modalities of corporate and private sector in water resources management and in water infrastructure management tested and clarified through appropriate frameworks.</p>	<p>A revised water act, water policy, and regulations supported and policy environment for sustainable and climate-resilient water management created</p>
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<p>While engagement of corporate and private sector is envisaged, the modalities of such engagement in not clarified in the policies and regulations.</p>		
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Output 1.3: Institutional & community level capacity for climate-smart water and watershed management strengthened

<p>The water flagship document recognizes that capacity a barrier to realizing safe and adequate water supplies. The gaps include capacity of technical staff across government, private sector as well communities in water resource management, appropriate technologies and water infrastructure designs, surveying and designing of water supply systems, water treatment plant operation and maintenance, monitoring and evaluation, instrumentation and maintenance of instruments amongst others.</p>	<p>The project will support capacity building of relevant stakeholders at different levels through training on climate-resilient water resource management at watershed and community levels, low-carbon climate-resilient nature-based solutions, appropriate technologies including ICT and water infrastructure designs that are climate resilient and water-efficient, water quality surveillance and monitoring, effective water treatment plant operation and maintenance, water quality testing, water resources planning and management.</p>	<p>Adequate and gender-balanced human capacity and skills available for climate-resilient water resources and water management at central, local and community levels including the private sector.</p>
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Output 1.4: Innovative financing mechanisms for both watershed management and water infrastructure introduced

<p>Irrigation and drinking water schemes are funded and maintained by the government. Private sector participation in the schemes is limited to construction phase where construction contracts are outsourced to private contractors.</p> <p>Funding for maintenance of watershed conditions of catchments is supported by the government. Examples of PES where communities are engaged</p>	<p>Corporate and private sector engagement in watershed and water supply facilities and services presents possibilities of revenue generation and enhancing sustainability of water supply systems, bringing in efficiency and effectiveness in the operations and maintenance of water infrastructure as well as in water resources management.</p> <p>The project will support detailing of</p>	<p>Conducive environment for corporate and private sector engagement in watershed management</p> <p>Private sector participation in drinking water and irrigation management initiated in at least 4 water infrastructure operation and maintenance</p> <p>Beneficiaries/users of ecosystem service pay to the provider of that service contributing to sustainable watershed management and sustenance of ecosystem services. The project results will include</p>
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<p>ions of catchments are demonstrated in Yakunin in Mongar Dzongkhag (between Yakunin Community Forest Group and Municipal Authority of Mongar township); in Paro between; Namey Nichu Watershed Management Group (WMG) from Namey Nichu village under Tsentog gewog and the Drinking water users consisting of five hotels and Satsham Water Association and in Chukha Dzongkhag between Burkhey Community Forest Management Group (CFMG) in Pasakha and ES buyers comprising of 4 companies (Tashi Beverages Ltd. – Coca Cola, Bhutan Board Products Ltd, Druk Cement, and Majur Oxygen and Gases) and 2 private water users; In Tsirang between Thakhorling Community Forest Group and residents of Damphu town in Tsirang.</p> <p>The Water Act, 2011, provisions for the NECS to promote PES provided by water resources, such that the cost of conserving water resources in the upper watershed areas are shared by downstream users.</p>	<p>private sector in drinking water and irrigation management.</p> <p>PES Framework schemes in drinking water and irrigation water management will be developed and adopted.</p>	<p>buting to sustainable watershed management in water catchment areas.</p> <p>Green Bhutan Corporation Limited (GBC L) engaged in plantation and agroforestry activities with support from the project establishing a modality for GBCL to collaborate with the Druk Green Power Corporation (DGPC). Post project, the DGPC will support plantation activities of GBCL for watershed restorations.</p>
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Outcome 2: Vulnerable natural water catchments in the target river basins (Punatsangchu river basin) restored, sustainably managed, protected and their ecosystem conditions improved

Output 2.1: Nature based solutions for watershed restorations implemented aimed at yielding stable spring/stream flows

<p>Watershed management is not linked to major water users and hence users are not given the opportunity to appreciate the value of conservation and management of their catchment watershed areas and to improve watershed conditions. Watershed protection</p>	<p>The project will support protecting and improving ecosystem conditions of watershed areas as well as spring sources.</p> <p>The interventions will include, etc.</p>	<p>Improved water security and biodiversity/ecosystem safeguards.</p> <p>Improved ecosystem conditions of 42 watershed areas as well as 147 spring sources etc. improve water availability and</p>
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<p>ation and restoration activities limited to conservation and actions by the government agencies and Community Forest Groups.</p> <p>The GEF financed UNDP project mainstream biodiversity conservation in to tourism development (under consideration for GEF approval) will develop a concessionary framework for use of state land for nature-based ecotourism enterprises.</p>	<p>ishment of green belts, management, and restoration of watershed vegetation to enhance infiltration, recharge groundwater stores and maintain surface water flows.</p> <p>The project will also assess and support opportunities to nature-based solutions such as eco-tourism, fodder product development, recreational activities so that communities appreciate and own up watershed restoration and protection activities. These enterprises can operate as per the framework developed through the other GEF ecotourism project and provide concessions for these nature-based enterprises (private sector) to participate in watershed management activities.</p> <p>As part of knowledge management, the project will document and share lessons from such nature-based solutions for upscaling.</p>	<p>quality at the source and to protect water resources conditions of which are exacerbated by climate change.</p> <p>Additional benefits will include carbon sequestration and storage, improved soil fertility, biodiversity conservation, and improved community livelihoods.</p> <p>Local sites for nature-based solutions identified and at least 12 start-up enterprises on based solutions promoted to incentivize and enhance watershed conservation such as fodder development, catch and release fishing, water sports, tourism, hot stone bath, etc. These enterprises can operate as per the framework developed through the other GEF ecotourism project and provide concessions for these nature-based enterprises (private sector) to participate in watershed management activities.</p>
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Output 2.2: Forest/Ground cover in catchment watersheds maintained through engagement of local communities and private/corporate sector

<p>Flooding, erosion and landslides induced by heavy rains pose risks to, among other things, human life, crops, livestock and infrastructure. Deforestation leads to significant decreases in the water storage capacity of soil leading to flooding and soil erosion. Climate change is projected to lead to increased precipitation, especially during monsoon, which will increase the risk of these hazards such</p>	<p>To combat these hazards, the project will promote an integrated watershed management approach that includes implementing reforestation and restoring and sustainably managing catchment areas.</p> <p>The project will support agroforestry practices to enhance canopy interception of rainfall and rainwater i</p>	<p>Catchment watersheds restored with vegetation to enhance infiltration, reduce runoff and peak flows, and stabilize slopes, soil fertility improved over 37,530 Hectares forest land/watersheds.</p>
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<p>entually degrading water quality.</p>	<p>e, thereby reducing run-off and erosion. Ecosystem-based adaptation measures such as check dams, planting of grass, and native tree species that help restore degraded agricultural lands benefiting individual farmers as well as watershed conditions benefiting larger communities will be supported.</p>	
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Outcome 3: Enhanced adaptive capacity of water infrastructure to climate-induced water shortages and quality deterioration through climate proofing, private sector engagement and technology deployment

Output 3.1: Climate proofing measures implemented in multi-purpose storage, conveyance and distribution network of drinking and irrigation water

<p>Due to inadequate and inefficient infrastructure, drinking and irrigation water shortages are reported across the country. Water pipe and canal leakages, canal seepages, wetting and drying of canals, tank overflows, illegal tapping of waterlines, lack of maintenance, increased demand, management inefficiency, and lack of adequate water treatment are major reasons that affect the water supply systems in Bhutan and making these systems vulnerable to climate change risks.</p> <p>The sources of water are largely dependent on surface water from streams and rivers.</p> <p>A rapid assessment of rural drinking water quality the Royal Centre for Disease Control in 2012, showed that only 17% of stream water sources and 28% of spring water sources were safe for use as drinking water in the</p>	<p>Establishment and demonstration of adequate climate-smart and efficient water infrastructure including multi-purpose water storage, conveyance and distribution systems in four dzongkhags.</p> <p>The project will support diversification of water sources to include rain water and ground water and improvement of water quality through restoration of watershed areas, strengthened water safety planning and monitoring</p>	<p>Community resilience improved covering 2,567 households with access to adequate irrigation water and be able to bring about additional area of 559.9 Hectares of agriculture land under sustainable agriculture production.</p> <p>Source of water supply would have extended beyond surface water to include ground water and rain water enhancing resilience of water sources and human hygiene and sanitation improved covering 7435 households with access to 24*7 drinking water of quality that meets Bhutan Drinking Water Quality Standard, 2016 and WHO guidance for drinking water quality.</p>
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<p>... of microbiological quality. Water contamination is considered to be occurring at water sources due to intense flooding on steep terrain intensified by erratic rainfall patterns as a result of climate change and also due to seepage from agriculture and household effluents as well as due to lack of standard water treatment and quality assurance. Water supply systems across the country have inadequate water treatment plants.</p> <p>The Water Regulation of Bhutan 2014, requires water supply system to have Water Safety Plan (WSP). The Master Flagship document recognizes that although WSPs have been implemented in the past, many are not fully functional and thus, require reinforcement</p>		
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Output 3.2: Efficient drought-resilient water management technology tested and upscaled through private sector (youth-based start up enterprises)

<p>The management of water infrastructure is based on conventional systems and available technological solutions are not deployed optimally to improve operations, monitoring and maintenance of the systems.</p> <p>Water infrastructure operations and maintenance are largely handled and overseen by government agencies rendering the infrastructure management inefficient.</p>	<p>New/Information technological solutions deployed to improve efficiency in water acquisition, storage, conveyance, distribution, quality assurance and in overall operations, monitoring and maintenance of the water infrastructure.</p> <p>The project will support testing, demonstration and scaling up integration of domestically designed technology (DHI's DRIVE prototype for water management solution) in operation and management of water infrastructure.</p> <p>It will entail a network of sensors to</p>	<p>Improved resilience through climate-proofing of water infrastructure and jobs created through implementation of innovative technology on-boarding; reduced vulnerability of communities to erratic water supplies due to climate impacts.</p> <p>Enhanced efficiency in acquisition, storage, conveyance, distribution, quality assurance of water supplies and overall operations, monitoring and maintenance of infrastructure improved in four Dzongkhags.</p>
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	<p>the infrastructure layout that detects and informs management of problems and changes within the infrastructure system. Use of social media will be deployed to communicate among stakeholders on demand and supply management and on operation of the infrastructure.</p> <p>The project will support youth-based start-ups to take up the deployment of domestically designed technology (DHI's DRIVE prototype for water management solution) within the drinking water and irrigation infrastructure management.</p> <p>Awareness on use of water efficient domestic appliances, impact of climate change on water resources, strengthening of local institutions and implementation of water pricing policy would rationalize water demand.</p>	<p>and capacity enhanced through DHI (corporate landscape) collaboration.</p> <p>The project support not only triggers engagement of corporate entities in Bhutan to be part of addressing climate risks and climate adaptation but also enables enterprise development, including through Public-private partnerships. The project provides systemic support to innovation through incubation (with DHI support) and accelerators support (project support to youth-based enterprises), piloting financial tools (certain portion of infrastructure maintenance and operations budget outsourced to private sector), and strengthening private sector engagement in adaptation.</p> <p>Engagement of private sector in water management enables contributing enhanced sustainability and efficiency in water management. At least four start-up enterprises will be promoted to take up deployment of technology-based water management solutions (one in each Dzongkhag).</p>
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Outcome 4: Strengthened awareness and knowledge sharing mechanism established

Output 4.1: Communication strategy developed and implemented on water conservation and sustainable management developed and implemented

<p>Devising and implementing workable strategies and plans for adaptation will have to be based on awareness by the communities and society of the risks and vulnerabilities as a result of climate change.</p> <p>The NBSAP, 2014 identified the need</p>	<p>The project support documentation and sharing of knowledge and practices as well as effective capacity for climate-resilient water and watershed management. A communication strategy will be developed and implemented on water conservation and sustainable management. Awareness will be created at different</p>	<p>Enabling conditions created for collaborative planning and development management in the form of enhanced awareness, knowledge, and information availability on risks and vulnerabilities of climate change, adaptation options, technologies, and solutions at different levels.</p>
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<p>and educational programs on the impacts of climate change on biodiversity as part of its target number 10 which aims to identify potential impacts of climate change on vulnerable ecosystems and to strengthen adaptation measures.</p>	<p>on water efficiency and conservation, watershed and source protection, on water use and conservation to the public, risks and vulnerabilities to human health, wellbeing and on the health of ecosystems as a result of climate change, institutional and regulatory provisions and on adaptation options, technologies, solutions on the need for harmonized data collection and reporting on identified parameters that represent the health of river basins.</p> <p>Monitoring and evaluation of the project are included and will contribute to this output.</p>	<p>ans to learn from relevant projects, initiatives and evaluations will be made available on the websites of UNDP and of the MOWHS.</p>
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Output 4.2: Publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin institutionalized

<p>Analytical Review of Gaps, Conflicts and Inconsistencies in Existing Sectoral Policy, Planning and Legal Frameworks for Developing Climate Resilient Integrated Landscape Management and Climate Resilient Communities, 2018 by the MoAF recognized the limited level of awareness and access to context specific information on climate change and its impacts.</p>	<p>The project will support institutionalization of State of the Basin Report (SOBR) for the Punatsangchu river basins at the national level. The SOBR will include;</p> <ul style="list-style-type: none"> · Overall situation of river basin in terms of its ecological health and the social and economic circumstances including water security index and impact of climate change on water sector in Bhutan · Highlight of key issues faced in establishment and functioning of the agency for water utilities at national level, River Basin Management Committees (RBMCs), Dzongkhag Water Management Committees (DWMCs) and Water User Associations (WUAs) · Establish gaps and needs for development of relevant River Basin 	<p>This component will enable meeting the requirements of the National Environment Protection Act and the Water Act of Bhutan to regularly publish information on the environment, including periodic state of the environment reports and to provide access to water related information.</p>
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Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF);

35. The proposed project responds to priorities and actions identified in the NAPA of Bhutan which articulates the urgency for deployment of critical measures and technologies to address pressing adaptation needs in the key priority sectors including mainly agriculture, water, and energy. In compliance with the objective of the GEF LDCF programmatic direction, project interventions enable private sector engagement for climate adaptation action and provision of localized and suitable solutions for vulnerable segments of the population with increased exposure to the consequences of climate change in the water sector in Bhutan. The project will focus on fostering innovation with adaptation benefits ultimately contributing to reducing the vulnerability and increasing climate resilience in the water sector including access to climate-resilient water supply in rural and urban environments; sustainable and resilient water management; improved natural resource management including watershed. Through the GEF funding, the project seeks to leverage on co-financing and complementarity and create large-scale deployment of climate adaptation-oriented technologies and reduce systemic risks across the project landscape. The proposed set of interventions under the project, are fully aligned with the GEF's comparative advantage and updated LDCF Programming Strategy (2018-2022) covering Bhutan's priorities identified in its NAPA, NDC, which are aligned with relevant SDGs such as SDG 6 on ensuring availability and sustainable management of water and sanitation for all; SDG 13 on combating climate change and SDG 15 on Sustainable use of terrestrial ecosystems.

36. In terms of LDCF objective to reduce vulnerability and increase resilience through innovation and technology transfer for climate change adaptation, the project interventions include establishment of climate-resilient water infrastructure and deployment of technologies to enhance efficiency in water management; In terms of LDCF objective to mainstream climate change adaptation and resilience for systemic impact, the project interventions include strengthening and restoring the health of watersheds and enhance ecosystem services and in terms of LDCF objective to foster enabling conditions for effective and integrated climate change adaptation, the project interventions include strengthening governance, policies, capacities and knowledge management for climate-resilient water resources and water management. The project also aspires to achieve a geographical balance in the introduction of the project interventions (together with co-financing) covering four of the five major river basin management units in the country.

Innovation

37. Focus on innovation: The project sets to create enabling conditions and build technical, policy, and institutional capacities for resilient water and water resources management. The project includes innovations in fostering technology, institutional arrangements, private sector engagement and policies measures that will enable sustainable financing and climate-resilient management of both watershed and water infrastructure to build the resilience of communities, livelihoods, and ecosystems.

38. Policy Innovation and Institutional Innovation - The project plans to support creation of a national agency for water sector development with clear mandates, organizational structure, and clarified linkages with the NECS, competent authorities, and local governments. It also includes supporting establishment of River Basin Management Committees, Dzongkhag Water Management Committees (DWMCs), and strengthening Water User Associations (WUAs). Mainstreaming water resources management into national planning guidelines and local planning guidelines would ensure regular government funding and ownership at different levels for sustainable water and water resources management. Focus on targeted watershed management would also create synergy across GEF focal areas of climate change, biodiversity, and land degradation.

39. Business model and innovative financing – Promotion of start-up enterprises to integrate and maintain technology in demand and supply management of drinking and irrigation water infrastructure through collaboration with DHI and which embeds the engagement of private sector for scaling up financing, creation of value chains, and market development. Enabling PES in water resource management supported by water pricing will pave the way for financing management of catchment watersheds. It will include engagement of corporate and private sector as well as communities.

40. Technology Innovation – The project will support testing, demonstration, and scale-up integration of domestically designed technology (DHI's DRIVE prototype for water management solution using a network of sensors that are integrated with GIS across the infrastructure layout) in the operation and maintenance of infrastructure that detects and informs management of problems and changes within the infrastructure system together with the use of social media to communicate among stakeholder on demand and supply management and on operation of the infrastructure. This initiative will address the upstream gap that exists in Bhutan's conventional water infrastructure management to move towards the deployment of technology options in overall drinking water and irrigation infrastructure management. In doing so, the project will engage support incubating youth-based enterprises to act as accelerators to deploy the local innovation designed by the DHI. The project support to test and validate the local innovation will reduce uncertainty and risk associated with the technology and create enabling conditions to facilitate private sector to partner and catalyze larger-scale deployment and replication of the local technology beyond project areas.

41. Partnerships and collaboration complementarity – The project aims to achieve inter-agency partnership, particularly with FAO to complement and leverage climate change adaptation results in terms of addressing critical issues in water sector. For instance, FAO and UNDP are already working together in terms of conducting a joint consultation with stakeholders as issues related to water and impact of climate change are mostly common. It is also agreed that such partnership will continue during the PPG and complement, in some cases provided coordinated upstream policy support. During the implementation, partnership will focus on knowledge and expertise sharing through the creation of common communication and knowledge exchange platform. This is particularly important since the two projects will be treating the adjoining landscape. The two projects will implement complementary measures to address climate vulnerability at the sub-basin level by restoring the functionality of broader watershed ecosystem.

42. In addition, the project will also bring on-board Bhutan Water Partnership to explore scaling up of the use of Hydraulic Ramp Pump (a low-cost water climate-smart technology to address water scarcity in rural Bhutan) and will collaborate with the DHI, the DGPC, GBCL and private sector (non-state actors). These partnerships will enhance effectiveness and impact and ultimately offer more sustainable solutions through new technologies, nature-based solutions, sustainable watershed management initiatives and strengthened capacities and to enhance resilience of Bhutan's vulnerable water resources and fragile ecosystems. By addressing critical issues around climate change impacts, the project aims to also complement the GCF project on Climate-Smart Agriculture in achieving its outcomes. The RGoB seeks support to enhance the resilience of smallholder farms to rainfall variability, as well as increases in temperature and projected increases in monsoonal rainfall. Enhancing the resilience of the population engaged in agriculture, including the transition from reactive to climate-informed planning is fundamental to meeting the RGoB's aspirations on climate-resilient, low carbon development.

43. Management innovation - Private sector engagement in maintenance and operation of water storage and distribution infrastructure. Due to the engagement of private sector, it will also bring about involvement of financial institutions and banks into the water sector. Further, this project will seek to have a common PMU for the GEF project as well as all co-financing projects. As a result, the cost of PMU for each project will be reduced by half and enable complementarity, resource efficiency, coordination and be able of command over consolidation of lessons learnt for knowledge sharing and upscaling.

Sustainability

44. Resilience – The project interventions to diversify water sources into rain water, ground water besides surface water and to integrate and multi-use water storage and distribution will enhance resilience of the water supply as number of water sources would be diversified.

45. Sustainability – The engagement of corporate and private sector in the project includes the collaboration DHI for technology development for efficient water management. The domestically developed technology which is already at a prototype stage will be tested in project activities and youth start-ups will be supported to facilitate the on-boarding of the technology in all water infrastructure networks. As private sector initiatives take over management of the monitoring and reporting on failures across the infrastructure network, efficiency and sustainability in water service monitoring will gain sustainability. The project will collaborate with Druk Green Power Corporation (DGPC) and Green Bhutan Corporation Limited (GBCL) on watershed management. The GBCL is a state-owned company that has the mandate for plantation activities across the country. The Watershed Management Division of MoAF will partner with GBCL for plantation and agroforestry activities within the identified catchment watersheds, initially through support from the project. During the project implementation, a modality for support (innovative financing) from DGPC on watershed management will be detailed so that GBCL can continue to secure plantation and agroforestry activities in watershed areas that are not included in the project and beyond the project landscape securing sustainable watershed management. Further, the project will support and kickstart the engagement of private initiatives through nature-based solutions which will provide incentives for private sector to engage in watershed management and protection activities and contribute to sustainable watershed management.

Potential for scaling up

46. Scalability innovation – A holistic approach to water resources management that considers governance, as well as the natural watershed and ecosystem conditions, is a model that can be replicated in areas that are beyond the project landscape. The engagement of corporate and private sectors will also be a model that continues beyond the project landscape and project period into activities supported by the RGOB, initially through the water flagship program and eventually through the national water agency establishment of which the project will support. The upscaling across the country will be enable through the capacity and lessons from the project across all levels within the communities, private sector, corporate sector and government agencies.

[1] Population and Housing Census of Bhutan (PHCB), 2017

[2] Report on the National Irrigation Database and Canal Alignment Mapping, 2013, DoA, MoAF.

[3] Ngawang Chhogyel, Lalit Kumar and Yadunath Bajgai; Consequences of Climate Change Impacts and Incidences of Extreme Weather Events in Relation to Crop Production in Bhutan, Sustainability, 25 May 2020 (

[4] Imported food control in Bhutan, National Situational Report, FAO, 2019

[5] Feasibility Study for GCF “Supporting Climate Resilience and Transformational Change in the Agriculture Sector in Bhutan”, 2019

[6] Records of Extreme Weather Events in Bhutan (208), <https://www.nchm.gov.bt/attachment/ckfinder/userfiles/files/Extreme%20Weather%20Records.pdf>

[7] Evaluation of the National Plantation Strategy for Bhutan, 2010

[8] Bhutan’s Proposed National Forest Reference Emission Level and National Forest Reference Level, 2019

[9] Feasibility Study, for the Green Climate Fund (GCF) , “Supporting Climate Resilience and Transformational Change

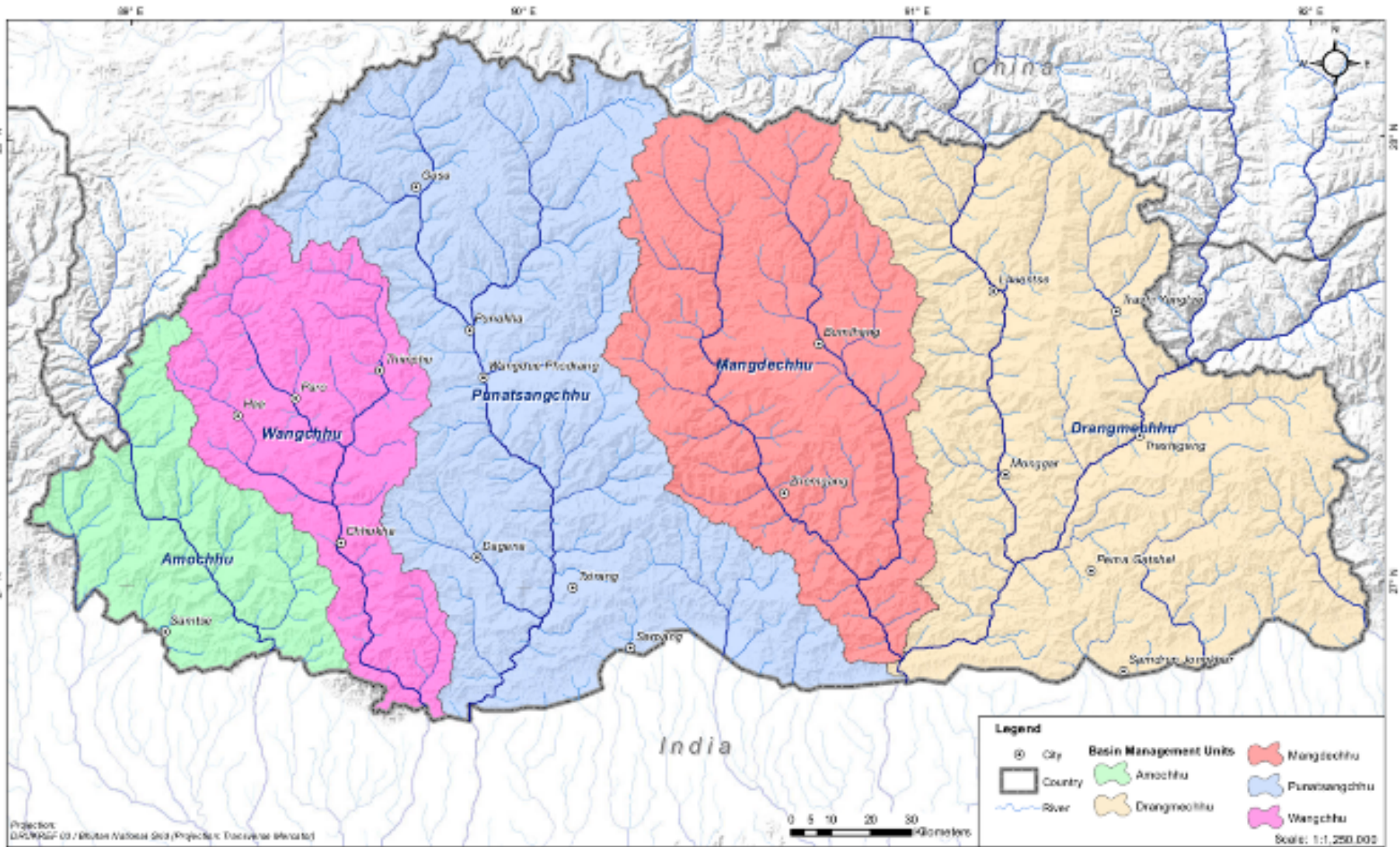
[10] National Irrigation Master Plan, 2016.

[11] DHI is the commercial arm of the Royal Government of Bhutan established to hold and manage the existing and future investments of the Royal Government for the long-term benefit of the people of Bhutan. DHI, the largest and only government-owned holding company in Bhutan. Its InnoTech Department is responsible for strategizing technology and innovation pathways to enhance access and diffusion of the technologies across DHI. To address the national socio-economic challenges, the department is also undertaking applied and fundamental research and development in the field of science and technology to create ventures and start-ups, build national intellectual property and establish a platform for innovation, creativity and jobs for the next generation. The Department's division called DHI Research and Innovation Venture Excellence Center (DRIVE), has developed a prototype on IT based solution for water management. The PIF process has consulted with the management of the InnoTech Department based on which it has been agreed to test, validate and upscale the technology in the proposed project. Youth based enterprises can be engaged to on-board of this technology into the project area so that these youth-based enterprises can be engaged as private entities to handle the monitoring and providing advisory on maintenance of the infrastructure.

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

43. The project area comprises of four Dzongkhags Gasa, Punakha, Wangduephodrang (covering only two gewogs of Phangyuel and Rupisa), and Tsirang which form a major part of the upper catchments of Punatsangchhu river basin management unit. Further, the proposed FAO's GCF project would cover six Dzongkhags of Bumthang, Haa, Lhuentse, Trashigang, Sarpang, and Thimphu. The dzongkhags of Haa and Thimphu form parts of the upper catchment of Wangchhu river basin management in western region; Bumthang Dzongkhag forms part of upper catchment of Mangdechhu river basin management unit and Sarpang Dzongkhag forms part of downstream catchment of the same river basin management unit in the east-central region and the Dzongkhags of Lhuentse and Yangtse which form parts of the upper catchment of Drangmechhu river basin management unit in the eastern region. Together the projects would cover ten Dzongkhags that form larger parts of four out of the five major river basins management units in Bhutan (See Figure 1 for river basins management units). Hence this project will coordinate with the FAO's GCF for complementarity at various levels.



2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

Consultations were undertaken within the constraints imposed due to COVID lockdown Key agencies and stakeholders were consulted deploying different modes such as one on one, e-platform and face-to-face group consultations A national stakeholder consultation to present and finalize the PIF was held which was attended by key stakeholders such as Gross National Happiness Commission (GNHC)[1], Ministry of Works and Human Settlement (MoWHS)[2], Ministry of Agriculture and Forest

MoAF)[3] Watershed Management Division (WMD)[4], Department of Agriculture (DoA)[5] National Environment Commission Secretariate (NEC)[6], and Planning Officers of the Local government authorities. During the PPG, and depending on the evolving COVID situation, consultation will be enhanced deploying appropriate means, including using e-platform.

In addition, face-to-face meetings were held with the following: a) Bhutan Water Partnership (BWP)[7] on possible engagement in the context of low energy water hydrant installations where relevant in the project, and b) InnoTech Department of Druk Holding and Investment (DHI) on the possible collaboration on water management solution and support to start-up enterprises where they presented Research and Innovation Venture Excellence Center (DRIVE) program and made a presentation of their prototype on water management solution.

Due to COVID 19 travel restrictions, communities were consulted through their representatives, such as the *Gups*[8]. However, since the PIF is anchored on the Water Flagship Program which was prepared through extensive local government consultation, community priorities are already reflected in the PIF. The PPG process will ensure communities are directly consulted further as part of preparing safeguards, and gender action plans where priorities as presented in the PIF will be further validated

[3] MoAF is responsible for agriculture development in the country

[4] WMD is responsible for managing country's watershed

[5] DoA is directly responsible for irrigation development

[6] NEC is the country's apex environment agency, and is the national focal agency for UNFCCC and UNCBD

[7] Bhutan Water Partnership is currently hosted under Royal Society for Protection of Nature (RSPN), <http://www.rspnbhutan.org/>

[8] Gup is the Head of the *gewog*, elected by the community of the *gewog*. *Gewog* is the lowest administrative unit is part of local government.

[1] GNHC is the office of the GEF OFP as well as government's agency to nationally co-ordinate policy, plans, programs and to mobilize grant resources

[2] Amongst other mandate, MoWHS is also responsible for rural water supply, and currently Water Flagship secretariate is housed with MoWHS

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement

Stakeholders	Stake / Interest	Means of engagement in the project
GNHCS	Overall coordination of development plans and programs including coordination with development partners. Integration of climate change into policies, programs, and plans and mobilize external resources for the implementation of climate change programs and projects	Support and commit to water flagship program Participate at the Project Steering Committee
MoWHS	Formulation and implementation of policies, regulations and plans related to physical infrastructure and human settlement including provision of adequate drinking water infrastructure for urban and rural areas	Overall coordination - PCU and component manager for components three and four Overall infrastructure development Member of TWG
MoAF	Integrated watershed management	Participate at the Project Steering Committee WMD will be component manager for component two Responsible for coordination of irrigation schemes Member of TWG (Irrigation Division and Watershed Management Division)
MoH	water quality surveillance and standards	Participate at the Project Steering Committee Member of TWG (Public Health Department)
NECS	Water governance	Participate at the Project Steering Committee

	<p>Responsible of all policy and regulatory matters on climate change as the National Climate Change Committee (NCCC),</p> <p>Lead the preparation of national strategies and plans on climate change such as NDCs, NAPs, LEDS.</p>	<p>and component manager for component one</p> <p>Member of TWG</p>
National Center for Hydrology and Meteorology	Provide hydro-meteorological data and information, climate modeling and scenarios and other early warning services	Provide climate data
Local Governments	Local development coordination and local actions on climate change	<p>Member of Dzongkhag Water Management Committee</p> <p>Be part of River Basin Management Committees</p>
Dzongkhag Administrations	Coordination of local development activities	<p>Management of field project activities at local level (Dzongkhag Engineers) for drinking water and irrigation</p> <p>Coordination of Dzongkhag Water Management Committee</p>
Beneficiaries	Adequate and sustained supply of quality drinking and irrigation water	<p>Member of Dzongkhag Water Management Committee and Water Users Associations</p> <p>Participate in monitoring and evaluation of water resource management</p>
UNDP	GEF Implementing Agency and GEF oversight	<p>Participate at the Project Steering Committee</p> <p>GEF Project oversight</p>
FAO	GECF Implementing Agency and GCF oversight	<p>Participate at the Project Steering Committee</p> <p>Co-financing through GCF project</p> <p>Technical support in watershed management and spring augmentation</p>

Bhutan Water Partnership	Support strategic policy and development issues in water sector	Member of TWG Responsible of low energy water hydrant installations
DHI	Innovation and technology solutions in development	Test bedding boarding the DHI's water management solution and support to start-up enterprises
Private entrepreneurs	Business interest	Construction and post-construction maintenance Implementation of technology for operation and maintenance Establish business ventures based on nature-based solutions and assuming a role in watershed protection and maintenance
Druk Green Power Corporation	Operation and maintains hydropower assets of Bhutan. Hence have a stake in the health of watersheds for ensuring reliable flow of water for hydropower.	Engage in collaboration with GBCL for watershed maintenance
Green Bhutan Corporation	Responsible for plantation activities	Collaboration with Watershed Management Division to carry plantation in identified catchment watersheds

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

44. The PPG phase of the project will carry out a gender analysis in the context of water resources and water management and gender-based vulnerabilities to climate change. Based on the gender analysis a gender action plan for the project will be prepared and budgeted in the project. The project will contribute to enabling gender-balanced access and control over natural resources (water and water resources) and enable gender-balanced participation and leadership in decisions related to water management as well as in awareness and capacity development for climate-resilient water and water resources management.

Equal rights are enshrined in the Bhutan's Constitution and other legal framework. The institutional architecture is comprehensive with the presence of the National Commission for Women and Children (NCWC), an institution established by the government to mainstream as well as monitor gender program and results across ministries and local government. NCWC works through a network of Gender Focal Points (GFPs) in each ministries and districts, and regularly work with Gender Expert Group (GEG) to improve the services. However, human capacity and resources are reported to be limited. A National Gender Equality Policy has been adopted in 2019 with a vision for a society where substantive equality is practiced providing equal opportunities for women and men, boys and girls to achieve their full potential and benefit equitably from the social, economic and political development in the country. To improve women's participation in the Civil Service and promote women in leadership positions, the Royal Civil Service Commission (RCSC) in the 12th Five-Year Plan incorporated two Key Performance Indicators (KPIs), "*number of interventions to promote women in leadership positions in the civil service*" and "*number of gender interventions in the civil service*". However, male participation in various social groups and associations is 56 percent as compared to 48 percent for females; and in climate initiatives male participation is 10 percent as compared to only 3.5 percent for females[1]. In 2017, almost 60 percent of employed women were active in agriculture, as compared to more than 34 percent of the employed men (PHCB, 2017) showing increased participation of women in the agriculture sector, which itself is a sector that is vulnerable to impacts of climate change. The PPG phase of the project will carry out a gender analysis in the context of water resources and water management and gender-based vulnerabilities to climate change. Based on the gender analysis a gender action plan for the project will be prepared and budgeted in the project. The project will contribute to enabling gender-balanced access and control over natural resources (water and water resources) and enable gender-balanced participation and leadership in decisions related to water management as well as in awareness and capacity development for climate-resilient water and water resources management.

[1] Gender and climate change in Bhutan with a focus on NDC priority areas; Agriculture, Energy and Waste, National Commission for Women and Children, 2020.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes

closing gender gaps in access to and control over natural resources; Yes

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women.

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

45. Private sector engagement in water supply facilities and services presents possibilities of revenue generation and enhancing sustainability of water supply systems, bringing in efficiency and effectiveness in the operations and maintenance of water infrastructure. Private sector participation in drinking water and irrigation management will be initiated in at least 4 water infrastructure operations and maintenance. This will trigger an enabling environment and models of private sector engagement, enterprise development, and public-private partnerships. The project will also support detailing out PPP model for engagement of private sector in drinking water and irrigation management sector. PES Framework for schemes in drinking water and irrigation water management will be developed and adopted. The project results will include the establishment of 4 PES schemes established contributing to sustainable watershed management in water catchment areas. This will ensure that beneficiaries/user of ecosystem service pay to the provider of that service contributing to sustainable watershed management and sustenance of ecosystem services.

1. Under the PES scheme, the project will support Druk Green Power Corporation (DGPC), as the premier corporate agency in the country for hydropower development, to adopt PES for improved health of watershed. The project will also support the Green Bhutan Corporation Limited (GBCL) which is already engaged in plantation as its core areas of business to establish a modality for GBCL to collaborate with the DGPC whereby the DGPC provides financial resources to fund the plantation activities of GBCL. Post project, the DGPC will support plantation activities of GBCL for watershed restorations which will sustain watershed restoration and enrichment.

2. The GEF funded UNDP project (under consideration by GEF) on ecotourism will develop concession framework for engagement of private sector in development of ecotourism products and services. This project will upscale implementation of the concessions framework in enabling private sector to be engaged in nature-based solutions/enterprises that will support restoration and enrichment of watersheds. Also in the water infrastructure operations, youth based private firms will be engaged in implementation of DHI's technology for water management. This will, for the first time in Bhutan, enable engagement of private sector in water infrastructure management and embed an element of sustainability in operations and management of water infrastructure.

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

1. In addition to below risks, project is mindful of the continuing risks associated with COVID-19 pandemic and the resulting risks, and the disruptions in of the global supply chain and restrictions on human mobility it has had. However, UNDP's on-going project activities have not been impacted seriously, as most of the supplies, particularly goods, come from India. The special agreement and protocol on export and import of goods have facilitated trade, which has greatly benefitted Bhutan. This practice is expected to continue. The vaccination drive, first round of which has been successful for Bhutan is also expected to result into easing of domestic travel. There are national experts who could implement the PPG and project activities. When needed, international consultants could provide virtual inputs to the local team. Nevertheless, the situation will be monitored and assessment will be made during the PPG to understand and adapt accordingly to the evolving situation and to make appropriate mitigation measures to overcome any risks. Similarly, during the PPG, context specific climate risk and vulnerability will be explored and elaborated to mitigate any negative impacts on local biodiversity, eco-system and others

Outputs	Identified Risks	Type of risk	Risk Rating (Low/Medium/High)	Mitigation Measures
1.1 Agency for water utilities at national, river basin, and local levels established and appropriate capacity supported	The priority to establish an overall lead agency for water utilities may change in 2023 during the planning process for 13th FY P	Political and Governance	Low	During PPG process, institutional analysis and feasibility assessment will be conducted. This will inform on the relevancy, effectiveness, and feasibility for such an agency with structural and organizational arrangement including terms of reference for its governance arrangement, operations and functional divisions, legal entity, financing modalities, and linkages with stakeholders.
	Establishment of River Basin Management Committees (RBMCs), Dzongkhag Water Management Committees (DWMCs) be constrained by initial funding support	Budgetary	Medium	The project will provide initial support for establishment and functioning of RBMCs and DWMCs. During the project period, lessons will be drawn and institutionalize these entities to be covered by national and local planning and budgeting process

	ns			
1.2 Relevant policies and strategies aligned with sustainable and climate-resilient water management	Water pricing may be socially sensitive and establishment of the pricing policy may drag on beyond project period		Low	<p>The project will support awareness on climate change, scenarios of water volumes, and quality in the future with business as usual approach.</p> <p>The process for development of water pricing policy will consider provisions for rural household and lower-income households in urban areas. The electricity pricing in Bhutan as has adopted similar approach with differential pricing for industrial, urban, and rural residential consumptions.</p>
1.3 Institutional & community level capacity for climate-smart water and watershed management strengthened	Water pricing may be socially sensitive	Institutional	Low	Water pricing policy to be developed will consider provisions for rural household and lower-income households in urban areas
1.4 Financing Mechanism for both watershed and water infrastructure piloted and launched		None		
2.1 Vulnerable natural water catchments restored, sustainably managed, protected and their ecosystem conditions improved	Identification & declaration of critical water sheds/catchment areas/spring recharge areas for protection and management may be face challenges in community acceptance	Stakeholders	Medium	The project will support awareness on climate change, catchment ecosystem services, and implications on downstream water volumes and quality. The project will engage participatory assessment, identification & declaration of critical water sheds/catchment areas/spring recharge areas engaging local WUAs and community repre

				such sites.
	Risk of introducing alien invasive species during plantation plantations	Social and Environmental	Medium	The project will require the use of native species of agroforestry and plantation activities as per the National Forest Policy.
3.1 Resilient and efficient water infrastructure for multi-purpose storage, conveyance and distribution networks established	Location of water storage and water tapping structures on community claimed land or private land	Environmental and social	Low	The project will not fund any activity that involves the use of or acquisition of private land nor will it support any activity on state land or community used spaces with prior written consent or clearance from the concerned government authorities and concerned community representatives.
	Temporary disruption of access to water by existing users during the construction activities of irrigation and drinking water systems	Environmental and social	Low	Temporary water lines should be provided to existing water users during construction period so access water by existing users is not disrupted till the construction is complete and the system is operational. Existing water users must be pre-informed about water supply disruptions and alternative arrangements at least a month before the event. The project activity management should ensure a minimum of 10% water flow into the natural gullies for environmental flow.
	Overall environmental and social risks through construction activities	Environmental and social	Medium	During the PPG phase, upon identification of project activities and locations, a social and environmental assessment will be carried out including stakeholder analysis and gender assessment. Accordingly, a social and environmental safeguards plan

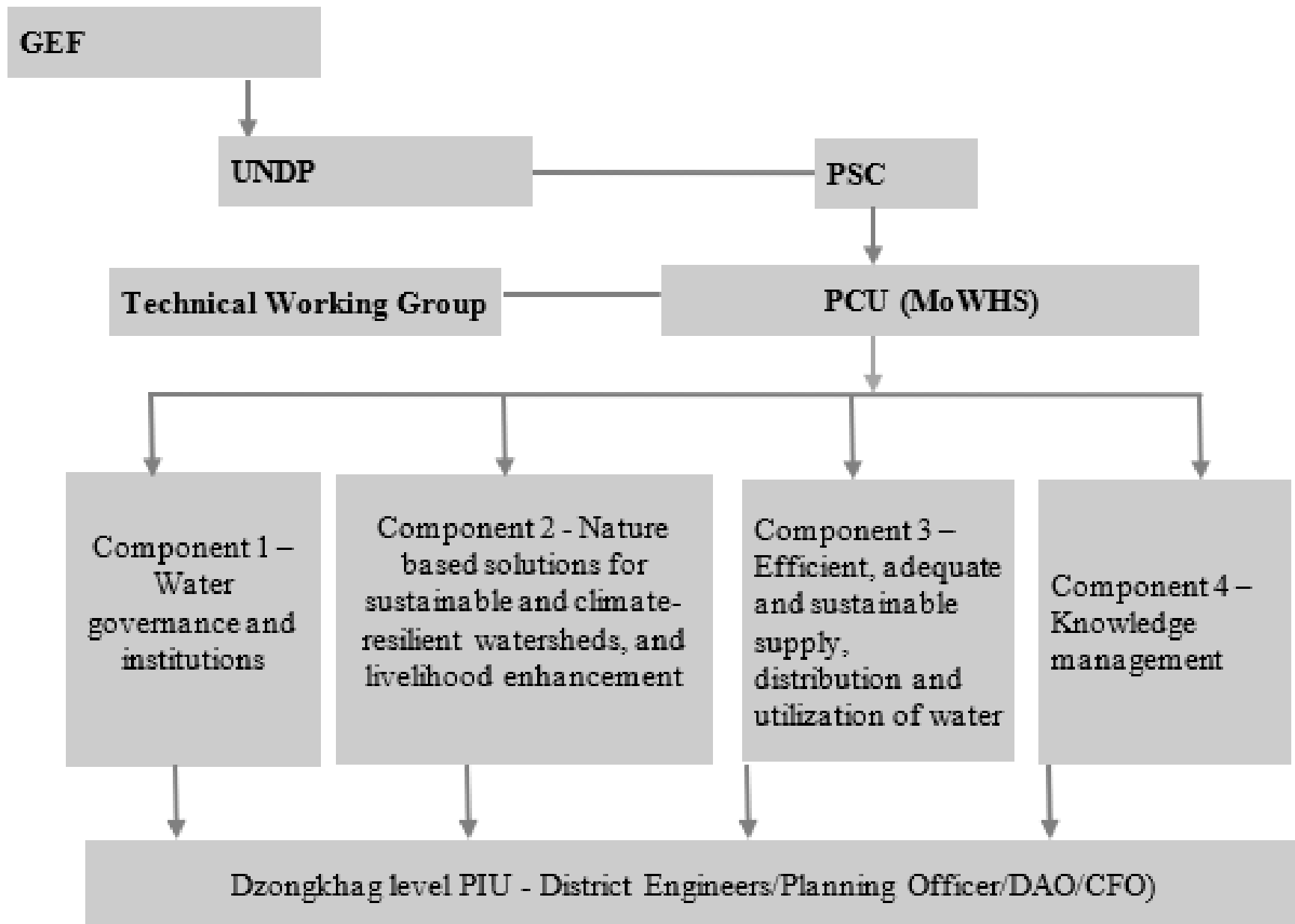
				nd a gender action plan will be developed and costed.
	Risk of soil erosion/landslide and damage to the site conditions due to excavation during site minor excavation and earthmoving activities at project sites or increase sediment load in the nearby water bodies	Environmental and social	Low	The project will carry out plantation of native trees in slide prone areas and erect local retention walls at activity sites to avoid soil erosion/landslides and construct drainage around the construction site to avoid sediment load into nearby water bodies as per Environment Assessment General Guidelines, 2012
	Working conditions, Occupational health and safety risks to workers during implementation of construction activities	Environmental and social	Low	The project management will ensure the following compliance in contractual arrangements for construction activities; <ul style="list-style-type: none"> · Equip every person at site with helmet/ boots/gloves/safety belts/first aid kit etc. · Erect site safety barriers around construction sites as per Regulations on Occupational Health and Safety of Workers, 2006) · Ensure that no underage workers or children are present on the construction site, either as employees, guests or as dependents of legal employees. · Install/erect signage at the site
	Disagreements among downstream and upstream communities in water	Environmental and social	Medium	Water distribution arrangements and points of distribution should be planned and agreed upon with the local water user's as

	ngements along the water conveyance lines.			government structures.
3.2 Efficient drought-resilient water management technology tested and upscaled through private sector (youth-based start up enterprises)	None			
3.3 Drinking water quality improved to meet Bhutan Drinking Water Quality Standard, 2016 and WHO guidance for drinking water quality	None			
4.1 Communication strategy developed and implemented on water conservation and sustainable management developed and implemented	None			
4.2 Publication of a State of the Basin Report (SOBR) for the Punatsangchu river basins institutionalized	None			

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

46. The executing entity for the project will be the Ministry of Works and Human Settlement (MoWHS). The Ministry will identify a Project Coordination Unit (PCU) which will lead the overall coordination, implementation, and monitoring of activities of the project and report to the Project Steering Committee (PSC) accordingly. The Project Coordination Unit (PCU) will be housed under the Ministry of Works and Human Settlement. The components 3 and 4 will be directly managed by the PCU. The executing entity will be required to fulfill all requirements on fiduciary, procurement, environmental and social safeguards, and other performance standards. The implementation arrangement for the project will be as follows;



47. The GCF financed UNDP project on Supporting Climate Resilience and Transformational Change in the Agriculture Sector in Bhutan supports resilient agricultural practices, interventions to integrate climate change risks into water and land management practices that affect smallholders and in reducing the risk and impact of climate change-induced landslides during extreme events that disrupt market access. The project picks up water supply for 8 Dzongkhags of Dagana, Tsirang, Sarpang, Punakha, Wangdue, Zhemgang, Trongsa and Samtse. The total grant financing for the project is USD 25,347,194 over its implementation timeline from 2016 to 2025. The DLCF project will draw lessons from this project and upscale useful learning and approaches.

48. The pipeline GEF financed UNDP project mainstream biodiversity conservation into tourism development in Bhutan as a long-term strategy for mitigation of threats to biodiversity and to generate sustainable conservation financing and livelihoods. It includes promoting Bhutan as a model ecotourism destination, generating livelihood opportunities, sustainable financing for landscapes within and outside protected areas, promoting human-wildlife coexistence, and mitigating the negative impacts of increasing tourism on Bhutan's socio-cultural heritage and globally significant biodiversity. The project demonstration approaches will focus on the landscape-scale covering two protected areas (PAs) of Bumdeling Wildlife Sanctuary (BWS) and Sakteng Wildlife Sanctuary (SWS) in eastern Bhutan as well as in the five Dzongkhags (districts) of Lhuentse, Mongar, Trashigang, Trashy Yangtse and Zhemgang. These locations represent the eastern and south-central parts of Bhutan. The total grant financing for the project is USD 4,854,128 over its proposed implementation timeline from July 2021 to 2026. The project will support the development of a concessions framework that will enable private sector to participate in ecotourism development in protected areas and state forest areas. The LDCF project will coordinate with this project and upscale implementation of concessions framework as a tool to implement nature-based enterprises to support watershed management and protection.

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions?

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

This proposed project, to a large extent, aligns with the following national policies, laws, regulations, and strategies.

- **The Constitution of Bhutan;**

1. The constitution of Bhutan obliges the RGoB to protect, conserve and improve the pristine environment and safeguard the biodiversity of the country; prevent pollution and ecological degradation; Secure ecologically balanced sustainable development while promoting justifiable economic and social development; and ensure a safe and healthy environment. It requires maintaining 60% of the total land area of Bhutan under forest cover in perpetuity in order to conserve the country's natural resources and to prevent degradation of the ecosystem. As per the constitution, every Bhutanese citizen has the duty to preserve, protect and respect the environment.

- **12th Fiver Year Plan of Bhutan, 2018-2023;**

2. The 12 FYP has 16 National Key Result Areas (NKRAs). The project intervention related to seven of these NKRAs including NKRA 5 on Healthy Ecosystem Services Maintained; NKRA 6 on Carbon Neutral, Climate and Disaster Resilient Development Enhanced; NKRA 8 Water, Food and Nutrition Security Ensured; NKRA 9 on Infrastructure, Communication, and Public Service Delivery Improved; NKRA 13 on Democracy and Decentralization Strengthened; NKRA on 14 Healthy and Caring Society Enhanced and NKRA 15 on Livability, Safety, and Sustainability of Human Settlements Improved. The watershed management program of the MoAF in the 12 FYP includes watersheds assessments including assessment of drying water sources, preparation of Watershed and wetland management plans, and climate-smart restoration of the watershed. The program has identified lake and spring revival and watershed management as a priority to be undertaken by the Watershed Management Division of the Department of Forest and Park Services with the aim to improve availability and accessibility of water, making communities more resilient to climate change. The Food Self Sufficiency and Nutrition Security Program of MoAF includes development of irrigation infrastructure for increased agriculture production.

- **Bhutan's 2020 Vision**

3. The vision 2020 document of Bhutan envisions equitable access to basic services and infrastructure under which priority is given to the rapid expansion of access to potable water and safe sanitation for the improvement of health outcomes. The document states that the effective management of watersheds must be considered a key component of our efforts to place the nation's development on a sustainable path since water is a precious natural resource and a heritage important to all aspects of social, economic, and environmental wellbeing.

- **UNFCCC National Communications (NDC)**

4. In 2009, Bhutan pledged to remain carbon neutral at COP15, in Copenhagen. This has been reaffirmed in 2015, through the submission of NDC. Bhutan's adaptation commitments in the NDC include ten priorities which include water security, climate-resilient agriculture, ecosystem services (forest/ biodiversity), resilience against climate hazards, climate health risks, climate-proof transport infrastructure, resilient livestock farming, enhanced climate information services, diversified energy generation, and resilient urban and rural settlements. The project activities support seven of the ten NDC adaptation priorities of Bhutan related to water security, climate-resilient agriculture, ecosystem services, resilience against climate hazards, climate health risks, climate-proof infrastructure and diversified energy generation and resilient urban and rural settlements.

· National Adaptation Programme of Action

5. Bhutan's NAPA document identifies water as a vulnerable sector within which increased sedimentation of rivers, water reservoirs, and distribution network, affecting notably irrigation schemes' productivity/ agricultural crop yields; reduced ability of catchment areas to retain water/increased runoffs with enhanced soil erosion (deterioration of environment) and deterioration of (drinking) water quality are considered key vulnerabilities. Within the water sector, the document identifies raising community awareness on sustainable use of water resources; improving land use planning in degraded water catchment areas to promote afforestation; improve watershed management; extending, improving and maintaining water supply infrastructure as urgent adaption needs. The project interventions are directly aligned with these NAPA priorities.

Third National Communications of Bhutan (TNC), 2020

6. The strategic objectives related to the water sector in the TNC include combating water shortages and drying up of water springs, ensuring access to safe drinking water and adequate water for irrigation as well as increasing resilience to prolonged dry periods under climate change. Priority actions in identified include;

- Adopting landscape/watershed-based/ spring shed approach in water management for sustained ecological functions (reduce impacts on soil, maintain hydrology, reduced forest fires, agro-forestry, good farming practices, and SLM) and linking water source protection to water utilization
- Considering gender-sensitive, nature-based, and ecosystem-based (EbA) actions as alternative livelihood solutions for climate change adaptation
- Improved capacity in handling climate change-induced dry periods through water well-designed reservoirs/storages with proper design and layout plans
- Improved water safety through strengthened information system on water quality, timely monitoring of water quality, development and implementation of water safety plans linked to well-designed water supply systems
- Ensuring adequate drinking water and water for irrigation through climate-resilient water supply network comprising of climate proofed new and existing infrastructures with water-efficient technology,
- Assess risks and potentials to use, rainwater harvesting, and ground water on a larger scale
- Improve water information and inventory of water resources
- Improve governance and engagement of communities, community water user associations, academic institution to conduct research and studies

7. Bhutan's priority climate actions in the CWP are built on existing policies, strategies, and plans such as the 12th FYP, Bhutan's Nationally Determined Contribution (NDC), and other documents related to climate change actions in Bhutan. It identifies Bhutan's priorities in three thematic areas of ecosystem and agriculture, sustainable infrastructure, and resilient communities. Investment priorities and action areas are identified under each thematic area. The following table presents the priority areas in the CWP that relate to this project.

Strategic Theme	Investment Priorities	Action areas
Ecosystem and Agriculture	Climate-resilient Agriculture and livestock development and management	<ul style="list-style-type: none"> · Agro-forestry or agro-silvo pastoral system for fodder production (falls under eco-friendly farm designs) · Climate proofing of agriculture and livestock infrastructures. · Promote climate-smart and micro-efficient irrigation system and water management.
	Sustainable forest management and conservation of biodiversity	<ul style="list-style-type: none"> · Forest fire management and rehabilitation of degraded and barren forestlands.
Sustainable Infrastructure	Energy Security	<ul style="list-style-type: none"> · Ensure energy security during the lean dry seasons through water storage and reservoir. · Protect catchment areas for hydropower.
Resilient Communities	Climate-resilient and Low emission Human Settlement (Rural and urban)	<ul style="list-style-type: none"> · Improve storm water management and sewer system. · Promote green and climate-resilient infrastructures · Environmental management and safeguards for development activities, · Promote climate-resilient household water supply and sanitation. · Assess and manage forest fire and seismic risk.
	Climate-smart water management and Climate-resilient technology	<ul style="list-style-type: none"> · Conduct water resources assessment and mapping. · Implement spring shed management interventions. · Ground water assessment. · Promote efficient water use and harvesting technologies. · Wetland inventory. · Integrated watershed and wetland management

		<ul style="list-style-type: none"> · Improve skills and develop capacity for water management and maintenance of water infrastructure. · Climate proofing water distribution system.
	Green and Sustainable Economy	<ul style="list-style-type: none"> · Invest in cleaner technology, energy efficiency, and environmental management. · Promote eco-tourism. · Enhance new skills and knowledge in the technical educational institution to promote green and climate-resilient economy.

the National REDD+ Strategy & Action Plan of Bhutan, 2020

8. The National REDD+ Strategy & Action Plan of Bhutan has been developed as part of the REDD+ Readiness Program. With a vision of “A perpetually carbon neutral, climate change resilient and prosperous society”, the strategy aims to contribute towards advancing the carbon neutrality pledge of our Bhutan and support in meeting the commitments under the Nationally Determined Contributions (NDC) of Bhutan to UNFCCC as part of the Paris Agreement. The document covers four components of the REDD+ Warsaw Framework, which are the National Forest Monitoring System, the REDD+ Strategy, the Forest Reference Emission Level, and the Safeguard Information System. This project aligns with the following action measures under the strategy;

- Establish plantations to provide sustainable wood-based products supply, increase carbon-stock, and enhance biodiversity
- Promote the development of enterprises that sustainably manage NWFP
- Broaden opportunities for income generation from ecosystem services
- Develop climate-smart approaches in agriculture

National Biodiversity Strategy Action Plan (NBSAP), 2014:

9. The project’s result areas on addressing climate change impacts on water through restorations and protection of watershed directly align directly with four out of the twenty national targets identified by the NBSAP, 2014 which are target 8 on pollution from different sources, including from use of fertilizers and agro-chemicals affecting biodiversity and ecosystem functions are maintained within the national environmental standards; target 10 on potential impacts of climate change on vulnerable ecosystems identified and adaptation measures strengthened; target 14 on key ecosystems and ecosystem services are identified, assessed and safeguarded for human well-being and target 15 on priority degraded ecosystems and habitats are identified and rehabilitated.

Comprehensive Development Plan for Bhutan (CDP), 2030

10. For the water sector, the CDP, 2030 identifies organizational coordination to optimize cross-sectoral structures; promotion of attractive water basin; study on water resource conservation and ICT application in water management. These are integral parts of this project.

11. The NIWRMP identifies five river basin management units within Bhutan and requires each river basin management unit to be operated by designated River Basin Committees (RBC). It also provides management framework for IWRM at the basin level so that each basin management can be managed through a River Basin Management Plan (RBMP) and identifies priorities for implementation of integrated water resources management. It promotes inter-agency coordination for development, management, conservation, and efficient use of water resources, including surface and groundwater resources. The plan includes actions to adopt cost recovery policies, utilize water-efficient technologies, and establish de-centralized water management authorities at all levels. The plan identifies every Thromde and Dzongkhag Administration to prepare an Integrated Water Use Management Plan based on demographic projections for the next decade, to ensure efficient water supply and effluent disposal, including drainage systems, in its jurisdiction. The project landscape (including co-financing) covers major parts of four of the five river basin management units in the country and will support the establishment of Dzongkhag Water Management Committees, RBCs, and built capacity in the project Dzongkhags to develop RBMPs.

Water Regulation of Bhutan. (WRP), 2014

12. The WRP, 2014 regulates effluent wastewater/ discharge, to minimize pollution and ensure quality.

Water Quality Standards (WQS), 2018

13. The WQS, 2018 includes ambient water quality criteria, industrial effluent discharge standards, and standards for sewerage effluent. It identifies the roles and responsibilities of Thromdes/Municipalities in conducting monitoring of effluent discharged from their sewage treatment plants, to ensure that discharges are within the prescribed standards.

Water National Land Use Zoning Implementation Guidelines, 2018,

14. The land-use zoning implementation guidelines aim to protect and preserve watersheds, wetlands, and forest ecosystems that are important for adaptation.

Water National Sanitation and Hygiene Policy (NSHP), 2020

15. The NSHP, 2020 commits to achieving universal coverage and adoption of appropriate technology for sustainable sanitation systems. It calls for conducting research and development in the sanitation sector to devise appropriate, cost-effective, disaster-resilient, climate-resilient, and sustainable technologies. The policy requires the adoption of water treatment systems that are locally appropriate, disaster-resilient, climate-resilient, and sustainable to minimize the environmental impacts associated with management of wastewater.

Water Policy, 2003 Water Act of Bhutan, 2011

16. The Water and Water Policy Act aims to ensure that water is available in abundance to pursue socioeconomic development. The water act aims to ensure that the water resources are protected, conserved and/or managed in an economically efficient, socially equitable, and environmentally sustainable manner. It enshrines the concept of integrated water resources management, and prioritizes management of water for drinking and sanitation, then for agriculture and hydro energy. A key goal of the Water Act is to create the conditions for a shift from a fragmented approach to an integrated approach for the management of water resources, with decentralized water governance. River Basin Management Committees and Water Users' Associations are to be formed to ensure implementation of water plans and promote local capacity development and water security. WUAs can take actions to enhance water availability for household use, wetland paddy, and irrigating vegetables, resolve disputes and ensure equitable distribution.

National Environment Protection Act (NEPA) 2007

17. The NEPA, 2007 states a person has the fundamental right to a safe and healthy environment with equal and corresponding duty to protect and promote environmental well-being.

National Human Settlement Policy (NHSP) of Bhutan 2019

18. The NHSP, 2019 requires environmentally sensitive areas, including bio-diversity hot-spot areas identified in national land-use plan and in settlement areas to be protected including protection and management of watershed areas and water resources for consumption, farming, and conservation of ecosystems. The policy prescribes appropriate buffer areas for rivers and major streams restricts channelization to allow historic flow speeds, water-sensitive green design concepts, eco-efficient, and energy-efficient infrastructure. The policy also supports the incorporation of technologies and designs that reduce vulnerability to risks such as earthquakes, landslides, floods, fires, windstorms and ensure improved performance and sustainability of infrastructures.

National Economic Development Policy of Bhutan (EDP), 2016

19. The EDP, 2016 commits Bhutan's decision to pursue green growth and provides a conducive policy environment for green technology, technology transfer, climate-smart agriculture. The policy supports private sector participation through PPP policy including private/community participation in the development and maintenance of irrigation and water management systems.

Climate Change Policy of the Kingdom of Bhutan (CCP), 2020

20. The CCP, 2020 aims to enable a climate-resilient and carbon neutral development. It sets four major objectives of pursuing carbon neutral development; building resilience to climate change; ensuring adequate finance, technology, and capacity building means of implementation of the policy, and establishing an effective and coordinated action to address climate change.

8. Knowledge Management

Outline the knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

1 Knowledge management mechanisms to share best practices and lessons learned between key stakeholders involved in water governance and management are generally lacking. The situation of multiple agencies involved in water governance and management call for a systematic approach to sharing of information and lessons between different units, departments and agencies of (local) government and with the private sector and civil societies. The GEF investment aims to significantly increase the capacity and knowledge of local and national stakeholders working in water sector through implementation of a transparent, effective, and efficient communication strategy that will be prepared during the PPG. Further the publication of an institutionalized State of the Basin Report (SOBR) for the Punatsangchu river basins will ensure that stakeholders are informed of the issues, opportunities, and state of affairs of watershed conditions including climate information of the Punatsangchu river basins. Lessons learnt from the project areas will also be included in the SOBR so that the water flagship program can upscale success cases and best practices in other project areas. The project's annual PIR, MTR and TE should also include discussion on lesson learned and opportunities for scaling up.

9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF

CEO Endorsement/Approval MTR

TE

High or Substantial

Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

Kindly refer to the project's Social and Environmental Screening Procedure (SESP) template.

Annex D

Indicative Monitoring and Evaluation Budget

No	M&E Activity	GEF Project Financing(US \$)	Co-financing
1	Project inception workshop	12,500	56,914
2	Annual work plan preparation and monitoring	10,000	45,531
3	Annual implementation review of Gender Action Plan and sensitization workshop on gender and social safeguards (including safeguards and gender expert)	22,700	103,356
4	Conduct surveys as necessary to update all indicators in the results framework at mid-term and end of project (survey cost)	21000	95,616
5	Conduct independent Mid-term Review of GEF-financed and co-financed activities in line with UNDP/GEF requirements, and incorporate recommendations of MTR into revised project plans (management response) following PSC's approval	36,000	163,912
6	Surveys for MTR and TE on estimation of direct beneficiaries	21000	95,615
7	Conduct independent Terminal Evaluation of GEF-financed and co-financed activities in line with UNDP/GEF requirements	50,000	227,656
	Total	173,200	788,600

Supporting Documents

Upload available ESS supporting documents.

Title	Submitted
PIMS 6647_Bhutan ACREWAS 30April2021 -Clean	
PIMS 6447_10779 review sheet 30April2021	
TOC_Submitted 23April2021	
PIMS 6647_Bhutan ACREWAS 23April2021	
Climate_change_adaptation_results_framework Bhutan 23April2021	
10779 Response to Review sheet 23April2021	
PIMS 6447_10779 review sheet 16 April clean	
PIMS 6647_Bhutan ACREWAS 16April clean	
PIMS 6647 Bhutan Water SESP_March 17 2021_clean	

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Mr. Rinchen Wangdi	Director	Gross National Happiness Commission	3/15/2021

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

Due to the file size, please refer to Annex document in attachment (ROADMAP section)