



United Nations Development Programme

Project Document




Project title: Advancing Climate Resilience of the Water sector in Bhutan		
Country: BHUTAN	Implementing Partner (GEF Executing Entity): Ministry of Infrastructure and Transport (MoIT)	Execution Modality: <i>National Implementation Modality (NIM)</i>
Contributing Outcome (UNDAF/CPD, RPD, GPD): Outcome 4: Bhutan's communities and the economy are more resilient to climate change induced disasters and biodiversity loss as well as economic recovery (Output 4.1 Inclusive risk informed systems and capacities in place to enable people to benefit from conservation and sustainable management of natural resource and reduced environmental and health risks. Output 4.2 National policies and programmes foster food self-sufficiency, innovative financing an inclusive business environment and improved livelihoods through climate change resilient value chains and nature-based solutions)		
UNDP Social and Environmental Screening Category: Moderate	UNDP Gender Marker: 2	
Quantum Award ID: 1067009	Quantum Project ID: 01000556	
UNDP-GEF PIMS ID number: 6647	GEF Project ID number: 10779	
LPAC meeting date: 24 th May 2023		
Last possible date to submit to GEF: 31 st October 2022		
Latest possible CEO endorsement date: 10 th April 2023		
Project duration in months: 60 months		
Planned start date: 30 August 2023	Planned completion date: 30 August 2028	
Expected date of Mid-Term Review (MTR submission to the GEF): 31 December 2025	Expected date of Terminal evaluation (TE submission to the GEF): 20 May 2028	
Expected Operational Closure Date: 20 May 2029	Expected Financial Closure Date: 20 November 2029	
Brief project description: Bhutan is highly vulnerable to climate change and climate induced hazards. The project seeks to address the shortages and declining water quality, which has a direct bearing on increased vulnerabilities of livelihoods, food production and human health that depend on the renewable natural resources (RNR) sector, particularly for communities those dependent on forest resources.		

The project will enhance the resilience of communities to climate change-driven impacts on water resources and water infrastructure in some of the most climate vulnerable regions of Bhutan. It will directly benefit 37,334 persons (19,465 ♂, 17,869 ♀) residing across three Dzongkhags and four watersheds. Of these 19,391 will benefit from water supply and 17,943 from enhanced watershed services.

The project will restore, manage, and protect 38,518 hectares of critical catchments to stabilise and enhance water yields by enhancing their resilience to extreme events and extended dry seasons. Further, it will provide 3,392 hectares of agricultural land with irrigation and support farmers to adopt climate resilient agriculture. Existing (Payment for Eco-system Services) PES schemes will be replicated to sustain the management of critical catchments.

The project will climate-proof 74.14 km of water transmission and distribution infrastructure and will augment water storage and treatment through small tanks (1 to 250 cubic meters) and two water treatment plants. Public-private-partnership (PPP) models will be explored for the long-term financial sustainability of water utility services. Entrepreneurs will be facilitated to take over aspects of O&M of water supply and monitoring of water distribution infrastructure and metering.

FINANCING PLAN	
GEF Trust Fund grant: LDCF	USD 8,932,420
UNDP TRAC resources:	USD 100,000
(1) Total Budget administered by UNDP	USD 9,032,420
(2) Total confirmed co-financing to this project not administered by UNDP	USD 25,032,000
(3) Grand-Total Project Financing (1)+(2)	USD 34,064,420

SIGNATURES:		
Signature Secretary, Ministry of Finance 	Agreed by Government Development Coordination Authority	Date/Month/Year: 01/09/2023
Signature: Secretary, Ministry of Infrastructure and Transport 	Agreed by Implementing Partner	Date/Month/Year: 31/8/2023
Signature: Resident Representative, UNDP 	Agreed by UNDP	Date/Month/Year: 01/9/2023

(As OIC)



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I. Table of Contents	
II. Development Challenge	6
III. Strategy	22
IV. Results and partnerships	33
V. Project Results Framework	64
VI. Monitoring and Evaluation (M&E) Plan	66
VII. Governance and Management Arrangements	80
VIII. Financial Planning and Management	84
IX. Total Budget and Work Plan	87
X. Legal Context	110
XI. Risk Management	110
XII. Mandatory Annexes	113

[Annex 1: GEF Budget template](#)

Annex2: Co-finance letters

Annex3: Project map and Geospatial coordinated of project sites

Annex 4: Multi Year Work Plan

Annex 5: Monitoring Plan

Annex 6: UNDP Social and Environmental Screening Procedure (SESP)

Annex 7: UNDP Risk Register

Annex 8: Overview of Project staff and Technical consultancies

Annex 9: Stakeholder Engagement Plan

Annex 10: Environmental Social Management Framework

Annex 11: Gender Analysis and Gender Action Plan

Annex 12: Procurement Plan

Annex 13: GEF focal areas specific annexes

- Annex 13a. Climate Analysis
- Annex 13b. Watershed Assessment
- Annex 13c. Economic Analysis
- Annex 13d. National Strategies and plans relevant to Bhutan
- Annex 13e. Description of project activities
- Annex 13f. Covid response
- Annex 13g. Partnerships

Annex 14: GEF Core Indicator

Annex 15: GEF Taxonomy

Annex 16: HACT & PCAT

Annex 17: GEF Audit Checklist

Annex 18: On-granting Provisions Applicable to the Implementing Partner

Annex 19: TOR for Project Board and Project team

Annex 20: GEF CEO Endorsement/ Approval

LIST OF ACRONYMS

CCA	Climate Change Adaptation
CFMG	Community Forest Management Group
CSA	Climate Smart Agriculture
CSOs	Civil Society Organisations
DEMC	Dzongkhag Environment Management Committees
D MDF	Department of Marco Fiscal and Development Financing
DoA	Department of Agriculture
DoFPS	Department of Forests and Park Services
DoI	Department of Infrastructure
DoW	Department of Water
DRM	Disaster Risk Management
DRR	Deputy Resident Representative
DRR	Disaster Risk Reduction
DWMC	Dzongkhag Water Management Committee
ESIA	Environment and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EWS	Early Warning System
FGD	Focused Group Discussion
FYP	Five Year Plan
GAP	Gender Action plan
GBCL	Green Bhutan Corporation Limited
GCF	Green Climate Fund
GCM	General Circulation Models
GDP	Gross Domestic Product
GEF	Global Environment Facility
GLOF	Glacial Lake Outburst Flood
GNHC	Gross National Happiness commission
GRM	Grievance Redress Mechanism
HH	Household
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
LDCF	Least Developed Countries Fund
LG	Local Government
MoAL	The Ministry of Agriculture and Livestock
MoENR	Ministry of Energy and Natural Resources
MOF	Ministry of Finance
MoIT	Ministry of Infrastructure and Transport

NAPA	National Adaptation Programme of Action
NAP	National Adaptation Plan
NAP	National Adaptation Plan
NCHM	National Center for Hydrology and Meteorology
NCHMS	The National Center for Hydromet Services
NCWC	National Commission for Women and Children
NDC	Nationally Determined Contributions
NDCs	Nationally Determined Contributions
NECS	The National Environment Commission Secretariat
NIWRMP	National Integrated Water Resources Management Plan
NKRAs	National Key Result Areas
NRM	Natural Resource Management
O&M	Operation and Maintenance
PES	Payment for Environment Services
PMU	Project Management Unit
PPG	Project Preparation Grant
PPP	Public-Private Partnership
RBC	River Basin Committee
RBMP	River Basin Management Plan
RCC	Reinforced Concrete
RGOB	Royal Government of Bhutan
RNR	Renewable Natural Resources
SAPA	Sector Adaptation Plan of Action
SOBR	State of the Basin Report
TBWP	Total Budget Workplan
UNDAF	United National Development Assistance Framework
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WMD	Watershed Management Division
WUA	Water User Association

Glossary of Bhutanese Terms:

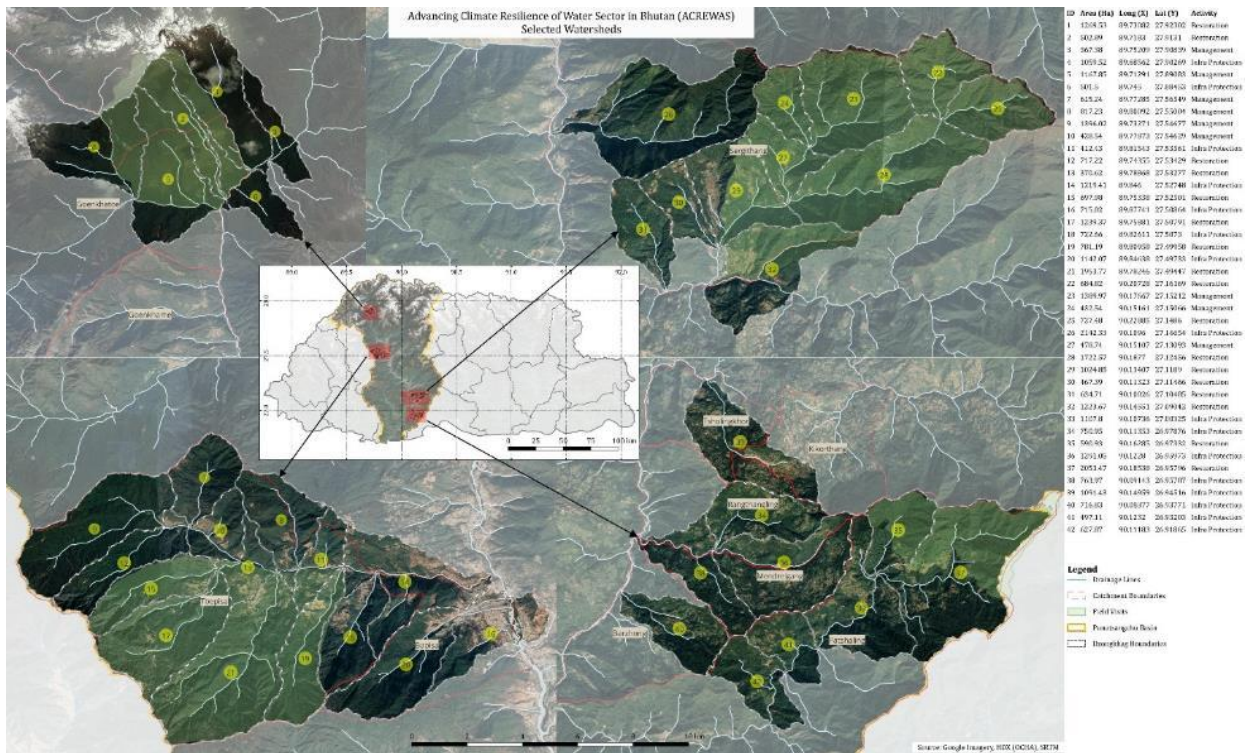
Chiwog	:	A cluster of villages under a Gewog
Dzongdag	:	District Administrator/Governor
Dzongkhag	:	District
Dzongkhag Tshogdu (DT)	:	District Development Committee/highest decision-making body in the Dzongkhag
Gewog	:	Lowest political and administrative unit comprising of a group of Chiwogs
Gewog Tshogde (GT)	:	Gewog Development Committee/ highest decision-making body in

Gup	:	the Gewog
Mangmi	:	Head of a Gewog
Tshogpa	:	An elected representative of the Gewog, who is also a deputy Gup
Thromde	:	Representative of a Chiwog. Also referred to the Community Representative of a Chiwog to the GT
	:	Municipal local government

II. DEVELOPMENT CHALLENGE

Background Context

Bhutan is a small landlocked country in the Eastern Himalayas, occupying 38,394 km² between China in the north and India in the south, east, and west. High snow-capped peaks and alpine pastures occupy the north and the mid ranges are covered with temperate forests in deep, north to south valleys and hills created by fast-flowing rivers. The south's foothills comprise alluvial plains with broad river valleys and sub-tropical forests. About half of Bhutan's rugged terrain has slopes greater than 50%, and ≈52.45% of its land area is over 2,600 meters above mean sea level.¹ The entire country, with its fragile mountainous ecosystems, is part of a global biodiversity hotspot.² Bhutan is among the least populated countries in mainland Asia with a population of 727,145 (47.7% ♀ 52.3 ♂) and a population growth rate of 1.3%³, with an additional 2.51% under meadows, 9.74% under shrubs and 5.35% under snow and glaciers.⁵ 51.44% of the total area is protected.⁶ Only 2.75% or 112,556.2 hectares constitute cultivated agricultural land. Maize, rice, potatoes, and vegetables are the major food crops, in addition to farmers raising livestock. Farmers largely depend on rainfed irrigation systems to grow crops.



¹ Renewable Natural Resources Statistics Division Directorate Services, "Bhutan RNR Statistics 2019."

² Mittermeier et al., "Hotspots Revisited"; Myers, "Threatened Biotas"; Myers et al., "Biodiversity Hotspots for Conservation Priorities," 2011.

³ World Bank, "DataBank | The World Bank.", 2021.; Population and Housing Census of Bhutan, 2017, nsb.gov.bt, 2018,;

⁴ Forest Resources Management Division (FRMD), "Land Use and Land Cover of Bhutan 2016 Maps and Statistics.", 2017.

⁵ Department of Forests & Park Services, "Bhutan's Proposed National Forest Reference Emission Level and National Forest Reference Level Submission for Technical Assessment to UNFCCC", 2019; "National Forest Inventory Report: Stocktaking Nation's Forest Resources.", 2018.

⁶ Forest Resource Management Division (FRMD). Bhutan Land Cover Assessment, technical Report, 2019

The Punatsangchhu basin is the largest of Bhutan's five major river basins. It has the highest number of glaciers and glacial areas (436 and 361.6 ±9.3 km² respectively) and 223 glacial lakes occupying a total area of 25.23 km².^{7,8}. Although Punatsangchhu is important in terms of hydro-power generation, the river has not benefited the farmers proportionately in terms of irrigation, as the agricultural lands are located on higher slopes. Smaller streams and spring sources on the upper slopes are tapped for irrigation and domestic water needs.

The project targets interventions in four watersheds namely Singtaulum, Okalum, Pawkhola and Sergithang Gewog Laraychuu which fall within three Dzongkhags (Gasa, Punakha and Tsirang) of the Punatsangchhu basin. These sites were selected based on a comprehensive assessment of socioeconomic and climate hazards at the dzongkhag level as well as a Gewog level vulnerability analysis of water resources in Bhutan including for the drinking water and irrigation water sources.

Problem Statement

The project seeks to address the irrigation and domestic water shortages and declining quality of drinking water, on account of climate change induced alterations in weather patterns and increased frequency and intensity of climate-induced hazards. This has increased vulnerabilities of livelihoods, food production and human health that depend on the Renewable Natural Resources (RNR) sector, particularly for farmers and those dependent on forest resources. Rainfall variability has made water sources on which communities rely for irrigation and domestic use increasingly unreliable and inadequate. The infrastructure used to harvest and convey water is vulnerable to physical damage by floods and landslides, leading to water insecurity among both rural and municipal water users.

Climate Change

A summary of climate related challenges in Bhutan is presented below, a more detailed discussion is presented in Annex 13a.

Bhutan is the 46th most vulnerable country and the 64th most ready country to climate change impacts according to the ND-GAIN Index⁹. Historical data on temperature and precipitation trends in Bhutan shows a gradual increase in mean temperature (0.177 C per decade) and a declining trend in total precipitation (-0.0021mm/day per decade) since 1901. This analysis is based on the Climate Research Unit (CRU) of the University of East Anglia. The increase in temperature since the 1960's has been significant and has increased sharply after the turn of the century. Changes in precipitation too have been more marked in the past two decades with increased variability and a declining trend¹⁰. A more recent comparison of the CRU dataset with station data showed consistent patterns and an increase of 0.8 C in mean annual temperatures between 1976 and 2005¹¹. The combination of increased temperatures and declining precipitation has contributed to a reduction of glacial areas. Erratic rainfall has resulted in reduction of water availability for irrigation leading to changes in growing zones, cropping patterns and worsening water pollution and scarcity¹². Other consequences of climate change have included outbreaks of diseases and pests, erratic rainfall, windstorms, hail storms, droughts, flash floods and landslides¹³.

⁷ Cryosphere Services Division and Meteorology "Bhutan Glacial Lake Inventory (BGLI) 2021."

⁸ Bajracharya, Maharjan, and Shrestha, "The Status and Decadal Change of Glaciers in Bhutan from the 1980s to 2010 Based on Satellite Data.", 2014.

⁹ <https://gain-new.crc.nd.edu/country/bhutan>

¹⁰ World Bank Group, 'Bhutan - Summary | Climate Change Knowledge Portal', accessed 25 September 2022, <https://climate-knowledgeportal.worldbank.org/country/bhutan>.

¹¹ National Centre for Hydrology and Meteorology (NCHM), 'Analysis of Historical Climate and Climate Projection for Bhutan' (Royal Government of Bhutan, 2019).

¹² International Centre for Integrated Mountain Development, 'Bhutan Climate Change Handbook' (Bhutan Media and Communications Institute, 2016).

¹³ Ngawang Chhogyel and Lalit Kumar, 'Climate Change and Potential Impacts on Agriculture in Bhutan: A Discussion of Pertinent Issues', *Agriculture & Food Security* 7, no. 1 (1 November 2018).

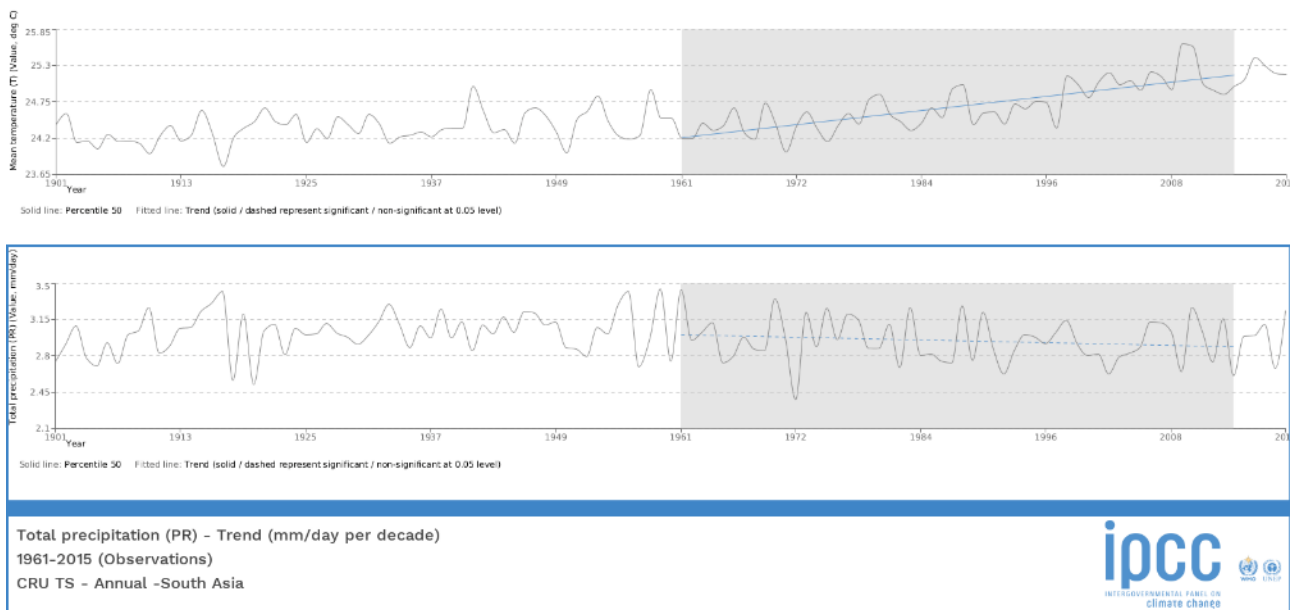


Figure 1: Historical observations of temperature and precipitation in the South Asian region based on the CRU dataset. Source IPCC

The National Integrated Water Resources Management Plan¹⁴ highlights the threat from Climate Change on drinking water supply, agricultural production and hydropower generation. The National Adaptation Programme of Action (NAPA) published in 2006¹⁵ details the damage caused by glacial lake outburst flood (GLOF), and floods triggered by extreme rain to irrigation channels. It lists the following climate change related vulnerabilities pertaining to the agricultural and water resources sector, other than those mentioned above: 1) Decreased water availability for crop/livestock production; 2) Drying up of water sources affecting availability as well as water quality; 3) Increased sedimentation of rivers, water reservoirs and distribution network, affecting notably irrigation schemes' productivity/ agricultural crop yields; 4) Increased pressure on catchment areas to retain water/increased runoffs with enhanced soil erosion (deterioration of environment); 5) Deterioration of (drinking) water quality and 6) Loss of safe (drinking) water resources increasing water borne diseases.

Climate related disasters reported during the past three decades are summarised below:

Year	Event	Region/River Basin / Dzongkhag	Reported Damage
1957, 1960, 1968	Glacial lake outburst flood (GLOF)	Lower valley s	Damage to life and property
1994	Most devastating GLOF in living memory	Luge Tsho in eastern Lunana burst. Pho Chu and Mochu rivers joined course above Dzongchu in Punakha.	Extensive damage to property along the Punakha- Wangdi valley. 91 households 5 water mills, 816 acres of dry land and 965 acres of pasture land damaged/washed away.
1994, 1999, 2001, 2003 & 2008	Drought	Paachu-Wangchu valley	Die back and insect attack on pine, conifer and oak forests. Low river flow/Water shortage /Impact on hydropower generation, drinking and irrigation water supply
1999 to 2014	Drought	Nationwide	An estimated average of 47 fire incidences recorded each year, totally 707 incidents of forest fire affecting over 102, 397.6 ha.

¹⁴National Environment Commission, 'National Integrated Water Resources Management Plan 2016' (Royal Government of Bhutan, March 2016).

¹⁵National Environment Commission, 'Bhutan National Adaptation Programme of Action (NAPA)' (Thimphu, Bhutan: Royal Government of Bhutan, 2006).

2000	Extreme rainfall, flash floods, landslides	Southern regions of Bhutan. Phuntsholing, Pasakha, Samtse and Kalikhola.	Unprecedented rains, highest recorded in Bhutan. Toorsa and Dhotikhola rivers changed their course. Loss of life and infrastructure.
2004	Extreme rains and floods	Eastern Dzongkhags of Trashigang, Trashiyangtse and Samdrupjongkhar	9 deaths, 29 houses washed away, 26 houses collapsed, 107 houses damaged. 161 acres of wetland and 503 acres of dry land was washed away. Agricultural produce lost to 1437 households. 39 irrigation channels damaged and 22 bridges were damaged or washed away.
2009	Rain, cyclone Aila	Nationwide	Private/ public buildings, water infrastructure, roads, forests, plantations, fields
2010	Flash floods	Sarpang river/ Sarpang Sarp town	Paddy fields, irrigation channels, farm roads, drinking water supply schemes, and crops
2012	Extreme rain, landslide/ flooding	Damji, under Gasa* Dzonkhags	Arable fields & road, siltation, irrigation canal networks
2013	Flash flood	Punakha Kabj*	Paddy fields (6 acres)
2014	Flash floods	Sengphug Rongchu, Trashiyangtse Toetsho gewog	Paddy fields (600-700 acres)
2015	GLOF	Lemthang Tsho, Gasa Laya*, Puna kha-wangdue valley*	Drinking water infrastructure
2015	Flash flood	Nahi stream, Wangdue*	Drinking water sources, irrigation sources washed away
2016	Flash flood	Setikharay stream, Gelephu (Pelrithang)	Water treatment plant
2016	Flash flood	Setikharay stream, Gelephu geowg, Ghaden chewog	Paddy fields (60 acres), cardamom (2 acres)
2019	Flash flood	Phangruchhu stream, Jaroggang, Kamichu area, Wangdue Phodrang	Roads submerged, irrigation channel, drinking water infrastructure, paddy (20 acres)

Climate projections for Bhutan suggest an increase in temperatures likely to trigger heat waves and droughts and contribute to glacial and snow melt¹⁶. The latter is likely to change patterns of river discharge and water availability and cause an increased occurrence of glacial-lake outbursts in the region¹⁷. Floods, triggered both by glacial-lake outbursts and by increased frequency of extreme rain events during the monsoon are the most significant climate-related hazard in Bhutan, affecting agriculture in particular, which is concentrated in the more vulnerable drainage basins¹⁸. Bhutan lost $23.3 \pm 0.9\%$ glacial area between 1980 and 2010¹⁹. Warming trends, particularly at higher altitudes and during winter months, are likely to further accelerate glacial-melt which additionally threatens the water-dependent economy.

¹⁶ The World Bank Group and Asian Development Bank, 'Climate Risk Country Profile: Bhutan', 2021.

¹⁷ Anirudha Mahagaonkar et al., 'Glacier Environment and Climate Change in Bhutan—An Overview', *Journal of Climate Change* 3, no. 2 (2017): 1–10.

¹⁸ The World Bank Group and Asian Development Bank, 'Climate Risk Country Profile: Bhutan', 2021.

¹⁹ Bajracharya et al., 'The Status and Decadal Change of Glaciers in Bhutan from the 1980s to 2010 Based on Satellite Data', *Annals of Glaciology* 55, no. 66 (2014): 159–66.

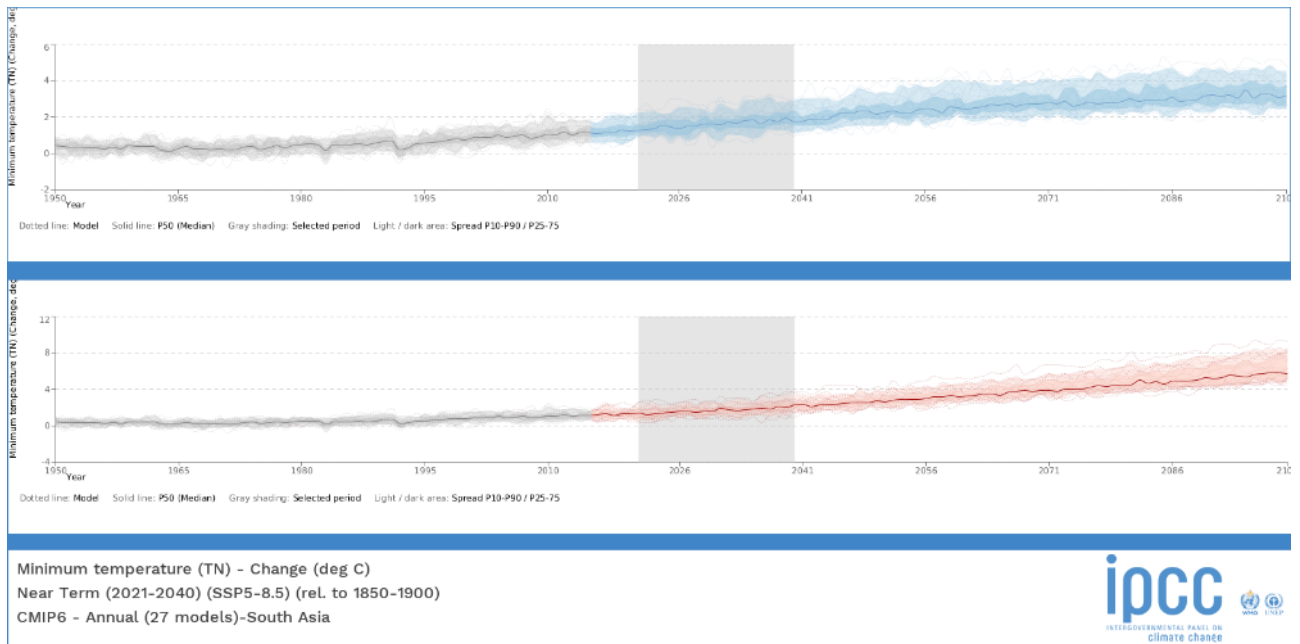


Figure 2: CMIP6 projections of change in temperature in the South Asian Region with short term shaded in grey. Source IPCC

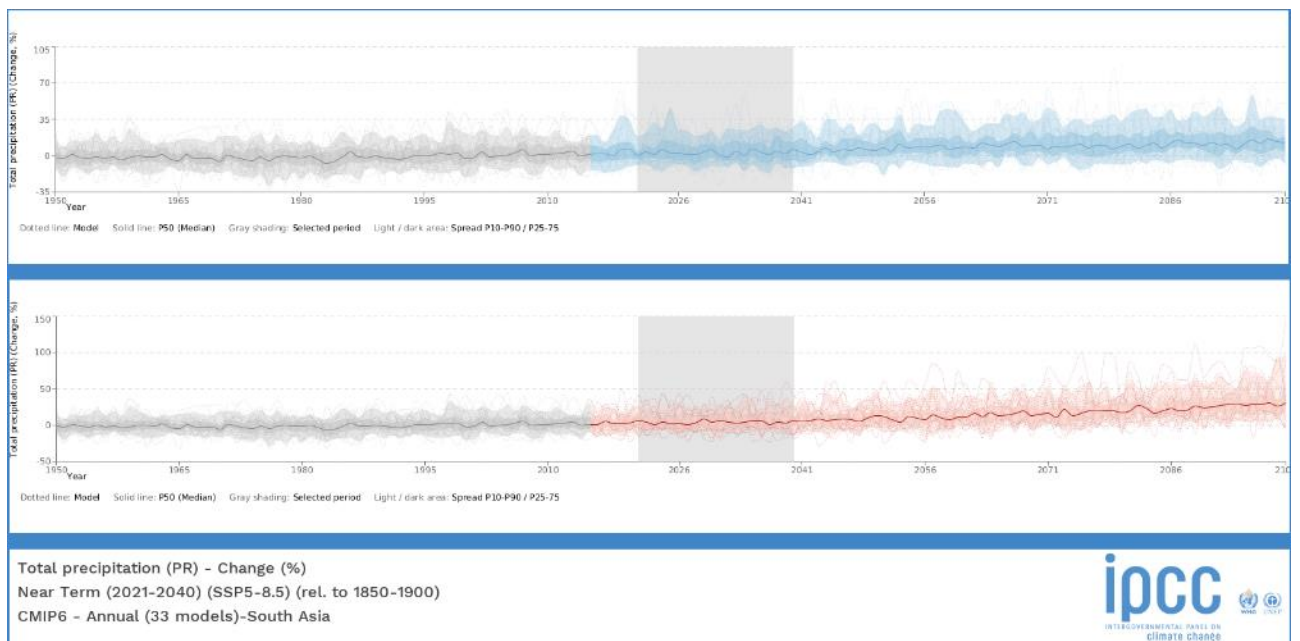


Figure 3: CMIP6 projections of change in precipitation in the South Asian Region with short term shaded in grey. Source IPCC

Regional level projections: The CMIP-6 model projections²⁰ (figure 2 and 3) suggest that in the Asia region, there will be an increase in average and heavy precipitation, a decline in glaciers, and an increase in glacial runoff. There will also be more intense and frequent heat waves and humid heat stress and an increase in both annual and summer monsoon precipitation with enhanced inter-annual variability. Expected trends as per four different scenarios (representative concentration pathways) and for the near (2021-2040), medium (2041-2060), and long term (2081-2100) are presented in Table 1. A more comprehensive description is provided in the Feasibility Study (Annex-13a).

²⁰ Masson-Delmotte et al., *Climate Change 2021*; IPCC, “Regional Fact Sheet - Asia.”

Table 1: CMIP6 - Total annual median change related to 1850-1900 baselines for precipitation (%) and minimum and maximum temperature change (° C). Source: interactive atlas

Period	Scenario	Precip. (%)	Min. Temp. (° C)	Max. Temp. (° C)
Near Term (2021-2040)	SSP1-2.6	5.6	1.6	1
Medium Term (2041-2060)	SSP1-2.6	8.2	2	1.5
Long Term (2081-2100)	SSP1-2.6	9.1	2	1.5
Near Term (2021-2040)	SSP3-7.0	5.3	1.5	0.9
Medium Term (2041-2060)	SSP3-7.0	5.4	2.3	1.5
Long Term (2081-2100)	SSP3-7.0	19.8	4.1	2.4
Near Term (2021-2040)	SSP2-4.5	4.3	1.6	0.9
Medium Term (2041-2060)	SSP2-4.5	8.7	2.1	1.6
Long Term (2081-2100)	SSP2-4.5	11.3	3	3.3
Near Term (2021-2040)	SSP5-8.5	4.4	1.7	1
Medium Term (2041-2060)	SSP5-8.5	9.3	2.7	1.9
Long Term (2081-2100)	SSP5-8.5	25.5	5.2	4.4

National and site level projections: The Third National Communication to the UNFCCC²¹ confirms these projections. In the coming years, Bhutan will likely face an increase in frequency and magnitude of extreme rain events and windstorms causing flash floods and landslides. Temperature increases are likely to alter patterns of glacial and snow melt and cause water sources and streams to dry up.

A Gewog level vulnerability analysis for water resources in 2021, as a part of the National Adaptation Plan (NAP) formulation for Bhutan, identifies the Punatsangchhu basin as a hot spot with the highest likelihood of increased duration and frequency of low flows²². The analysis concludes that climate change and erratic rainfall are causing an increasing lack of good quality water resources due to drying up of springs and streams during the dry season and reduced groundwater recharge. The 10-year precipitation events increase most in the Gewogs across the Punatsangchhu basin. An increase in landslide risk is projected for both RCPs 4.5 and 8.5 in the upstream regions of the basin. An increase in frequency of droughts and extreme rain events is projected in both Gasa and Tsirang. The NAP assessment on socioeconomic and climate hazards at the Dzongkhag level²³ ranked Gasa and Tsirang in third and fourth position in terms of vulnerability. Punakha was ranked at 17 on account of a very high adaptive capacity, even though it ranked among the highest in terms of hazard, exposure and environmental degradation.

Site-specific climate trends from the NASA Earth Exchange Global Daily Downscaled Projections were analysed as part of the PPG process (refer Annex 13a – Climate Analysis). A comparison against baselines from 1960 to 1990 (Table 2) suggests an increase ranging from 8.9 to 9.6 percent for the near term under RCP4.5. The same comparison for RCP8.5 scenario projects increases from 9.7 to 14.7%. For the long term, the increase in rainfall is expected to be between 16.5 and 18.6% for RCP4.5 and 40.3% and 45.5% for RCP8.5. The crucial issue with rainfall is its seasonality and variability. Most of the increases in rainfall will be during the monsoon months (June to September) and will be accompanied by fluctuating variability, particularly during June and July.

Minimum temperatures are also expected to increase significantly (Table 2). For the near term, an increase of 1.52° to 1.56° C is expected under RCP4.5, which under RCP8.5 is projected to be between 1.46° and 1.74° C. For the long term this is projected to be between 1.43° C and 2.74° C and 4.33° and 4.92° C under the RCP4.5 and RCP8.5 scenarios, respectively. Increases in temperatures, have serious implications for crop production and productivity of ecosystems, and in Bhutan, for increased glacial melt. Trends in minimum temperature²⁴ are projected to increase under both scenarios, with sharpest increases in the winter months.

Table 2: Percent change in precipitation and minimum temperature at project sites projected as per NEX-GDDP for the near, medium, and long term for two representative concentration pathways compared against baseline periods of 1961 to 1990. Additional details and plots presented in Annex 13a.

Site	RCP4.5 Near	RCP4.5 Medium	RCP4.5 Long	RCP8.5 Near	RCP8.5 Medium	RCP8.5 Long
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²¹ National Environment Commission Royal Government of Bhutan, "Third National Communication to the UNFCCC.", 2020.

²² Deltares . Climate Change vulnerability analyses and mapping for National Adaptation Plan (NAP) formulation process in Bhutan., 2021.

²³ Ad Jeuken, "Umit, Taner, Laur`ene, Bouaziz, Chhimi, Dorji, Sonam Pem, Tshering Lhamo, & Choening Wangmo. Assessment of Climate Risks on Water Resources for the National Adaptation Plan (NAP) in Bhutan: Priority Risks and Recommendations for Adaptation. 2021.

²⁴ Minimum temperatures have increased globally three times faster than maximum temperatures and therefore are a better index of temperature change.

Precipitation						
Gasa	8.9	16.2	18.6	14.7	22.6	45.5
Pawkhola	8.9	17.3	16.6	10	21.4	40.3
Punakha	9.6	15.2	17.5	12.9	21.8	43.1
Sergithang	8.9	15.7	16.5	9.7	20.7	40.4
Minimum temperatures						
Gasa	1.56	2.06	2.74	1.74	2.59	4.92
Pawkhola	1.49	2.02	2.43	1.46	2.27	4.33
Punakha	1.53	2.01	2.55	1.6	2.48	4.86
Sergithang	1.52	2.01	2.45	1.48	2.31	4.42

Implications: Impacts of climate change are expected to seriously affect food production, considered a direct threat to food security in Bhutan.²⁵ Climate projections suggest an increased frequency and duration of dry spells, reducing flows and recharge of aquifers during the dry season. However, the same sites will face increased damage to watersheds and water infrastructure from floods and landslides triggered by extreme rain events. The latter will additionally impact water quality and silt up springs, channels, reservoirs, and storage facilities.

Rapid changes in average temperatures and rainfall patterns are the biggest threat to farmers, who depend on the monsoon²⁶. Variability in rainfall, particularly delays in the arrival of monsoon has led to water shortages affecting crop yield/productivity leading to fallowing of agricultural land which is recognised as a threat to food and nutritional security of the country²⁷. These are often accompanied by excessive rains during the monsoon which triggers landslides and floods, causing extensive damage to both farms and infrastructure²⁸. Rainfall variability also affects watersheds, with many water sources now drying up. As per the 12th Five Year Plan on Renewable Natural Resource Sector²⁹, 26.5% (54,524ac) of the total 205,026 acres of operational agricultural land are left fallow. The yields of crops have been declining at a compounded annual rate of 1.84% over the last 27 years³⁰. Climate change impacts have been conspicuous in terms of reduced yields, frequent pests and diseases, and unpredictable weather patterns. Climate change, therefore, has the most pronounced impact on the poor, as poverty in Bhutan is predominantly a rural phenomenon. The recent food price inflation due to disruptions to agriculture because of the COVID-19 pandemic³¹ Furthermore, climate-induced disasters result in loss of agricultural land, infrastructures, crops and livestock and affect the food distribution system and trigger price escalation of essential commodities.

Increases in temperatures, particularly during the dry season, have severe implications for crop production and productivity of ecosystems. Increase in temperatures significantly increases water demands of major crops, and on average reduces yields of several important cereals, highlighting the need for reliable irrigation as a means of mitigating climate change impacts. Observed warming of more than 1 degree Celsius is equivalent to another 10–20 percent reduction in rainfall for crops³², and, on average, reduce yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%³³. The Renewable Natural Resources (RNR) sector, including agriculture, livestock and forestry, employs 64.96% of the population and provides livelihoods for about 57% of the total population. The agricultural sector alone employs 49.9% of the total population and 69.3% of the rural population of Bhutan. Rural areas account for 62.2% of the population and 90% of its poor.

In most parts of Bhutan, farming is done on steep and moderate slopes, susceptible to erosion, landslides and other forms of land degradation induced by climate change³⁴. Rapid changes in average temperatures and rainfall patterns are the biggest threat to farmers who depend on the monsoon. Variability in rainfall, particularly delays in the arrival of monsoon is often accompanied by excessive rains, which trigger landslides and floods, causing extensive damage to farms and infrastructure. Rainfall variability also affects irrigated farmlands as water used for irrigation is sourced from

²⁵ Royal Government of Bhutan, “Food and Nutrition Security Policy of the Kingdom of Bhutan, 2014”; RNR Climate Change Adaptation Program, “The Renewable Natural Resources Sector Adaptation Plan of Action, 2016 (SAPA 2016)”

²⁶National Statistics Bureau (NSB) Bhutan, “Labour Force Survey Report 2020.”

²⁷ Royal Government of Bhutan (). Food and Nutrition Security Policy of the Kingdom of Bhutan, 2014.

²⁸National Statistics Bureau of Bhutan, “2017 Population and Housing Census of Bhutan.”

²⁹<https://www.ifad.org/en/web/operations/w/country/bhutan>

³⁰<https://www.cia.gov/the-world-factbook/countries/bhutan/>

³¹International Center for Tropical Agriculture (CIAT), & World Bank. Climate-Smart Agriculture in Bhutan. 2017.

³² Funk et al., “A Climate Trend Analysis of Sudan.” 2011.

³³ Zhao et al., “Temperature Increase Reduces Global Yields of Major Crops in Four Independent Estimates.” 2017.

³⁴ IFAD, “Kingdom of Bhutan Country Strategy Note.” 2018.

small rivers and streams in the headwaters of the watersheds, which are drying up. These climate change related impacts have resulted in the following problems:

Declining Productivity and Diminishing Ecosystem Services from Watersheds

The degradation of forests and watersheds coupled with impacts of climate change has put increasing pressure on the integrity of biodiversity and ecosystem services in the country. Several assessments in the recent past, including those with communities³⁵ and forest management units adjacent to commercial as well as community managed forest areas have confirmed the loss of ecosystem services as a consequence of forest degradation.³⁶ The Assessment and Mapping of Water Sources/Springs in Bhutan reports that about 34.6% of the watersheds around all water sources in Bhutan are degraded³⁷. Degradation of watersheds has a direct and long-term impact on ecosystem services, particularly hydrologic services.³⁸ This is often in the form of reduced dry season flows coupled with increased flashiness of streams during the wet season. Increased runoff and erosion are other consequences of degraded watersheds,³⁹ especially from deforestation and cultivation on slopes,⁴⁰ which directly impact off take for domestic water supplies.

Declining Supply Duration, Volume and Quality of Water

Domestic Water

Issues of acute domestic water shortages and dried-up water sources were raised by almost all Dzongkhags and communities where rural water supply schemes were implemented.⁴¹ Decreased winter flows over the past two decades and drying up of springs and rivulets, comprising about 35% of all water sources, has led to a surge of water shortages across Bhutan during winter. According to the studies on community perceptions⁴², winter flows in springs and rivulets, which are the major domestic water sources, have declined over the past two decades. Of the 7,399 water sources recorded in a recent assessment,⁴³ 25.1% or 1,856 sources were found to be drying.

Increased frequency of extreme rain and consequent floods, landslides and mud-slips have resulted in higher sediment loads in streams and rivers, which are the offtake points for domestic and irrigation water. Existing filtration systems at these offtake points are not designed to address this growing challenge, leading to a decline in water quality.

Water for irrigation

Increasing temperatures and longer dry periods contribute to crop failures and/or decreased yields.⁴⁴ In Bhutan, the projected increase in temperature, combined with a decrease in winter precipitation⁴⁵ is expected to increase area under fallow land and create acute water shortages, reducing the area suitable for the cultivation of key crops such as potatoes and maize under both RCP4.5 and RCP8.5 over the medium and long term. For rice, the models suggest an increase in a suitable area in the medium but a reduction over the long term under both scenarios.⁴⁶

Increased Vulnerability of Livelihoods Dependent on Agriculture and Natural Resources

Climate change is predicted to result in a decline in agricultural production in Bhutan from 4% to 10% in the absence of appropriate measures⁴⁷. Separate studies have documented the impacts climate change has had on communities. Natural calamities, such as floods, temperature increases and prolonged dry spells, increased production losses from

³⁵ Wangchuk et al., "Community Perception of Ecosystem Services from Commercially Managed Forests in Bhutan" 2021; Rai et al., "Participatory Assessment of Ecosystem Services from Community-Managed Planted Forests in Bhutan." 2020.

³⁶ Sears et al., "Forest Ecosystem Services and the Pillars of Bhutan's Gross National Happiness" 2017; Sears et al., "Bhutan's Forests through the Framework of Ecosystem Services." 2018.

³⁷ Ministry of Forests and Services} "Assessment and Mapping of Water Sources/Springs in Bhutan." 2021.

³⁸ Singh, "Land Use/Cover Changes, Extreme Events and Ecohydrological Responses in the Himalayan Region" 1998; Calder and Aylward, "Forest and Floods." 2006.

³⁹ Tiwari, "Land-Use Changes in Himalaya and Their Impact on the Plains Ecosystem." 2000.

⁴⁰ Chalise and Kumar, "Land Use Change Affects Water Erosion in the Nepal Himalayas." 2020.

⁴¹ National Environment Commission Royal Government of Bhutan, "Second National Communication to the UNFCCC." 2011.

⁴² Phurba Lhendup et al., "Climate Change Vulnerability Assessment of Wangchuck Centennial Park." 2011.

⁴³ Watershed Management Division Department of Forests and Park Services, 'Assessment and Mapping of Water Sources/Springs in Bhutan', December, 2021

⁴⁴ Zhao et al., 'Temperature Increase Reduces Global Yields of Major Crops in Four Independent Estimates'. 2017.

⁴⁵ Gross National Happiness Commission, "Strategic Programme for Climate Resilience (SPCR) Under the Pilot Programme for Climate Resilience (PPCR)" 2017; Tambe et al., "Reviving Dying Springs." 2012.

⁴⁶ National Environment Commission Royal Government of Bhutan, 'Third National Communication to the UNFCCC'. 2020.

⁴⁷ Egis Eau, Royal Society for Protection of Nature, and Bhutan Water Partnership, 'National Irrigation Master Plan - Adapting to Climate Change through IWRM'. 2016.

close to 65 MT in 2011 to more than 1,154 MT in 2015⁴⁸. Natural calamities, limited access to seeds and crop damage by pests and disease were reported to be among the most important constraints on farming.⁴⁹ Climate change has weakened the livelihood systems of both poor and middle-income households who lack knowledge on adaptation measures to mitigate its impacts.⁵⁰

Root Causes

High dependence on climate sensitive natural resources

The RNR sector, including agriculture, livestock and forestry, is crucial in securing national food security and self-sufficiency. The agricultural sector accounted for 19.23% of GDP in 2020⁵¹, employing 49.9% of the total population and 69.3% of the rural population of Bhutan. The share of women in the sector is much higher at 58.5% when compared to men (41.7%)⁵². Rural areas account for 62.2% of the population⁵³ and 90% of its poor⁵⁴. The agricultural sector is predominantly subsistence-based and cultivated agriculture is only 2.75% of the land area, of which just 300 sq.km., or 0.83% of total land area, is under irrigation⁵⁵. Nearly 30% of agriculture households depend on rain-fed irrigation.

Gender roles in Bhutan add to the climate vulnerability of rural women⁵⁶. These include the role of producing and sourcing food in addition to supporting household wellbeing. Therefore, women depend more on natural resources such as water, non-wood forest products, and fuel-wood energy sources, all of which are impacted by climate change. This increases the time and labour burden on women as well as their health and security.⁵⁷

17.7% of Bhutan's GDP is from hydropower export⁵⁸ which also accounts for 99% of all electricity used in the country⁵⁹. The sector, an important economic driver, is vulnerable to Climate change induced changes in precipitation patterns, increased evapotranspiration and heightened risks of glacial lake outbursts.

Inaccessible Topography and Terrain

The mountainous landscape, fragile ecosystem and diverse agro-climatic conditions make Bhutan vulnerable to several risks. Half of the land area of Bhutan has slopes greater than 50% and lies over 2600 meters above mean sea level.⁶⁰ The inaccessible terrain makes the delivery of infrastructure and services, including during emergencies, difficult and expensive and contributes to increased vulnerabilities. It severely constrains market penetration and commercialization and weakens supply and value chains that are necessary to sustain and support economic development.⁶¹

The proposed climate change adaptation solutions are: 1) Adoption of climate resilient practices in agriculture, forestry and natural resources management among communities; 2) Restoration, enhancement and climate proofing of water infrastructure and implementation of small scale water storage and of conveyance and distribution systems for both domestic and irrigation supply which are designed to be climate resilient; 3) Soil and water conservation measures and construction of protective infrastructure to stabilize catchments, slopes and channels; 4) Nature based solutions, including assisted natural regeneration to for ecological restoration and revival of watersheds; and 5) Providing climate resilient livelihood alternatives and income sources specifically targeting youth and women.

However, there are significant barriers that prevent the proposed adaptation solutions from being realized.

⁴⁸ Gross National Happiness Commission, "Twelfth Five Year Plan 2018-2023 Volume I: Main Document." 2019.

⁴⁹ Policy and Planning Division, Ministry of Agriculture and Forests (MoAF), 'Twelfth Five-Year Plan 2018 - 2023 Renewable Natural Resources Sector'. 2019.

⁵⁰ Wangdi, T, P. Lhendup, and N. Wangdi, 'An Analysis of Forestry Policy, Acts and Rules of Bhutan to Mainstream Climate Change'. 2013.

⁵¹ National Statistics Bureau, "Annual Environmental Accounts Statistics 2021."

⁵² National Statistics Bureau (NSB) Bhutan, "Labour Force Survey Report 2020."

⁵³ National Statistics Bureau of Bhutan, "2017 Population and Housing Census of Bhutan."

⁵⁴ <https://www.ifad.org/en/web/operations/w/country/bhutan>

⁵⁵ <https://www.cia.gov/the-world-factbook/countries/bhutan/>

⁵⁶ World Bank. Poverty, Vulnerability, and Welfare in Bhutan: Progress and Challenges. 2019.

⁵⁷ UNDP Bhutan, "Bhutan Gender Analysis." 2021.

⁵⁸ National Statistics Bureau (NSB) Bhutan, "Annual Environmental Accounts Statistics 2021."

⁵⁹ Tariq, Wangchuk, and Muttil, "A Critical Review of Water Resources and Their Management in Bhutan." 2021.

⁶⁰ Chhogyel and Kumar, "Climate Change and Potential Impacts on Agriculture in Bhutan." 2018.

⁶¹ Policy, Planning Division and Ministry of Agriculture and Forests. Twelfth Five-Year Plan 2018 - 2023 Renewable Natural Resources Sector. 2019.

Barriers

Lack of Awareness, Capacities and Skills among Communities Dependent on RNR sector to Address Climate Impacts

Most farmers in Bhutan perceive that rainfall has decreased, become unpredictable and the frequency of extreme rain events has increased. Drying up of water sources, delays in planting, soil erosion, damage to infrastructure and disruption to work are perceived as the immediate impacts of these anomalies.⁶² However, farmers (including women and youth), lack awareness, capacities, skills and resources to mitigate and adapt to the impacts of climate change. For instance, inappropriate cultivation practices on slopes or poor crop choices contribute to erosion and impact soil fertility in the long run. This requires adoption of water-use efficiency and a more resilient irrigation system with enhanced skills and knowledge among the farmers to operate and manage water resources. These capacities and resources are required to up-scale existing Climate Smart Agriculture (CSA) technologies and to test and adopt new ones.

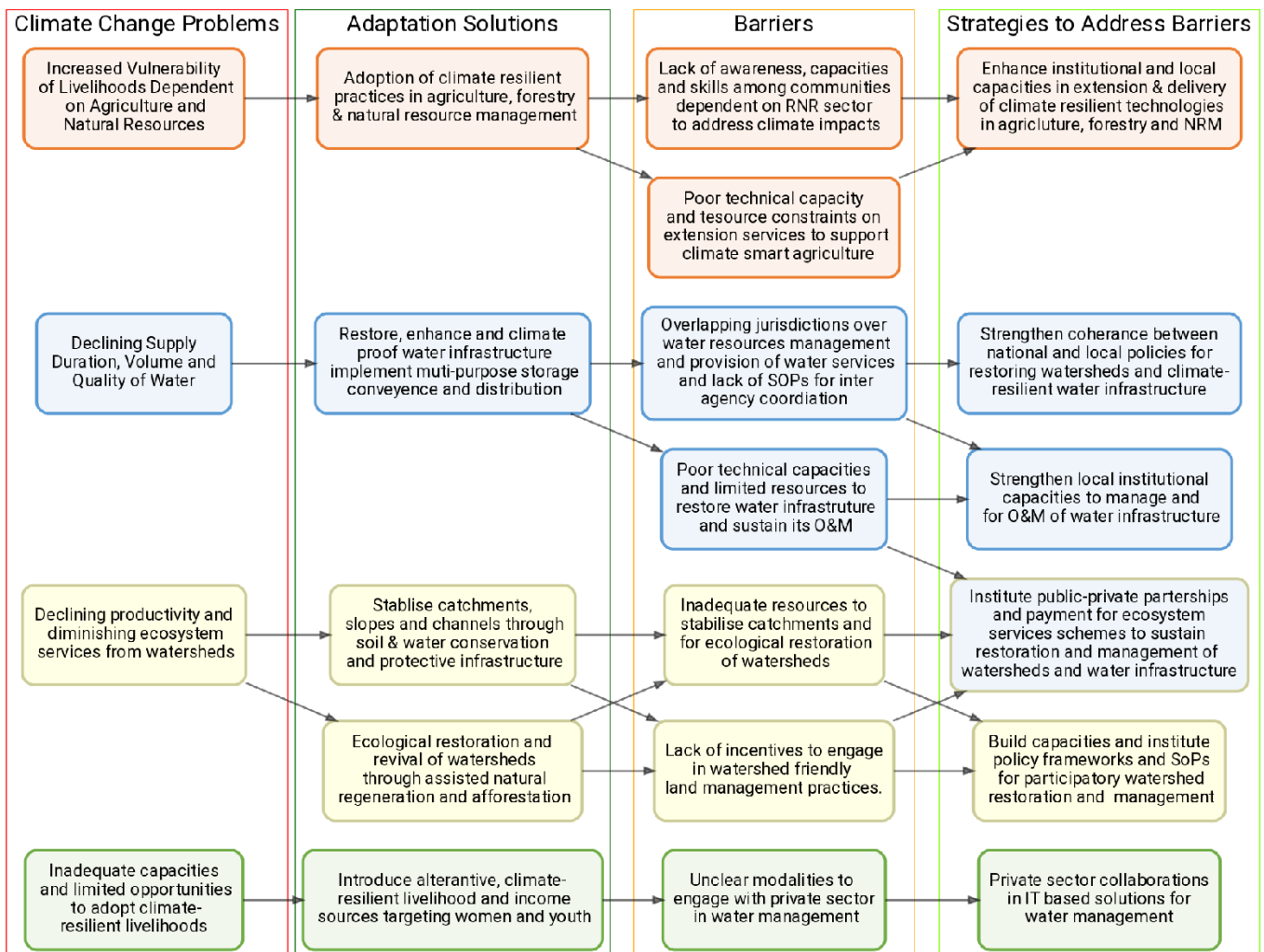


Figure 2: Relation between problems/barriers and solutions/strategies proposed

Poor Technical Capacity and Resource Constraints in Agricultural Extension Services to Support Climate Smart Agriculture

Challenges due to climatic shocks and distress can be addressed through up-scaling and adoption of CSA approaches. However, government institutions have gaps and resource constraints in implementing climate adaptation measures and supporting communities in adopting climate resilient livelihoods. Poor research-extension linkages impede the

⁶² Chhogyel, Kumar, and Bajgai, "Rainfall Anomalies and Their Impacts on Bhutan's Agro-Ecological Landscape" 2021; Chhogyel, Kumar, and Bajgai, "Consequences of Climate Change Impacts and Incidences of Extreme Weather Events in Relation to Crop Production in Bhutan." 2020.

adoption of CSA technologies by farmers. The technical skills of extension officers in surveying and designing water supply systems, water treatment plant operation and maintenance, monitoring and evaluation, instrumentation and maintenance of instruments need to be enhanced. There is a need for capacity development on climate resilient water/watershed management practices as well as training on climate-smart operation and maintenance of water supply systems, water conservation/efficiency technologies and adoption of Integrated Water Resources Management (IWRM) approaches.

Bhutan's agricultural system faces many challenges associated with its distinct geographical conditions and climate change impacts. The situation is aggravated by inadequate access to technology and the absence of an enabling environment for private sector investments and business development services.⁶³ Furthermore, investment in research, innovation and technology, have been on a decline due to overall decrease in share of capital investment in the agricultural sector.⁶⁴ The assessment of RNR institutional capacity⁶⁵ recommended that extension programs need to be expanded to promote climate resilient and sustainable agricultural production systems. The RNR strategy⁶⁶ identifies climate-smart production systems such as land development, pest and disease management and smart irrigation technologies as the strategic priorities for extension advisory and technology transfer.

Agriculture and food security, water, forest and biodiversity have been identified as the core sectors vulnerable to climate change which require immediate attention. Gaps in technical capacities, knowledge and data need to be addressed to enable climate change adaptation.⁶⁷ These capacity gaps need to be understood to better support smallholder farmers and communities with timely advisory, technology transfer and facilitation of CCA with a focus on climate smart agricultural technologies. Strengthening capacities are an immediate priority for the next 1-2 years.⁶⁸ This includes protected cultivation technologies, Sustainable Land Management and bio-engineering technologies, irrigation system, Crop protection, Integrated Pest and Nutrient Management, and biogas. Critical inputs, capacity-building and extension services will be key basis for adopting of various CSA practices and technologies.

Overlapping Jurisdictions and Policy Gaps in Water Resources Management and Provision of Water Services

Gaps in water governance policy result in lack of clarity in roles and responsibilities of the institutions responsible for water supply and management. Multiple institutions have responsibilities and mandates for protection of watersheds and managing water distribution in Bhutan. At the national level, the agencies include the Ministry of Agriculture and Forest (MoAF), National Environment Commission (NEC), the Ministry of Works and Human Settlement (MoWHS), and the Ministry of Health (MoH). At the local level, the Dzongkhag Engineering Divisions are responsible for infrastructure, including water management. These overlaps in roles and lack of coherent and consistent standard operating procedures for inter-agency coordination are a barrier to effective management of water resources and implementation of watershed restoration initiatives⁶⁹. The Water Act of 2011⁷⁰ empowers NEC to coordinate line agencies through the Water Resources Technical Advisory Committee. However, the committee, comprising senior officials from relevant agencies, has failed to make any significant impact.

Poor Technical Capacities and Limited Resources to Restore Water Infrastructure and to Sustain its O&M

Line departments lack the resources and technical capacities to restore water infrastructure and sustain their O&M⁷¹. Technologies being used to monitor and manage distribution systems are obsolete and result in wastage, poor and delayed O&M and inefficiencies. Presently, there are no incentives to mobilize investment in technological upgrades or management practices to ensure efficiencies in the system. This is a barrier to water resource management and

⁶³ IFAD, "Bhutan Country Strategy Note 2022-2023." 2021.

⁶⁴ Policy, Planning Division, and Ministry of Agriculture and Forests Twelfth Five-Year Plan 2018 - 2023 Renewable Natural Resources Sector. 2019.

⁶⁵ Assessment of Existing Institutional Capacity of the RNR Sector and Its Related Agencies to Plan and Implement Climate Resilient Integrated Landscape Management and Community Development." 2018.

⁶⁶ Ministry of Agriculture and Forestry (MoAF), "RNR Strategy 2040." 2021.

⁶⁷ RNR Climate Change Adaptation Program, 'The Renewable Natural Resources Sector Adaptation Plan of Action, 2016 (SAPA 2016)'.

⁶⁸ Ministry of Agriculture and Forests (MoAF), "Draft Study on Farmers Training Programme for the RNR Sector." 2021.

⁶⁹ Karma Tsering, "A Roadmap for Watershed Management in Bhutan: From Policy to Practice." 2011.

⁷⁰ Parliament of Bhutan, "The Water Act of Bhutan 2011."

⁷¹ Policy and Planning Division, MoAF. Assessment of Existing Institutional Capacity of the RNR Sector and its related Agencies to Plan and Implement Climate Resilient Integrated Landscape Management and Community Development 2018; National Environment Commission, Royal Government of Bhutan and United Nations Development Programme (UNDP), "Skills Assessment for National Adaptation Plan (NAP) Formulation Process in Bhutan." 2020.

prevents adoption of appropriate technologies for water infrastructure design and systems. Many engineers and technicians currently lack technical competence in climate-resilient designs, construction, and water infrastructure management. There is a need to increase awareness and emphasise capacity development in these aspects, including climate-resilient watershed management, restoration, and climate-smart operation and maintenance of water supply systems.

Traditional systems and institutions for managing infrastructure and water resources cannot cope with climate change induced hazards coupled with degradation and increased vulnerabilities of catchments. These institutions need to be strengthened and their capacity built to address the increased scale of damage and deterioration to water infrastructure due to erosion, landslides and mud-slips.

Inadequate Resources to Stabilise Catchments and for Ecological Restoration of Watersheds

Substantial investment is required for stabilisation and ecological restoration of catchments through soil and water conservation initiatives⁷². Both government agencies and communities lack the financial and technical resources to undertake these interventions, particularly the sophisticated design elements to factor in climate change induced extreme weather events. Weak Mechanisms for Coordination and Financial Support to Participatory Watershed Management.

As mandated by the Water Act of Bhutan 2011⁷³, the National Integrated Water Resources Management Plan (NIWRMP)⁷⁴ was prepared in 2016 which identified the need to form River Basin Committee (RBC). To date, only Wangchhu RBC has been formed. The RBC is required to develop River Basin Management Plan (RBMP) which serves as management framework for IWRM at the basin level. The watershed management programme of the MoAF in the 12th Five Year Plan⁷⁵ includes watersheds assessments, assessment of drying water sources, preparation of watershed and wetland management plans and climate-smart restoration of watershed. However, due to the lack of RBC, water users are often not involved and lack coordinated approach in watershed management activities.

Lack of Incentives to Engage in Watershed Friendly Land Management Practices

There are few financial mechanisms to sustain the continuous monitoring of catchment conditions, O&M and infrastructure protection and implementation of vegetative measures required to restore watersheds. This is partly because there is no existing framework to monetise the ecological goods and services from these watersheds and existing PES mechanisms remain limited to Damphu township in Gasa and Khuchi-Darachhu/Thakoling in Tsirang.

It is also observed that in areas with a high population of people and livestock, the pressure on natural resources has increased leading to over-exploitation, deforestation, overgrazing and consequently degradation⁷⁶. These challenges are compounded by the following⁷⁷:

- Master plans for watershed management tend to present a static approach to an inherently dynamic challenge and diverse interest groups.
- Watershed boundaries do not coincide with political boundaries creating problems in establishing watershed authorities.
- Inefficient use of data for planning, creating unrealistic plans which are inherently complicated.
- Slow planning processes impeding on-ground action.
- Fragmented authority and mandates of agencies engaged in watershed and water resources management compounded by limited resources.

Unclear modalities to engage the private sector in water management

The lack of clear modalities for engaging the private sector, absence of water pricing mechanisms, and methods of arriving at actual cost as well as inadequate capacity and experience are some of the factors limiting the engagement of the private sector in water management. While the Economic Development Policy⁷⁸ (EDP), 2016, supports private sector participation through the Public-Private Partnership (PPP) policy including private/community participation in

⁷² Karma Tsering, "A Roadmap for Watershed Management in Bhutan: From Policy to Practice." 2011.

⁷³ Parliament of Bhutan. "The Water Act of Bhutan 2011."

⁷⁴ National Environment Commission, "National Integrated Water Resources Management Plan 2016."

⁷⁵ Policy, Planning Division, MoAF. "Twelfth Five-Year Plan 2018 - 2023 Renewable Natural Resources Sector." 2019.

⁷⁶ Watershed Management Division Department of Forests and Park Services, 'Drivers of Deforestation and Forest Degradation in Bhutan'. 2017.

⁷⁷ Karma Tsering, "A Roadmap for Watershed Management in Bhutan: From Policy to Practice." 2011.

⁷⁸ Royal Government of Bhutan "Economic Development Policy." 2016.

the development and maintenance of irrigation and water management systems, there is very limited examples of private sector engagement in the field of domestic and irrigation water management.

Further, challenges of terrain and connectivity, coupled with impacts of the COVID-19 pandemic, have adversely affected the development of the private sector in Bhutan. Limited market access due to logistics challenges, particularly for rural agricultural communities, also limits livelihood and income diversification opportunities. The 12th Five Year Plan for the RNR sector⁷⁹ recognises inadequate implementation and coordination between value chain players in agro-based enterprises. It emphasises the need for reallocation of economic activity towards the promoting of agro-processing (value-addition) activities and agro-based enterprises to create a significant number of 'off-farm' jobs and to also achieve the economy of scale.

Immediate Causes

Deterioration and Increased Vulnerability of Water Supply Points and Water Infrastructure

Landslides, flash floods and landslips are increasingly damaging water infrastructure, including water intakes and conveyance and distribution structures. They additionally obstruct access, hindering O&M and repairs resulting in delayed and insufficient supplies and deterioration of water quality.

Domestic water

Based on a supply and demand analysis carried out for 2014 and 2030, the capacity of existing infrastructure requires rehabilitation to cater to the demand of some of the urban centers. In addition to the inadequacy of infrastructure, a public survey on access to 24x7 safe domestic water commissioned by MoWHS in 2018 indicated water pipe leakage, tank overflows, illegal tapping of waterlines, frequent breakage of water pipelines, lack of maintenance, increase in consumption, drying up of water sources⁸⁰ as some of the challenges. In Gasa and Lobeyisa area of Punakha which fall within peri-urban areas are reliant on multiple off-take points at streams and springs. Furthermore, there are no facilities for water storage to help tide with increasingly frequent and prolonged dry spells. Neither of the sites have any water treatment facilities, which are now a necessity given the increased sediment loads and debris being transported by streams, owing to more frequent extreme events.

Irrigation

The irrigation Master Plan⁸¹ assessed canal seepage, wetting, and drying of canals, leakage at canals, blockage and management inefficiency as major problems. Conveyance and distribution efficiency were found to be at 75% and application efficiency at 70% with the overall irrigation system efficiency at 39%. Most irrigation systems in Bhutan are ageing run-of the river, gravity-fed earthen canals with low technical efficiency. Their climate inefficient designs are vulnerable to deterioration by even slight increases in stream/river floods and landslides caused by climatic variability.⁸² The high conveyance losses of these systems due to seepage and their poor design leads to mismanagement and increased conflict among water users. Water shortages are more pronounced during the main cropping season, which coincides with the pre-monsoon season. Farmers are not able to deal with the increasingly frequent damage these system face.

Environmental and Ecological Deterioration of Watersheds

The loss of forest, habitat degradation, overgrazing, land use conversion coupled with unsustainable agricultural practices for various purposes have been repeatedly flagged as a matter of serious concern in Bhutan.⁸³ This is further exacerbated by increased forest fires, hydro-power projects, haphazard infrastructure development, mining and quarrying⁸⁴. Local institutions, particularly those in densely populated areas, have been unable to reconcile the accelerated demand for natural resources with conservation.⁸⁵ An increased awareness of the role of healthy watersheds in water resources and capacity building of community-based institutions for watershed restoration is urgently needed to manage and protect watersheds as mandated by the watershed management policy in Bhutan. The Water Flagship Program, 2020 recognises the impacts of climate change is exacerbating systemic issues leading to the degradation of watersheds and threatening water availability. These include insufficient source management,

⁷⁹ Policy, Planning Division MoAF, "Twelfth Five-Year Plan 2018 - 2023 Renewable Natural Resources Sector." 2019.

⁸⁰ Department of Engineering Services, Settlement, and National Environment Commission "Water Flagship Program: Access to 24X7 Safe Domestic Water with Irrigation." 2020.

⁸¹ Egis Eau, Royal Society for Protection of Nature, and Bhutan Water Partnership " 2016.

⁸² Ibid

⁸³ Ministry of Agriculture and Forests}, "RNR Sector Progress Report 2013-14." 2014.

⁸⁴ Policy, Planning Division, and MoAF, "Twelfth Five-Year Plan 2018 - 2023 Renewable Natural Resources Sector." 2019.

⁸⁵ Tsering, K. "A Roadmap for Watershed Management in Bhutan: From Policy to Practice." 2011.

inadequate infrastructure development and maintenance, and issues in governance and sector-based systems⁸⁶. Inappropriate and Climate Vulnerable Practices in Agriculture and Unsustainable Use of Natural Resources and Forests

The recently concluded vulnerability assessments conducted to inform the National Adaptation Plan⁸⁷ and the Nationally Determined Contributions (NDC)⁸⁸ recognise the vulnerability of the agriculture sector to the impacts of climate change. It highlights the need to promote climate smart and resilient agriculture and livestock development, sustainable forest management and conservation of biodiversity. The RNR Sector Adaptation Plan of Action (SAPA 2016)⁸⁹ also identifies climate change issues, vulnerabilities, and adaptation plan.

Traditional farming practices and undulating terrain present some of the greatest challenges in the adoption of CSA in Bhutan⁹⁰. The steep slopes inhibit mechanisation, soil conservation measures such as terracing and counter hedgerow are expensive and labour intensive, adoption of integrated pest and soil fertility management is hindered by costs and socio-cultural barriers, low acceptance of legumes inter-cropping, and limited knowledge about good practices for cattle and poultry cross breeding for disease resistance and higher yields. Limited access to credit and financial services and the predominance of small holdings also excludes farmers from crop intensification, diversification and technological investments.

Baseline Analysis and Initiatives

The proposed project will specifically build on and complement several government efforts in Bhutan. Partnerships and collaborations are summarised in the relevant section below with details in Annex 13g.

Baseline efforts and investments

Through, the central government programs, the RGOB has invested in on-going programs on sustainable land management, plantation activities, renovation and establishment of new domestic and irrigation water infrastructure, improved pasture development, establishment of cottage livestock enterprises and sustainable management of forest areas. The Ongoing government programmes under the Renewable Natural Resource (RNR) sector invested Nu. 1,784.843 million (≈21.42m USD) for current and Nu. 2,241.609 million (≈26.9m USD) was capital works. The bulk of these investments were made by three key departments. The Department of Agriculture had a total expenditure of 903.15 million nu (≈10.83m USD). In all, 3591.65 ha of agricultural land was developed, and fallow land was revived. In addition, 178.42 ha were brought under Sustainable Land Management. In addition, 1,019,785 fruit seedlings were supplied under Million Fruit Tree Plantation and 2,38,323 fruit seedlings under the National Seed Centre. New and renovated irrigation of 289.4km was done leading to 945.75 ha being brought under micro-efficient irrigation.

A total of 5,119 green houses were established for high value crops. The Department of Livestock had an expenditure 741.12 million nu (≈8.89m USD) in the last fiscal year. This was used to bring 12140.58 ha under improved pasture developed and 214,531 MT of conserved forage production. Of this 650.28 ha of improved pasture and 2,008.46 ha was for winter fodder as part of their climate smart livestock farming. Other investments included support to dairy for milk, poultry, piggery, goats, sheep, yak and fisheries. Investments included the establishment of layer farms, fishponds, milch cattle and pig breeders. The Department of Forest and Park services had a total expense of 1,309.34 million nu (≈15.71m USD). This was used to support sustainable extraction of timber and scientific thinning (146ha). The department developed 9 nature based eco-tourism products and improved effective management of 18 protected areas. Human wildlife conflict mitigation measures were additionally implemented for tiger, elephant and snow leopard related conflicts. Investments in livelihoods training and income diversification included training to 887 youths for enterprise development and to over 300 farmers/youths on farmers' business literacy.

The RGoB, through its local governments, has taken up construction of domestic and irrigation water schemes as well as rehabilitation of existing ones. Since 2012, the RGoB has developed 20.2 km of new irrigation schemes and renovated 74.2 km of irrigation schemes in the project districts. The local development plans, which largely comprise of these efforts will continue to invest about US 9.02 annually in the project dzongkhags and will continue to do so in the form of co-financing for the project form the local governments.

⁸⁶ Department of Forests & Park Services, 'Bhutan's Proposed National Forest Reference Emission Level and National Forest Reference Level Submission for Technical Assessment to UNFCCC'. 2019.

⁸⁷ Deltares. Climate Change vulnerability analyses and mapping for National Adaptation Plan (NAP) formulation process in Bhutan, 2021; Ad Jeuken et al. Assessment of Climate Risks on Water Resources for the National Adaptation Plan (NAP) in Bhutan: Priority Risks and Recommendations for Adaptation. 2021.

⁸⁸ Royal Government of Bhutan, "Second Nationally Determined Contribution." 2021.

⁸⁹ RNR Climate Change Adaptation Program, 'The Renewable Natural Resources Sector Adaptation Plan of Action, 2016 (SAPA 2016)'.

⁹⁰ International Center for Tropical Agriculture (CIAT) and World Bank, 'Climate-Smart Agriculture in Bhutan'. 2017.

The RGoB has made significant investments in strengthening water resources and ecosystems. Expansion of the irrigation network has been prioritized in the 11th FYP as well as 12th FYP, to achieve national food self-sufficiency goals. The national water flagship program aims to enable access to domestic and irrigation water by all communities in the country through appropriate design and implementation of water infrastructure, skills development in water infrastructure, smart water management and strengthening of water user associations.

The RGoB has also made targeted investments in sustainable land management (SLM) to reduce soil erosion – to increase crop diversity and fodder availability, as well as to enhance resilience of irrigation networks (e.g. irrigation channel renovation works are often needed because of persistent slope instability issues like deep-seated landslides, mudflow areas, rock fall areas and flooding of intake areas).

Bhutan has over 51.44% of its land area under protected areas network system. The Department of Forests & Park Services (DoFPS), has been implementing Sustainable Management of areas outside the protected areas under State Reserve Forests (SRFL) or areas outside the protected areas, Sustainable management of forest landscapes and conservation of biodiversity and integrated watershed management to ensure sustainable environmental service delivery.

Gaps related to the baseline efforts

Despite the considerable investments made in water resource management, there has been limited explicit consideration of future climate change impacts undermining these investments jeopardizing many of the gains made through past interventions. For instance, RGoB's past investment in irrigation and domestic water systems has not been climate resilient, causing irrigation system susceptibility to flood damage from heavy monsoon, erosion and flooding while the sustainable land management efforts such as terracing and integrating with efficient use of water in the field needs upscaling.

While forestry legislations require all areas under state forest to be strategically guided by sustainable management plans, only about 6.4% of the SRFL under Forest Management Units and Working Schemes and 2.2% under Community Forests have well formulated resource management plans. Besides other forest defined as Forest Management Units, Working Schemes, Local Forest Management areas, Community Forests, the DoFPS have also been implementing Watershed Management Plans and Wetland Management Plans. These watershed plans are not necessarily aligned to the actual catchments that function as the water source for actual domestic and irrigation water schemes downstream.

The ACREWAS project builds on these key investments by 1) "Climate proofing" existing infrastructure, particularly water infrastructure; 2) Enhancing investments in management and protection of critical catchments to sustain water sources; 3) Contributing to policies plans to enhance coordination between departments for effective and targeted investments; and 4) Incorporation of climate projections in designs of water infrastructure.

Consistency with National Strategies and Plans

The project aligns with several laws, policies, and strategies, including international commitments, particularly those concerned with climate change, water resources management, agriculture, and management of forests, rangelands, and natural resources. This includes, among others Economic Development Policy of Bhutan (EDP), 2016; Land Act. 1979; National Irrigation Policy, 2012; National Integrated Water Resource Management (IWRM) Plan, 2016. A summary is presented below with a detailed description in Annex 13d

Bhutan's National Adaptation Programme of Action (NAPA) identifies water as a vulnerable sector and flags increased sedimentation of rivers, water reservoirs, and distribution networks as issues affecting irrigation schemes', productivity and agricultural crop yields. The NAPA highlights the reduced ability of catchment areas to retain water and increased runoff with enhanced soil erosion leading to increased vulnerability of domestic water quality. It suggests the need for 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. The cross-sectoral National Adaptation Plan process has been underway since 2015 and has received renewed impetus through funder from the GCF. The plan is expected to be completed by 2023.

The project will support the implementation of the country's National Action Program (NAP) under UNCCD, aligned with the national strategic plan and framework of the convention in 2014.[1] The Action Programme contributes to the

overarching development philosophy of environmental sustainability. Its main goal is to "prevent and mitigate land degradation and through systems and practices of SLM that protects and maintains the economic, ecological and aesthetic values of our landscapes." The project is aligned with the following objectives of the NAP: 1) Conservation, rehabilitation, and sustainable use of forest resources to maintain well-functioning forest landscapes and watersheds; 2) Development and promotion of sustainable agricultural practices that enhance local livelihoods whilst maintaining the productivity and stability of agricultural lands; 3) Integration of environmental management measures in development activities that pose significant risks of land degradation; 4) Strengthening of systemic and institutional capacity to combat land degradation and its impacts and 6) Information, advocacy, and education to create increased policy and public support for sustainable land management.

The Project aligns with the country's Land Degradation Neutrality Report (LDN), including; 1) By 2035, reforestation with native species in open areas will be realised on 25.00 km². In addition, further productivity decline will be avoided through various means and SOC will be maintained at 50 ton/ha by 2030; 2) By 2030, wood substitute products will be promoted with subsidies and further declines in productivity will be avoided; 3) By 2025, improved pasture will be promoted on 0.50 km². In the meantime, and beyond, by 2030, improved breeds will be promoted; 4) By 2025, SLM measures will be implemented as identified in the NAP on 35.07 km². In addition, further productivity decline will be avoided through various means and SOC will be maintained at 50 ton/ha; 5) By 2035, plantations in open areas will be realised on 0.10 km² and 6) By 2035, restoration/reclamation of degraded areas will be realised on 0.50 km².

The Project will support the implementation of Bhutan's 12th Five-year Plan and 13th Five-Year Plan, coinciding with Bhutan's 'last mile' to LDC graduation in 2023, which places critical importance on the water sector through a dedicated Water Flagship Programme. The 12th Five Year Plan has 17 National Key Result Areas (NKRAs). The project intervention relates 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 Food and Nutrition Security Ensured; NKRA 9 on Infrastructure, Communication, and Public Service Delivery Improved; NKRA 13 on Democracy and Decentralisation Strengthened; NKRA on 14 Healthy and Caring Society Enhanced, NKRA 15 on Livability, Safety, and Sustainability of Human Settlements Improved; and NKRA 17: Sustainable Water Ensured. 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 the availability and accessibility of water, making communities more resilient to climate change. The Food Self Sufficiency and Nutrition Security Program of MoAF includes the development of irrigation infrastructure for increased agriculture production. The project will support the climate adaptation interventions in the water sector to enhance resilience and sustainable economic well-being of the people. These themes are well aligned with the following national policies and priorities.

- 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.
- The Comprehensive Development Plan for Bhutan (CDP), 2030 identifies organisational coordination to optimise cross-sectoral structures; promote attractive water basins; study water resource conservation and OCT application in water management. These are integral parts of this project.
- The National Water Policy, 2003, and the Water Act 2011 aim to ensure that water is available in abundance to pursue socio-economic development mandating that water resources are protected, conserved and/or managed in an economically efficient, socially equitable, and environmentally sustainable manner. The Policy and Act are supported by Water Regulations, 2014 and Water Quality Standards, 2018.
- The National Land Use Zoning Implementation Guidelines, 2018 aim to protect and preserve watersheds, wetlands, and forest ecosystems that are important for adaptation.
- The National Sanitation and Hygiene Policy (NSHP), 2020 commits to achieving universal coverage and adoption of appropriate technology for sustainable sanitation systems.
- The National Environment Protection Act (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.
- The National Human Settlement Policy (NHSP) of Bhutan, 2019 requires environmentally sensitive areas, including bio-diversity hot-spot areas identified in the 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 National Forest Policy of Bhutan[2011] emphasises a decentralised and people-centered approach to forest governance and management with a strong agenda directed at poverty reduction through integration of water, and climate change
- RGoB prepared the Poverty Reduction Strategy Paper (PRSP) in 2004,[3] aligning it with the 9th Five Year Plan. Since then, the Five-Year Plans served as the PRSP.
- The Climate Change Policy of the Kingdom of Bhutan (CCP) adopted in 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 technology, capacity building means for implementation of the policy, and establishing an effective and coordinated action to address climate change. The National Environment Strategy, 2020 is important in guiding environmental conservation and giving equal importance to social, cultural and economic development. It will help all sectors in prioritising their plans and programmes within the ambit of the environmental concern. Bhutan’s Third National Communications of Bhutan (TNC), 2020 include combating water shortages and drying up of water springs, ensuring access to safe domestic water and adequate water for irrigation as well as increasing resilience to prolonged dry periods under climate change.
- Bhutan’s Country Work Program (CWP)(2021) for GCF has been prepared on existing policies, strategies, plans and Bhutan’s Nationally Determined Contribution (NDC). Emphasis has been placed in three thematic areas that include ecosystem and agriculture; sustainable infrastructure and resilient communities. Investment priorities and action areas are identified under each thematic area.
- The Project supports the implementation of Bhutan’s National REDD+ Strategy & Action Plan of Bhutan, 2020 which includes the establishment of plantations to provide sustainable wood-based products supply, increase carbon-stock, enhance biodiversity; and promotion of enterprises that sustainably manage NWFP. The strategy includes broadening opportunities for income generation from ecosystem services and developing climate-smart approaches in agriculture.
- The project supports the implementation of Bhutan’s National Biodiversity Strategy and Action Plan (NBSAP) under UNCBD 2014, particularly, target 8 on pollution from different sources, affecting biodiversity and ecosystem functions to be maintained within the national environmental standards; target 10 on identifying and strengthening adaptation measures for potential impacts of climate change on vulnerable ecosystems; 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 to be identified and rehabilitated.
- SDGs: The project will contribute directly to the achievement of Sustainable Development Goal (SDG) 13 Climate Action, SDG 15 Life on Land and SDG 6 Clean Water and Sanitation. It will also contribute substantially to SDG 1: No Poverty; SDG 5: Gender Equality; and SDG 9: Industry, innovation, and infrastructure.

III. STRATEGY

Theory of Change

The objective of this project is to enhance the resilience and sustainable economic well-being of the people of Bhutan by supporting climate adaptation interventions that enhance climate resilience of water resources through climate adaptation of the water sector. This will be achieved through catchment restoration and management, “climate-proofing” of small-scale water infrastructure for rural and peri-urban areas and enhancing institutional capacities in local government and communities for operation, maintenance and management of these catchments and water infrastructure. The project will be implemented in three Dzongkhags of Gasa, Punakha and Tsiriang. The project comprises of four closely integrated components which will benefit 37,334 residents of three Dzongkhags (19,465 men/ 17,869 women), restore and manage 38,518 ha of watersheds and bring 3,392ha of agricultural land under climate resilient practices including adoption of climate smart agricultural technologies. Water storage will be augmented (by 1,266 cum), water transmission and distribution lines (74.14km) and water off-take points along streams and springs will be made resilient to landslides, mud-slips and floods. Both government and community-based institutions will be strengthened for sustained management and O&M of these resources and infrastructure through financial mechanism and supportive policy frameworks.

- Component 1: Water governance and institutions
 - Outcome 1: Strengthened water governance, institutions, and financing mechanisms in support of climate-resilient water management
- Component 2: Nature-based solutions for sustainable & climate- resilient watersheds, and livelihood enhancement
 - Outcome 2: Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and their ecosystem conditions improved.

- Component 3: Efficient, adequate, and sustainable supply, distribution, and utilization of water
 - 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.
- Component 4: Knowledge management
 - Outcome 4: Strengthened awareness and knowledge sharing mechanism established

The TOC presents strategies to address the climate change problem by addressing specific barriers, described earlier, to the proposed adaptation solution through clear causal linkages. These strategies were developed through extensive consultations with stakeholders at all levels, including women and vulnerable groups. Analysis of data collected by subject experts from field sites and secondary sources, coupled with an exhaustive review of literature, informs this strategy. The project strategy seeks to leverage available opportunities, including collaborating with the private sector and CSOs/NGOs. It is relevant to the local context and situation and includes a comprehensive assessment of watershed conditions, engineering designs and options, and economic analysis, details of which are presented in the Feasibility Study (Annex 13b Watershed Assessment and 13c Economic Analysis). Details of the consultations conducted, and descriptions of stakeholders are presented in the Stakeholder Engagement Plan (Annex 9).

The root causes are a combination of climate change-induced hazards with Bhutan's unique geographical characteristics such as high elevations and rugged terrain. The latter limits access and delivery of services and contributes to the high dependence of rural populations on locally available natural resources and agriculture. These root causes lead to environmental deterioration of watersheds and increased vulnerability of water sources and supply points as a consequence of inappropriate practices in agriculture and unsustainable use of natural resources to create serious problems for communities. The climate change problems include reduced flows from catchments due to delayed onsets of monsoons and reduced quality of water from damage to water infrastructure and increased sediment loads in water sources from floods and landslides triggered by extreme rain events. These problems have accelerated the degradation of critical water catchments, reducing their productivity and disrupting critical hydrologic services. Water infrastructure to capture and transfer water for irrigation and domestic use has faced structural damage and inefficiencies and increased O&M costs. Consequent loss of irrigation has resulted in an increase in fallow land and declining yields which are further affected by increased variability in rainfall, longer and hotter dry spells. The lack of alternative sources of income and livelihoods has increased the dependence of local communities on natural resources leading to their over-exploitation which has further accelerated their degradation and exacerbated the vulnerability of local communities as it disrupts hydrologic services and productivity.

In order to address these climate change driven problems, communities need to adopt climate resilient practices in agriculture, forestry and natural resource management. Critical water infrastructure needs to be restored and storage and conveyance structures need to be "climate proofed" and their O&M improved to meet the additional challenges posed by climate change. Ecological restoration of watersheds is needed to ensure sustained provision of ecosystem services. This needs to be coupled with soil and water conservation measures to stabilise critical catchments and protective structures around water off-take points. Finally, alternative, climate resilient livelihoods need to be promoted, especially among women and youth.

There are key barriers to the proposed solutions. Communities lack awareness of the implications of climate change and those dependent on natural resources lack capacities to address climate impacts. Constraints on technical capacities and resources hinder extension services to support climate resilient and climate smart agriculture. Barriers at the policy level include overlapping and unclear jurisdictions between agencies engaged in water resource management and delivery of water services. Limitations of resources and technical capacities are a barrier to restoring and sustaining the O&M of existing water infrastructure or to undertake ecological restoration of watersheds and stabilize critical catchments. The involvement of the private sector in water management is constrained by the lack of formal mechanisms and modalities and hinders the adoption of innovative technologies and financial sustainability of these services.

In order to address these barriers the project proposes to enhance institutional and local capacities in extension and delivery of climate resilient technologies in agriculture, forestry and NRM. It will strengthen and increase coherence of national and local policies for climate resilient water resource management and supply of water for irrigation and domestic use, including creation of climate-resilient water infrastructure. It will simultaneously strengthen local institutions to manage, operate and maintain their water infrastructure.

The government, in line with the mandate of the Water Act, is developing River Basing Management Plans for five major river basins in Bhutan. This provides an opportunity for the LDCF project to support establishment of the RBC for Punatshangchu river basin with appropriate linkages to grassroots water user stakeholders and to systematically embed climate change risks based on the risk modelling work that will be delivered by the project. The plan will

additionally provide a framework for coordination between line agencies and local governments on projects and programs that affect the basin.

Public-private partnerships will be instituted and payment for ecosystem services schemes for watershed restoration and management will be replicated and scaled up to ensure their financial sustainability. The project will also build capacities and institute policy frameworks and standard operating procedures to enhance participatory watershed restoration and management. Finally, the project will facilitate private sector collaborations in IT based solutions for water management.

These strategies are based on rigorous assessments outlined below.

- Catchment-based technical assessments of interventions for watershed restoration, water infrastructure and the economic viability of identified activities have been undertaken and inform this strategy. These reports are part of the Feasibility Study (Annex 13b Watershed Assessment).
- Comprehensive assessments of gender (Annex 11 GAAP) and social and environmental safeguards (Annex 6 SESP and Annex10 ESMF) following UNDP and GEF guidelines.
- A desktop study on biophysical and climatic trends and climate impacts based on remotely sensed datasets and literature. The analysis is part of the feasibility study (Annex-13a Climate Analysis) and covers national and as site-specific scenarios.
- Comprehensive consultations with communities and stakeholders at all levels have been undertaken (Annex 9) and validated the proposed strategy and the technical assessments. These have also informed the selection of sites.
- Interactions with the private sector, CSO, and NGO have helped inform the strategic framework for wider stakeholder engagement and partnerships.
- Continuous and rigorous engagement with the project preparation grant team comprising of members from relevant national and local stakeholders, UNDP CO, UNDP RAP and consultants.

The Theory of Change for the project can be summarised as follows:

The project will undertake the restoration of watersheds and critical catchments along with "climate-proofing" of water infrastructure and modernizing and decentralizing the management of water resources and water distribution. It will do so through strengthening of local institutions by making them gender-responsive, inclusive and financially and technically self-reliant by facilitating private sector engagement. It will additionally, enhance adoption of climate-resilient practices in agriculture thereby mitigate the impacts of climate change⁹¹ on water sources, water supply, water infrastructure and agriculture.

This will be facilitated by streamlining institutional policies and procedures and improved coordination between national and sub-national agencies. The project will strengthen the capacities of public institutions to develop adaptive water management policies and deliver services, including extension services to facilitate the adoption of climate adaptation practices. It will engage local entrepreneurs and the private sector to bring in IT based solutions to improve O&M and efficiencies in water distribution and supply.

Assumptions to the Theory of Change

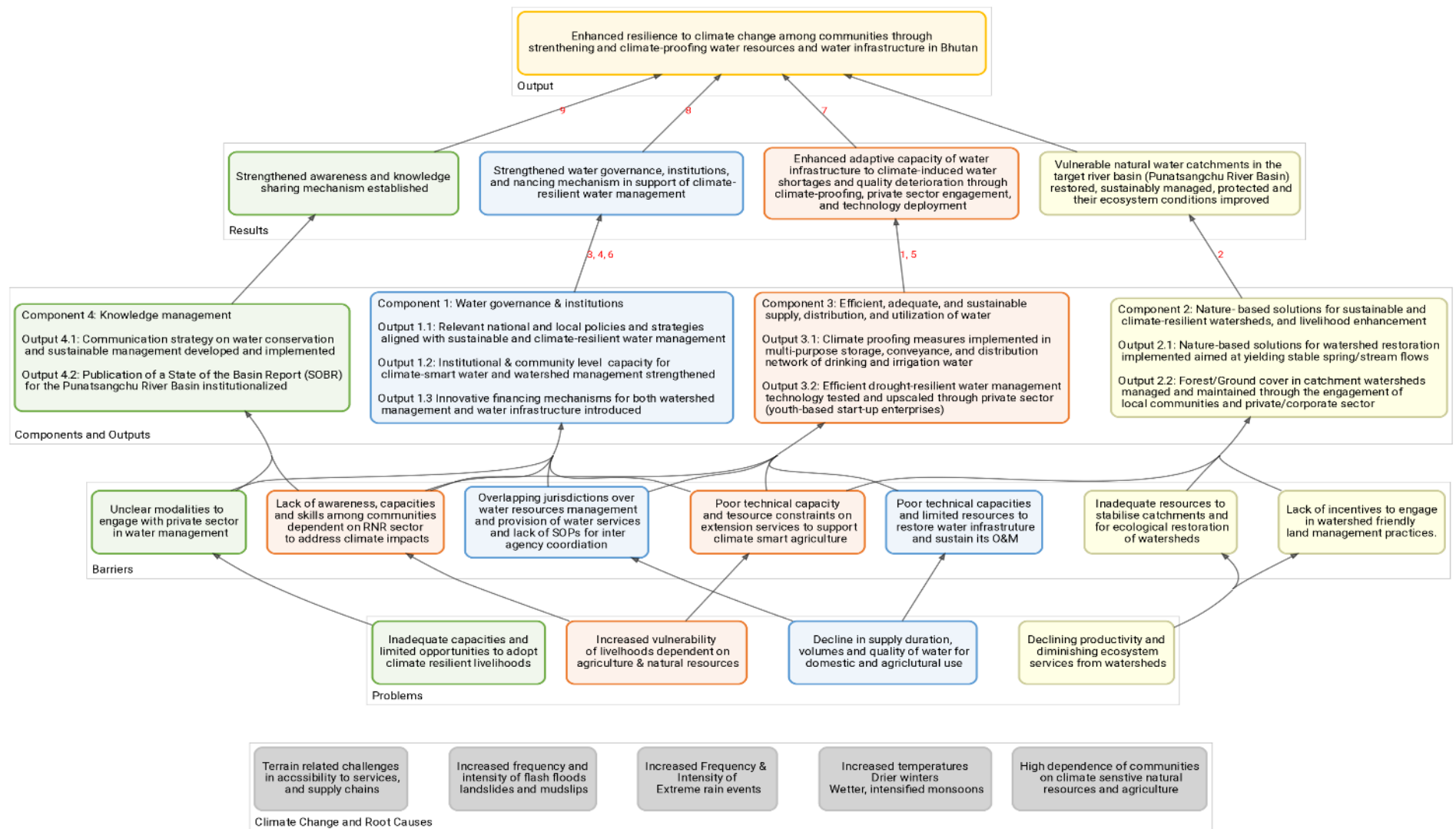
The following assumptions are made in the theory of change. These are shown in red text in the figure below.

- 1a. Women, minorities and vulnerable groups will have equal and equitable access to all project related activities and benefits. These risks, mitigation measures and strategies are presented in the GAAP (Annex 11), the SESP (Annex 6) and the ESMF (Annex-10)
- 1b. Local institutions and local leaders will be willing to provide meaningful representation to other stakeholders in the community and facilitate women, minority groups and vulnerable sections in participating in these committees. These risks and strategies for stakeholder engagement are presented the SEP (Annex 9).
2. Traditional and customary tenure and owners of actual and perceived rights over natural resources, including grazing grounds and forests, will permit community-based management of these resources, which may include setting aside areas for regeneration and creation of structures and ex-closures. This risk is particularly relevant to outputs under Component 2.
- 3a. Government agencies will be receptive to proposed innovative financial mechanisms and private sector involvement and partnerships.

⁹¹Including rainfall variability, prolonged dry spells, extreme rain events and consequent floods, landslides and landslips.

- 3b. Relevant authorities will accept and provide permission, support and resources to use technologies such as IoT and ICT-based sensors and integrate them with existing management and planning systems.
4. Local level institutions and leadership - including traditional and customary leaders local level institutions and leadership - including traditional and customary leaders will adopt national and district policies, strategies and plans.
- 5a. Rural infrastructure will be made available for restoration and new infrastructure created by the project including water infrastructure and infrastructure for SWC, water harvesting, and flood control will be operated and maintained by communities.
- 5b. The global COVID pandemic will not significantly affect the activities proposed. There is a risk that lock-downs and other restrictions may disrupt supply chains, delaying and affecting transport prices and labour availability. A detailed discussion of risks to the project is provided in Section 4.3.2. This is an assumption at the project
- 6a. Institutions and governance structures at the local level will remain stable and provide a framework for project implementation as well as continuation of its activities.
- 6b. Community-based organisations including committees, associations and federations of users will be integrated with formal management and coordination systems and government-mandated governance structures.
7. Training and capacity building and support provided to communities and other actors will be retained and used for actual implementation and continuation of activities past the project's life.
8. Entrepreneurs and private sector participants will be able to access credit, insurance and other material and technical resources from existing sources in the government, private sector and CSOs.
9. There is ownership and willingness among stakeholders to mainstream local plans and programmes.

Figure 3: Diagrammatic view of the Theory of Change. Assumptions are shown in red text along the arrows.



Proposed Approach

The project will employ gender-responsive approaches that assist climate-vulnerable communities to build capacities to manage and protect natural resources and water sources, and to operate and maintain water infrastructure sustainably. Communities will be supported to adopt climate-smart and efficient agriculture technologies and to diversify into livelihoods and income sources that are climate resilient. Local institutions will be the primary conduit for project activities and will be provided necessary resources and training for long-term extension service delivery to communities. Policy gaps that hinder coordination between government agencies will be addressed and guidelines and standard operating procedures will be established to ensure a consistent and coherent institutional and policy framework. Linkages and partnerships with the private sector, especially youth-based enterprises in water utility service management will be demonstrated along with scaling up of PES-based financial mechanisms to sustain protection and conservation of watersheds.

The project will address climate change problem and barriers to adaptation solution using gender-responsive, integrated watershed-based approaches for restoration and innovative financial mechanisms and tools that leverage the Internet of Things (IoT) and digital technologies to improve operational efficiencies by automating detection of leaks and simplifying metering. It will tackle both the supply side of the challenge, of declining water quality and quantity, as well as the demand side, wherein appropriate technologies and techniques are used to reduce water consumption by improving efficiencies of delivery networks and exploring tariff regimes for both domestic and irrigation water, with community oversight. Involvement of women and vulnerable groups, including youth, will be guided by the SEP and GAAP (Annex 9 and 11 respectively). Policy gaps and capacity constraints that hinder coordination and prevent the use of appropriate climate-resilient technologies will be addressed in the initial phases of the project along with extensive awareness-raising and mobilisation of communities and strengthening of institutions responsible for managing and protecting watersheds. The inception phase of the project will include validation of capacity gaps identified by recent studies and project.⁹²

The feasibility of design, engineering options and budgeting for climate-proofing and strengthening water infrastructure was conducted as part of the PPG phase. These designs will be fine-tuned and finalised during the inception phase of the project and water infrastructure will be restored, enhanced and made resilient to climate change impacts. The project will implement multipurpose storage conveyance and distribution systems for both domestic and irrigation water. A mix of appropriate, innovative technologies and local knowledge will be used to extend water supplies. This includes restoration and upgrading of traditional systems of water conveyance which, in many areas, are highly inefficient and vulnerable to impacts of climate change. Policy frameworks and procedures will be reviewed and strengthened by clear, consistent frameworks and SoP established to disentangle confusing mandates and roles. This will specifically target policies dealing with local institutions and governments engaged with the construction, operation and maintenance of water infrastructure as well as those engaged in water resource governance.

Consultative procedures will be implemented so that local communities, including women, are involved in the design and siting/locating of infrastructure in line with the SEP, ESMF and GAAP (Annex 9, 10 and 11 respectively). Local institutions will be trained in performing their mandated responsibilities in the O&M of water infrastructure. Financial mechanisms for user fee collection and contribution of materials and labour will be instituted to ensure the financial sustainability of these groups and committees. Dual purposing of irrigation and domestic water supply schemes will be explored to improve the reach of project investments.

Catchments draining into water sources will be stabilised and restored based on the comprehensive assessments conducted during the PPG phase (report presented in Annex 13b Watershed Assessment). A mix of locally available materials supplemented with construction and vegetative methods for slope stabilisation and protection of infrastructure will be used. Designs will incorporate risks due to climate change-induced extreme weather events and hazards. Integrated watershed approaches that utilise assisted natural regeneration with afforestation measures will be used to restore the watersheds, ensuring long-term, equitable benefits from their goods and services. Innovative financing mechanisms such as Payment for Ecosystem Services (PES) schemes where downstream water users support

⁹² National Environment Commission, Royal Government of Bhutan and United Nations Development Programme (UNDP), 'Skills Assessment for National Adaptation Plan (NAP) Formulation Process in Bhutan' 2020; Policy and Planning Division The Ministry of Agriculture and Forests (MoAF), 'Assessment of Existing Institutional Capacity of the RNR Sector and Its Related Agencies to Plan and Implement Climate Resilient Integrated Landscape Management and Community Development'. 2018.

watershed management upstream are presently operational in parts of Gasa and Tsirang. These will be scaled up to financially support upstream communities in the management and protection of these catchments.⁹³

PES is supported by the legal and policy environment in Bhutan. The Water Act, 2011 promulgates PES provided by water resources, such that the cost of conserving water resources in the upper watershed areas are to be shared by downstream users. The Water regulations, 2014 promotes PES mechanism to support watershed management programs. It specifies that, in coordination with Dzongkhag and Gewog Administrations, the concerned Competent Authority will identify existing human settlements within watershed areas and in the event of restriction to pursue normal socio-economic activities within their own land, the Competent Authority will devise and implement incentives and compensation mechanisms which may be in the form of PES. Similarly, the National Forest Policy, 2011 enables options for the payment for watershed services to cover the costs of maintaining and improving watershed conditions and watershed services. Supported by the Divisional Forest Office (DFO) of Tsirang, a PES agreement was signed between the residents of Damphu town in Tsirang (beneficiaries of ES) and Community Forest Management Group (CFMGs) of Thakorling CFMG and Khuchi-Darachhu CFMG (ES service providers). The PES agreement started implementation from July 2019 whereby the CFMGs assumes the role for pre-identified actions for protection, management and conservation of forests under the ecosystem services in the water source catchments and the beneficiaries of ecosystem services pay for the services provided for maintaining all the agreed ecosystem services including maintenance of a buffer area of about 100 metres radius on both sides of the three streams in Khuchi-Darachhu, periodic clearing of stream channels guarding the watershed area from illegal extractions of forest resources and limiting livestock grazing in the area and plantation activities. The beneficiaries pay a sum of Nu.3.11 per month/meter holder to the Municipal Authority of Damphu on the monthly water bill and is released towards the respective accounts of the CFMGs. Drawing on the experience, PES initiative through ACREWAS will scale up existing PES schemes operating between the Thakhorling CFMS of Patsaling Gewog and residents of Damphu town to cover additional six of the project Gewogs, the Mendrelgang satellite town and institutions within these Gewogs as beneficiaries of the ecosystem services. Similarly, a new PES scheme will be set up for the Okalum watershed between catchment communities of Toedpisa Gewog and downstream communities of Toepisa and Barp Gewogs and institutions within the Gewogs including Lobeysa township. The PES schemes would enable models for sustainable management of water catchments in the project areas. IT will also add on to innovative financing mechanism for sustainable watershed management under output 1.3.

Local institutions will be supported through capacity building and framing gender responsive watershed development plans and SoPs will be established for institutional support to participatory watershed management. Rural communities will be encouraged to set up fee-based structures for water supplies which are created or extended through the project. Extensive engagements and sensitisation of communities and local government agencies will be taken up to explore both cash and in-kind payments, the latter including a contribution of labour and materials to O&M costs to enable poor and vulnerable groups to pay in kind. This will serve the dual purpose of financial sustainability for the O&M of the infrastructure and an incentive to adopt water-saving technologies. Income generation through the promotion of high-value crops, particularly winter cash crops, agro-enterprises and processing of NTFP through existing community forest initiatives will additionally be supported through training and subsidies targeted at women and youth in particular.

In addition to the proposed solutions summarised here, specific pathways to solving the four key adaptation problems in the proposed project sites have been presented below; and elaborated in Section 4. Results and Partnerships describing each of the project components, outputs, and activities in detail.

Addressing climate change driven water stress in the sector of agriculture and for domestic use: The project will systematically enhance efficiencies in the harvesting of water, its conveyance and distribution in view of the increasing climate driven water stress scenario in Bhutan. This will be done thorough upgrading and climate proofing water infrastructure and its management. Water services will be modernized and fee-based and cost recovery systems will be put in place for O&M. These fee structures will be in accordance with the communities' ability to pay and will include both in terms of cash as well as labor contributions. ICT technologies will be brought in to improve operational efficiencies of conveyance and metering, as well as increasing transparency in the O&M of water services.

⁹³ Examples of PES where communities are engaged in maintaining watershed conditions of catchments are demonstrated in Yakpugang in Mongar Dzongkhag (between Yakugang Community Forest Group and Municipal Authority of Mongar township for domestic water); in Paro between; Namey Nichu Watershed Management Group (WVG) from Namey Nichu village under Tsentog Gewog and the Domestic water users consisting of five hotels and Satsham Water Association; in Chukha Dzongkhag between Burkhey Community Forest Management Group (CFMG) in Pasakha and ES buyers comprising of 4 commercial companies (Tashi Beverages Ltd. – Coca Cola, Bhutan Board Products Ltd, Druk Cement, and Majur Oxygen and Gases) and 2 private water users; and in Tsirang between Thakhorling Community Forest Group and residents of Damphu town in Tsirang.

The project will conduct a comprehensive review of existing policies and procedures, to identify and disentangle conflicting jurisdictions and roles of local institutions. The review process will also ensure plans and policies are gender responsive and appropriately address differential priorities of women and men who are the end users of the water. The project will strengthen local institutional capacities in the management and O&M of water infrastructure and collection of tariffs, emphasising integration of modern IoT and Information and Communication Technology (ICT) equipment and techniques. This is expected to allow the project to implement activities to "climate proof" water infrastructure through strengthening, improvements and enhancements in existing installations.

Reversing degradation of watersheds reviving ecosystem services: A mix of assisted natural regeneration, reforestation and soil and water conservation measures will be undertaken. This will be combined with enhanced patrolling and protection of critical water catchments and construction of protective structures around water off-take points and along erosion prone slopes and streams. Local communities, including women and marginal/vulnerable groups will lead these watershed restoration measures. Bottom-up participatory watershed planning and comprehensive assessments of each micro-watershed comprising the targeted catchment will be taken up. The project will carry out extensive mobilisation and capacity building among communities and local institutions to this end. Public private partnerships and financial instruments, such as PES, will be instituted and formalized to ensure financial sustainability of these interventions.

Improving livelihood resilience of the communities engaged in agriculture and forestry: The project will facilitate the adoption of climate resilient practices in agriculture, forestry and Natural Resource Management (NRM) through capacity building of both institutions and of communities based on recent capacity gap analysis conducted by ongoing projects. Appropriate technologies and techniques will be introduced through hands-on, farmer field-based approaches. This will include efficient irrigation systems (drip, sprinklers) and soil moisture and nutrient management measures. Local institutions will be facilitated in setting up demonstration sites within the communities. Scaling of CSA practices, agroforestry and forestry will be facilitated through strengthened, field-based extension service, including farmer-to-farmer learning, knowledge exchange and replication. Training materials and programmes will specifically target women farmers and farmers from minority groups and will be designed to be gender-responsive and inclusive. The project will implement initiatives from several CSA practices that have been identified as suitable for Bhutan.⁹⁴

Increasing capacities and opportunities for climate-resilient livelihoods and incomes: The project will support communities, particularly women and youth, to adopt climate resilient livelihoods and income sources by increasing opportunities for private sector engagement and entrepreneurial activities. Entrepreneurs will be supported by mentors identified from within the private sector and corporations. They will be provided on-the-job training and facilitated in establishing their start up enterprises on successful completion of their internships.

Alignment with GEF Focal Area Strategy

The project aligns with the GEF programming strategy on adaptation to climate change⁹⁵ for three of the LDCF objectives and entry points:

Objective 1: Reduce Vulnerability and Increase Resilience through Innovation and Technology Transfer for Climate Change Adaptation. The proposed project will reduce the climate change vulnerability of target communities and increase resilience by restoring, protecting and sustainably managing vulnerable natural water catchments in the target river basin. Nature-based solutions such as plantation, bio-engineering works, site-specific micro check dams and PES schemes will be implemented to improve ecosystem conditions of water catchments. Physical assets created by the project will be made climate resilient through soil conservation and erosion control structures along water conveyance lines, protective walls around water off takes and vegetative/bio-engineering measures around the small reservoirs (Component 2). IT-based solutions for water management including automated IOT/ICT based systems will be integrated with the physical assets to enhance efficiency in management and maintenance (component 3).

Objective 2: Mainstream Climate Change Adaptation and Resilience for Systemic Impact. The proposed project will promote sustainable climate resilient farmland management practices in project gewogs of Tsirang where project support includes integrated domestic and irrigation water supply. These will include sustainable agriculture land management practices such as terracing of farmland on slopes; plantation of grass slip/hedgerow in dry-land agriculture for integrated fodder and soil stability measures; development of fodder/pasture; promotion of mulching technologies; Installation of sprinklers and drip irrigation and introduction of water harvesting ponds and structures to store water for irrigate crop during lean season (component 2).

⁹⁴ International Center for Tropical Agriculture (CIAT) and World Bank, 'Climate-Smart Agriculture in Bhutan'. 2017.

⁹⁵ Global Environment Facility (GEF), "GEF Programming Strategy on Adaptation to Climate Change for the Least Developed Countries Fund and the Special Climate Change Fund and Operational Improvements." 2018.

Objective 3: Foster enabling conditions for effective and integrated climate change adaptation. The project will support alignment of relevant national and local policies and strategies with sustainable and climate resilient water management; strengthen institutional & community level capacity for climate-smart water and watershed management and initiate innovative financing mechanisms for both watershed management and water infrastructure (component 1). It will also strengthen monitoring of forest conditions, spring discharges and rainfall in the water source catchments of project sites. Furthermore, it will sensitize and create awareness to generate public action for conservation and sustainable management of water resources and publish and disseminate State of the Basin Report (SOBR) for the Punatsangchu River Basin (Component 4) to enable sustainability and integration of climate change adaptations

GEF Focal Area Outcomes will be addressed through the proposed project, as detailed below:

CCA 1.1 Technologies and innovative solutions piloted or deployed to reduce climate-related risks and/or enhance resilience: The proposed project will facilitate the adoption of support watershed restoration and management in water source catchments and innovative use of IoT and ICT in managing water supply, storage and distribution networks in Gasa, Punakha and Tsirang.

CCA 1.2 Innovative financial instruments and investment models enabled or introduced to enhance climate resilience: Opportunities for revenue generation and enhancing sustainability of water supply systems will be explored through feasibility assessment on water pricing for peri-urban and rural areas for domestic water supply and providing feedback on establishing and implementing water tariff guidelines for the project sites which will gather feedback on national water tariff guidelines and criteria. A PPP model for corporate or private sector engagement in domestic water supply utility service will be piloted in Gasa and Lobeysa townships in Punakha. The pilot initiative will be used to address challenges, identify roles and establish protocols for engagement of private entities that can work with the municipalities and WUAs in providing elements of water utility service.

CCA 2.1 Strengthened cross-sectoral mechanisms to mainstream climate adaptation and resilience: The project's Stakeholder Engagement Plan (SEP) lays out a comprehensive multi-stakeholder engagement strategy across sectors and stakeholders to ensure equitable access and sharing of benefits from the project as well as equitable and meaningful participation of women and vulnerable groups within communities. It defines responsibilities to be undertaken by different stakeholders, timetable of activities and mode of communication including planning meetings and workshops, awareness and sensitization and trainings. A Multi Sector Technical Advisory Committee for the project will advise the PMU and PSC on issues concerning stakeholder sector agencies and mainstream project learnings and lessons into the sector policies and programs mainstreaming climate change adaptation in agriculture, forests and natural resources management sector policies and programs.

CCA 2.2 Adaptation Considerations Mainstreamed into investments: The project will enhance the adaptive capacity of water infrastructure to climate-induced water shortages and quality deterioration. Based on the lessons learnt from the project, the nationwide water flagship program will subsequently upscale and adopt similar adaptation and climate risk-reduction measures will be deployed approach in other Dzongkhags and river basins in a coordinated manner within Bhutan. The PMU of the project, being the coordinating agency for the water flagship program is strategically placed to upscale this approach.

CCA 2.3. Institutional and human capacities strengthened to identify and implement adaptation measures: The project will develop technical and institutional capacity for effective climate change adaptation at river basin, local government, and community-levels in Punatsangchhu river basin through;

- Alignment of national and local policies and strategies with sustainable and climate resilient water management including the gender responsiveness and climate resilience of national water standards;
- Strengthening of institutional & community level capacity for climate-smart water and watershed management, including-establishment of the River Basin Committee (RBC) for Punatsangchhu river basin; formation and building capacities of community-based water sector institutions such as Water User Groups and Water User Associations; training of local WUA representatives, staff from the Gewog Administrations, members of Dzongkhag Water Management/Environment Committee and relevant Dzongkhag sector staff in IWRM principles and practices, legal and technical matters related to water governance, water allocation and O&M aspects of domestic and irrigation water assets and training of technical professionals in climate resilient infrastructure designs.
- Promotion of sustainable climate resilient farmland management practices in project gewogs of Tsirang
- Sensitization and communication and awareness on issues of climate change impacts on water resources and vulnerabilities of ecosystems, communities and human health and well-being including documentation and sharing of good practices and lessons learnt from the project.

CCA 3.1: Climate-resilient planning enabled by stronger climate information decision-support services and other relevant analysis: The project will support participatory water resource assessments in the three project dzongkhags and facilitate development of Dzongkhag Water Masterplans for the project Dzongkhags and River Basin Management Plan for Punatsangchhu river basin. At local levels, community-based watershed and forest management plans will be supported for improved health of watersheds including two community forest management plans in Gasa water source catchment and four local forest management plans in the catchments of four water supply schemes. The publication of a State of the Basin Report (SOBR) for the Punatsangchhu River Basin will highlight water and water issues faced by the river basin and better inform governance and planning for climate resilient water resources management.

The project will utilize several innovations and new technologies that facilitate adaptation to climate change impacts. These include:

- Adoption of low-cost water harvesting and flood control techniques to local conditions such as soils and topography, making use of locally available materials and labour.
- Local adaptations of designs and materials for rural infrastructure increase the efficiency of irrigation and/or reduce costs.
- Use of IoT and ICT for monitoring and managing water supply and distribution networks, including detecting leaks, scheduling and metering.
- Geospatial technologies for watershed mapping, including participatory GIS methods that facilitate micro-watershed and watershed mapping, which feeds into the basin-level mapping and information system.
- The mainstreaming of systematic impact will be achieved through investments, collaborations with research and development agencies and through policy advocacy in key areas. These include:
- Climate risk and vulnerability assessments that feed into Dzongkhag, river basin and national policies on watershed management and forest management.
- Development, documentation and dissemination of scalable, climate resilient designs for water infrastructure including both rural water infrastructure for irrigation as well as domestic water distribution, and their integration with policies such as the Water Flagship Programme and water regulations.
- Collaborations with government agencies on development and testing of climate smart agricultural technologies for the selected sites including documentation, dissemination and integration with national programmes on agriculture and food security.
- Collaborations with government agencies engaged in water resources management and delivery of water services to ensure complementary between policies, plans and approaches.

Support of Strategic Approach

The project will bring transformational changes to managing water resources and the O&M of water infrastructure in Bhutan. It will demonstrate and scale up payment for ecosystem services (PES) for community-based watershed management and private sector investment in financing watershed restoration activities. Engagement with private entities and young entrepreneurs will encourage the wide use and deployment of technical innovations that leverage IoT devices and ICT for managing water distribution networks including controlling valves, measuring flow rates and water quality, metering and leak detection.

A multi-pronged project strategy is proposed. Adaptation problems identified during consultations and field visits will be addressed through on-ground interventions that:

- utilise locally appropriate techniques and technologies;
- generate awareness, mobilise and build capacities of local institutions and community-based organisations for implementing these activities in a participatory framework; and
- engage with entrepreneurs from the community for PES to support watershed restoration and management, and innovative use of IoT and ICT in managing water supply, storage and distribution networks.

Simultaneously, the project will address barriers that may prevent or reduce the efficiency and efficacy of these on-ground interventions through:

- policy interventions in plans and strategies, specifically to address overlapping jurisdictions and to strengthen and establish SoP for interaction between ground level community-based organisations and higher-level committees at the watershed and basin level;
- development of technological solutions such as climate smart agriculture (CSA) and applications of ICT and IoT technologies to automate the operation and monitoring of water supply and distribution networks;
- capacity building of institutions at the local and national level for contextual application and dissemination of these technologies; and

- formalising mechanisms for public-private partnerships to explore long-term investments in water and watershed management. These activities will facilitate the on-ground interventions by providing policy and financial mechanisms, a supportive planning and monitoring framework based on state-of-the-art technologies, and a system to build capacities and sustain local communities to adopt adaptation technologies and techniques.

Key strategic elements of the project are as follows:

- Engagement and involvement with community-based organisations, specifically including women, minority groups and vulnerable sections, to ensure transparency, equity and social safeguard standards are met and that local institutional capacities for sustaining and extending interventions are enhanced.
- A 12-month inception phase to complete all in-depth field surveys and finalise designs and plans for interventions in close consultations with stakeholders.
- Updating the social and environmental management framework, the gender action plan and the stakeholder engagement plan during the first six months of the project and instituting the grievance redress mechanisms ahead of activities.
- Gender sensitisation of communities, gender-disaggregated planning of activities, creation of women groups for implementing relevant interventions and gender-disaggregated monitoring and reporting.
- Strengthening local government institutions at Gewog and Dzongkhags to ensure project activities can be sustained, replicated and scaled up.
- Strengthening/replacement of decrepit water infrastructure with modern, climate-resilient infrastructure that requires minimal maintenance over extended time periods, ensuring long term benefits to communities.
- Use of local materials, skilled and unskilled labour to reduce costs, maximise local employment and instil a sense of local ownership of assets created through the project and transfer of skills required for construction, maintenance and enhancement of rural infrastructure.
- Adapt and adopt relevant CSA technologies and innovative micro/drip irrigation practices to local conditions to ensure technologies are properly vetted and extension services have the expertise for their dissemination.
- Involvement of the private sector for long term sustainability of the proposed interventions through 1) Public-private partnerships for long term financing of watershed restoration; 2) Facilitating entrepreneurs from within the community for nature-based, small-scale income generation and livelihood diversification activities; and 3) Managing water distribution networks and tariff collection through innovative applications of ICT and IoT.

Effectiveness and Efficiency

An economic and financial efficiency analysis of the project was done as part of the feasibility study (Annex 13c). The economic analysis indicates that investment with climate-proofing results in a positive ENPV of \$75.73, and an EIRR of 17%, confirming the project's economic viability. The estimated cost-benefit ratio is greater than one, indicating that the project is expected to generate incremental economic value. On the other hand, investment without climate-proofing results in a negative ENPV of (\$35.26) and a cost-benefit ratio of less than one, demonstrating the unviability of the investment. The economic analysis demonstrates that investment without climate-proofing generates higher incremental opportunity costs than incremental benefits to the communities and the RGoB. Whereas the project intervention with climate-proofing results in positive financial, economic, and social returns to the larger groups of communities and RGoB.

The adaptation scenario proposed leverages and enhances existing ecosystem services by restoring and protecting watersheds. This approach ensures long term protection of water sources for sustainable and climate resilient provision of hydrologic services. It combines this with strategic investments in stabilising slopes and protecting critical water sources. An alternative approach would have required large scale investments in reservoirs and dams for water storage which would be both more expensive, as well as more vulnerable to the increasingly frequent extreme rain events and associated floods and landslides.

By engaging communities and strengthening local institutions and financial mechanisms for upstream communities to protect and manage watersheds, the project will create interdependence between upstream and downstream communities. This will reduce reliance on external sources of funding. Top-down watershed restoration measures, on the other hand, would yield similar outcomes but would have lacked community buy-in and would require continuous injection of resources for routine management tasks. The integration of innovative IoT sensors linked with ICT will greatly enhance the efficiency of detecting water leakages and of metering. Given the terrain, this will significantly improve the efficiency of O&M operations. Manual inspections of transmission and distribution lines would have incurred a significantly higher cost, both financially as well in terms of time taken to detect and address leaks.

IV. RESULTS AND PARTNERSHIPS

Expected Results

The project aims to enhance resilience for the sustainable economic well-being of the people of Bhutan through climate adaptation of the water sector. It will directly benefit 37,334 persons (19,465♂, 17,869 ♀) residing across three Dzongkhags and four watersheds. Of these, 19,391 will benefit from water supply and 17,943 from enhanced watershed services⁹⁶.

The project will climate-proof 74.14 km of water transmission and distribution infrastructure and will augment water storage and treatment through small tanks (1 to 250 cubic meters) and two water treatment plants to ensure reliable supplies for both agricultural domestic uses. Public-private partnership (PPP) models will be explored for long-term financial sustainability of water utility services. Entrepreneurs will be facilitated on a PPP model to take over aspects of O&M of water supply networks or the management of the infrastructure's automated monitoring and metering system.

The project will also bring 3,392 hectares of agricultural land under assured irrigation and 38,518 hectares of watershed under climate-resilient management to stabilise water yields under extreme events such as rainfall variability and long dry spells. PES models will be upscaled from existing approaches to sustain restoration and management of critical catchments and monetise biodiversity services by exploring opportunities in eco-tourism and agro-tourism.

A river basin management plan will be prepared for the Punatsangchu River Basin which will be coupled with the strengthening of institutional capacities of nine watershed institutions. The project will set up three facilities for domestic water quality analysis and measurement of supply across both irrigation and domestic water distribution networks. The three Dzongkhags will also be supported in adopting water management information systems and using designs for irrigation and domestic water infrastructure based on modelling of climate scenarios developed under the project.

The project will target five key groups for different activities, summarised below. A more detailed description of the stakeholders and their associated activities are provided in the Stakeholder Engagement Plan (Annex-9).

The first group includes downstream farmers and domestic water users. Farmers will be mobilised and supported to adopt climate-resilient agricultural practices and water-efficient irrigation technologies through hands-on training and provision of materials and implements. Domestic water users will be targeted for the adoption of water-saving technologies. Both groups will be supported in setting up community based institutions for water management.

Upstream communities in the catchment areas that drain into water sources are the second group targeted by the project. They will receive support in setting up local institutions and, through them, adopt a slew of measures to protect and restore degraded watersheds. These include afforestation, soil and water conservation measures, assisted natural regeneration, agroforestry, sustainable management and use of forests and catchments.

Youth and women from project sites will be targeted for training and capacity building to help them take up agro-enterprises, income diversification from NTFP, eco-tourism and agro-tourism and entrepreneurship training and incubation, including for private sector involvement in the O&M and metering of water distribution systems.

The private sector and entrepreneurs will be the fourth group who will be engaged in PES schemes, Public Private Partnerships in water utility service delivery and integration of ICT and IoT technologies in O&M and metering of distribution networks. Private sector collaborations will also be sought in exploring income diversification through eco-tourism/agro-tourism. Private sector (construction company) entities will be engaged through contractual arrangements for the development of the infrastructure for irrigation and domestic water schemes. They will be engaged for at least a year of O&M upon completion of the development to ensure that the functionality of the schemes is effective before handing over to communities.

Finally, the project will engage with government agencies and their technical staff at multiple levels. These agencies will be engaged in the project to deliver and install equipment and infrastructure for enhanced O&M and distribution networks. Government agencies will also be involved in setting up hydromet equipment for monitoring and early warnings. Agencies at the Dzongkhag level and below will be the key conduit for the project to conduct technical training and capacity building for communities, water quality testing and monitoring and O&M of water infrastructure. Local extension services will be involved in demonstration sites for climate-resilient agriculture and in institutional capacity building of CBOs.

⁹⁶Description of Project Sites provided in (Annex 3) and Activities (Annex 13e)

The project will be implemented in two phases, the inception phase for the first year and the implementation phase for the remaining four years. The first phase will focus on creating awareness and sensitisation, organisational strengthening through training, and completing activity-specific surveys. Detailed designs and cost estimates for proposed activities will be reviewed and required environmental and social impact assessments will be drawn up for all physical interventions that are proposed. The latter will help to update gender action plans, stakeholder engagement plans, social and environmental safeguards plans, biodiversity action plans including the livelihood action plan. All plans and guidelines prepared and updated during the inception phase will be formally validated by the communities and the project steering committee.

The project's implementation phase will focus on hands-on capacity building of technical staff, trainers, communities, and project beneficiaries. Water infrastructure will be "climate-proofed", and watersheds will be restored to enhance hydrologic services, introduce a tariff structure and support water-saving technologies. Institutional structures and arrangements, including the river basin committee and its linkage with local stakeholders, will be put in place for coordination, management and replication of the physical interventions. Financial mechanisms will be established to encourage and facilitate the private sector/entrepreneur participation in water resource management including in the O & M. PES models that have been successfully implemented elsewhere will be replicated and upscaled in the project area.

The four components, expected outcomes, outputs and activities are summarised below. Activity-specific details are presented in Annex 13e and synergies of outputs with related projects are provided in Annex 13g.

Component 1: Water governance and institutions

Outcome 1: Strengthened water governance, institutions and financing mechanism in support of climate-resilient water management (LDCF: \$ 287,000; Co-financing: \$ 4,339,000)

This outcome will support 1): alignment of relevant national and local policies and strategies with sustainable and climate resilient water management; 2): Institutional & community level capacity for climate-smart water and watershed management and 3) Innovative financing mechanisms for both watershed management and water infrastructure. These outputs are expected to address the barrier of overlapping roles of multiple institutions in effective management of water resources and implementation of watershed restoration initiatives.

Output 1.1: Relevant national and local policies and strategies aligned with sustainable and climate resilient water management

Under this output, the project will support development and integration of scientific assessments of local hydrology including integration of appropriate climate projections, to strengthen water resource planning and management. Assessments of water consumption and distribution will be made and cross-sectoral standards for domestic water quality will be aligned with local conditions. Dzongkhag level water master plans will be developed based on an analysis of climate trends and a river basin management plan for Punatsangchhu basin will be developed based on Integrated Water Resources Management (IWRM) principles. Activities under this include;

Activity 1.1.1: Revise national water standards to account for climate risks and gendered approaches. A gender responsive domestic water safety plan for project sites will be developed. Existing WHO-based Drinking Water Quality Standard will be aligned to local conditions based on an assessment of daily per capita drinking water consumption baseline for Bhutan. A GIS-based digitization of domestic water distribution networks will be done to provide a framework for developing both national and Dzongkhag level water master plans.

Activity 1.1.2: Conduct participatory water resource assessments in the three project dzongkhags in alignment with the National Integrated Water Resources Management Plan (NIWRMP), 2016. The assessment will be used to develop watershed development plans for implementation by local institutions and Dzongkhag Water Masterplans for the project Dzongkhags and River Basin Management Plan for Punatsangchhu river basin. This will facilitate the adoption of integrated approaches to water resource governance and management and enable 1) economic water security; 2) urban water security; 3) environmental water security and 4) disaster and climate change resilience at both Dzongkhag and basin levels.

Activity 1.1.3: Develop hydrologic models to underpin and inform the water master plans and water governance decisions. A modeling exercise will be conducted based on available, downscale climate projections to help develop different scenarios for the short, medium and long terms that inform the design of the water master plans and provide decision support for water governance.

Output 1.2: Institutional and community level capacity for climate-smart water and watershed management strengthened

This output will result in strengthened institutional frameworks and capacities among institutions at both government and local levels in water governance and management that will fully account for the risks of climate change across the scenarios. This project will support establishment of the RBC for Punatsangchhu river basin with appropriate linkages to grassroots water user stakeholders. Critical capacity gaps will be addressed through establishment of water-related institutions and enhancement of their capacities including that of the RBC Secretariat at the MoENR. These institutions will be critical in ensuring that water resource management at the basin level as well as sub-catchment levels are proper and in alignment with the NIRWMP. Activities under this include;

Activity 1.2.1 Establish the River Basin Committee (RBC) for Punatsangchhu river basin representing stakeholders from the five Dzongkhags of Gasa, Punakha, Wangdue, Tsirang, and Dagana as well as relevant regional and national key stakeholders.

Activity 1.2.2 Form and strengthen capacities of community-based water sector institutions including Water User Groups (WUGs) at grass roots level and Water Users Associations (WUAs) at domestic water and irrigation scheme level with defined norms for formal registration of these institutions and established linkages to the RBC through the Gewog Administrations and Dzongkhag Water Management Committees (DWMC).

Activity 1.2.3 Train local WUA representatives, staff from the Gewog Administrations, members of Dzongkhag Water Management/Environment Committee and relevant Dzongkhag sector staff in IWRM principles and practices, legal and technical matters related to water governance, water allocation and O&M aspects of domestic and irrigation water assets.

Output 1.3: Innovative financing mechanisms for both watershed management and water infrastructure introduced

Studies to improve water pricing and tariff systems will be conducted to provide an assessment and gather feedback on national water tariff guidelines and criteria. The assessment will include costs of ecological services from watersheds for provisioning and regulating water quality. This will consist of a feasibility assessment on water pricing for peri-urban and rural areas for both domestic and irrigation and will provide feedback on establishing and implementing water tariff guidelines for the project sites. A PPP model for corporate or private sector engagement in domestic water supply utility service will be introduced in Gasa and Lobeysa townships. The PPP arrangement will be used to address challenges, identify roles and establish protocols for engagement of private entities that can work with the municipalities and WUAs in providing elements of water utility service. These include the development and installation of IoT sensors for real time monitoring of water infrastructure, particularly distribution networks and their use in O&M of water infrastructure and for household or farm level metering systems. Modalities for participation of the corporate and private sectors in water resources management and the management of water infrastructure will be tested and formalised. This output will provide lessons and a framework for up-scaling and replication of innovative financing mechanisms in the domestic water utilities. As part of testing the implementation of this draft guidelines and to improve it further, the project will commission a study to determine the potential for and impact of introducing a water tariff system for Gasa and Lobeysa townships including impacts on poor, vulnerable groups, gender implications and impacts on women headed households. This activity will lead to finalizing the national water tariff guidelines/criteria. Activities under this include;

Activity 1.3.1: Assess the options for the introduction of water tariff system in Gasa and Lobeysa townships to inform the national domestic water tariff guidelines/criteria.

Activity 1.3.2: Assess revenue generation and private sector engagement in water sector through PPP model in providing local level water utility services.

Component 2: Nature-based solutions for sustainable & climate- resilient watersheds and livelihood enhancement

Outcome 2: Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and their ecosystem conditions improved (LDCF: \$ 504,860; Co-financing: \$ 7,477,000)

Building on the water source assessment and mapping report, 2021 and the outcomes of watershed assessment during PPG phase, this outcome will support 1) restoration of the watershed through the implementation of nature-based solutions, and 2) improvement of the management of watershed by engaging local communities, establishing PES schemes to sustain watershed management and involving the private sector to improve and stabilize the yield of spring and stream flows. It will support the participatory assessment, identification & declaration of critical watersheds, catchment areas and spring recharge areas, and of management interventions to improve and restore ecosystem

conditions of vulnerable natural water catchments. Afforestation, reforestation and agroforestry will be supported as management intervention, improving forest and/or ground cover to enhance water infiltration in catchments. Where possible, community-based start-up enterprises will be promoted to incentivise and enhance watershed conservation, and their experience will be documented and shared for wider adoption.

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

The project will implement nature-based solutions for rehabilitation and restoration of catchment watersheds to improve forest conditions and stabilize stream and spring discharges across project sites. Interventions will include physical and vegetative measures such as plantation, bio-engineering works, removal of exotic species and replantation of native species in strategic locations to restore biodiversity and hydrology, establishment of site-specific micro check dams to arrest drain runoff along steep natural drains and enhanced protection of watershed through monitoring to sustainably manage extraction of natural resources and avoid degradation. Physical assets created by the project will be made climate resilient through soil conservation and erosion control structures along water conveyance lines, protective walls around water off takes and vegetative/bio-engineering measures around the small reservoirs and water transmission lines. These activities will be coordinated by the Watershed Management Division in collaboration with the respective Forestry divisions and form part of the watershed management program. Activities under this include;

Activity 2.1.1 Develop catchment restoration plans based on initial watershed assessments done during the PPG (Annex 13b) to guide physical interventions. Revive spring sources, restore degraded catchment watershed areas and enhance re-charge areas. Restore/rehabilitate degraded catchment watershed areas including physical and vegetative measures such as plantation of native species, bio-engineering works, site-specific soil conservation and erosion control measures and installation of data monitoring met stations for monitoring.

Activity 2.1.2 Strengthen monitoring of forest conditions, spring discharges and rainfall in the water source catchments of project sites including installation of meteorological stations and five flow gauges, supporting SMART patrolling methods, and supporting capacities of local institutions and communities in monitoring hydro-meteorological conditions.

Activity 2.1.3: Formulate community-based watershed and forest management plans for improved health of watersheds including two community forest management plans in Gasa water source catchment and four local forest management plans in the catchments of four water supply schemes supported by the project. Local communities will be directly engaged in both preparation and implementation of the watershed management plan in the project sites to ensure improved ownership of investment by the local agents. The role of the government will be that of facilitators and will largely be limited to providing technical backstopping.

Output 2.2: Forest/Ground cover in catchment watersheds managed and maintained through the engagement of local communities and private/corporate sector

Under this output, two PES schemes will be established contributing to sustainable watershed management of critical catchment areas. The PES schemes shall be similar to the earlier GEF supported schemes on PES to sustain hydrologic services⁹⁷. These PES scheme will involve arrangements through which the beneficiaries of ecosystem services (communities benefiting from water sources) shall compensate those providing the services (communities in the catchment watersheds) for appropriate management and protective measures in sensitive catchments, such as sustainable management of grazing and extraction of forest produce. Flexible systems for payments will be instituted, which allow water users, especially farmers, to contribute to the catchment maintenance through in-kind payments of labour and materials for restoration activities. The PES system will establish agreements between the catchment communities (ecosystem service providers) and beneficiary/user communities paying for the upkeep of hydrologic provisioning and regulatory ecosystem services. Ecosystem service providers and user groups will be formed by the project covering domestic water and irrigation water supply. Activities of the groups will be defined by framing bylaws and fee negotiations will be completed between service providers and users and formalized into signed agreements. These agreements will include a formal monitoring and evaluation protocol. WUAs and committees engaged in O&M of infrastructure will be assisted in raising finances and resources from PES systems and will be provided necessary training in financial administration and bookkeeping as well as monitoring and O&M, thereby sustaining the impact of the project.

⁹⁷ Jaime Cavelier and Ian Munro Gray. 'Gef Investments on Payment for Ecosystem Services Schemes'. Global Environment Facility, 2014. <https://www.thegef.org/sites/default/files/publications/28252nomarks.pdf>.

Sustainable and climate resilient farmland management will be pursued in the form of terracing of farmlands on slopes and planting of grass-slips and hedgerows in dry-land areas to enhance soil stability as well as provide fodder. Extension services will be strengthened to support farmers in adopting soil and moisture conservation measures such as mulching and efficient irrigation technologies such as drip and sprinklers. Both agricultural extension and forestry services will additionally support the restoration of barren and disturbed areas which will be planted with economically valuable and useful native species. Bio engineering works will be taken where necessary for improved soil and slope stability. Finally, the output will explore partnership mechanisms for long term support from the private sector to sustain watershed restoration activities. Activities under this include;

Activity 2.2.1: Scale up existing PES agreement between Damphu township and Khuchi-Darachhu/Thakoling CFMGs in Tsirang and establish a new PES agreement between catchment communities of Toedpisa Gewog and downstream communities of Toepisa and Barp Gewogs in Punakha.

Activity 2.2.2: Promote sustainable climate resilient farmland management practices in project gewogs of Tsirang through extension and forestry services where project support includes integrated domestic and irrigation water supply.

Activity 2.2.3: Facilitate corporate, private, and civil society entities in long term watershed and restoration rehabilitation activities through involvement in project planning meetings, workshops and training on plantation and maintenance.

Component 3: Efficient, adequate, and sustainable supply, distribution, and utilisation of water

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 (LDCF: \$ 6,669,022; Co-financing: \$ 9,020,000)

This component will focus on the establishment and demonstration of adequate climate-smart and efficient water infrastructure. The component will enhance efficiency in tapping at source, storage, conveyance, and distribution of domestic and irrigation water in the three project Dzongkhags and address barriers related to inefficient and inadequate surface water storage and distribution. Increased frequency of landslides and mud slips has contributed to sedimentation and contamination of water sources. The component will also address challenges related to quality of domestic water by improving and expanding water sources, storage, and treatment to meet Bhutan's Domestic Water Quality Standard, 2016 and WHO guidelines for domestic water quality. Two water treatment plants, one for Gasa and another for Toedpisa and Barpisa and Lobeyisa township in Punakha will serve 8,965 persons. To improve monitoring of infrastructure failures for both volume and quality of water supplies, the project will support integration of new/improved technologies so that vulnerability of the infrastructure to climate-induced hazards or disturbances are detected and solutions provided in a timely manner. Collaboration with the private sector will be explored to promote IT-based solutions for water management including automated IOT/ICT based systems

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

This output will result in the establishment of multi-purpose climate-smart water infrastructure and storage that are effective and ensures efficient conveyance and distribution of water in three Dzongkhags for both domestic and irrigation use. It will include tapping on additional water sources, storage structures and climate resilient water conveyance. The output will provide direct access to domestic water by 7533 individuals (3578 females); to integrated domestic and irrigation water by 11,362 individuals (5571 females); to irrigation water by 496 individuals (264 females) bringing the total number of beneficiaries to 19,391 individuals (9413 females). With a focus on watershed restoration activities under component two, an additional population of 17,943 individuals (8,456 females) will be benefited from secure their water sources. Overall, the project will accrue domestic water, irrigation, and watershed benefits to 37,334 individuals (17,869 females) in the three Dzongkhags.

Further, this output will enable winter cropping of 1816 Ha of agricultural land in Tsirang, which is currently limited to cultivation during summer due to a shortage of assured irrigation water. An additional 519 Ha of fallow land will be brought under sustainable cultivation, contributing to enhanced livelihood of communities through assured irrigation water. Climate resilient and "smart" water. Conveyance lines will be established from off-takes in sources to users. Soil and water conservation structures will be built along the water conveyance lines and off-takes and reservoirs will be protected with walls and gabions. Extensive use of vegetative measures will be made to protect all water infrastructure. Site and activity specific ESIA, where necessary, will be conducted and ESMPs will be prepared and implemented during the project implementation period. Activities under this include;

Activity 3.1.1: Install a water supply system in Gasa township comprised of 1 collection tank at intake point, two water storage tanks of 120 cum and 50 cum, one water treatment plant of 1 MLD and piped water conveyance length of 2.5 km from Shingtalum water source to Gasa town.

Activity 3.1.2 climate proof domestic water supply systems for Toedpisa and Barpisa including Lobeysa township in Punakha comprising of one reliable and consolidated collection tank at intake point, two water storage tanks of 16 cum and 20 cum, one water treatment plant of 1 MLD and piped water conveyance length of 17 km from Okalum water source to Lobeysa town with distribution points along the pipeline connected to the existing distribution network.

Activity 3.1.3 Climate proof integrated domestic and irrigation water supply main line for Patshaling, Barshong, Mendrelgang, Rangthangling, Tsholingkhar and Kilkhorthang Gewogs in Tsirang comprising of one reliable and collection tank at intake point, three water storage tanks of 250 Cum each and eight brake pressure points of 5 Cum each and piped conveyance length of 43 Km connected to existing distribution network through several distribution points for all communities along the length of the main conveyance line.

Activity 3.1.4 Climate proof integrated domestic and irrigation water supply main line for Sergithang Gewog in Tsirang comprising of one water storage tanks of 250 Cum and 5 brake pressure points of 1 Cum each and piped conveyance length of 11.64 Km connected to existing distribution network through several distribution points for all communities along the length of the main conveyance line.

Output 3.2: Efficient drought-resilient water management technology tested and up-scaled through private sector (youth-based start-up enterprises)

This output will result in the installation IoT based telemetric sensors in 74.14km of water transmission and distribution lines across the project sites. Sensors will also be installed in water storage facilities for the 1,266 cum of storage created to help track water levels on a continual basis. The automation will be integrated with GIS systems.

The integration of innovative IoT and ICT based monitoring technologies will modernize monitoring, maintenance and metering for efficient water distribution and management in all water related assets created by the project. Systems such as the Supervisory Control and Data Acquisition (SCADA) and equivalent tools will result in improved efficiency in water acquisition, storage, conveyance, distribution, quality assurance and overall operations, monitoring and maintenance of the water infrastructure. This output will also facilitate the involvement of private sector entities in Bhutan as part of addressing climate risks and adaptation and will enable enterprise development. Partnerships with private entities involved in development of low cost IoT based sensors and their integration with ICT based monitoring systems for water distribution networks will be established to train and help establish local entrepreneurs in the management of these systems. Private sector partnership is a strategic decision to enhance partnership through introduction of technology and innovation, optimizing resource use and cost savings and reinforce sustainability during and beyond the project period.

During the PIF and PPG design phase consultations have been held with all key stakeholders including DHI. DHI offers extensive homegrown experience in setting up water management systems within Bhutan which meets the expectation of the ACREWAS project to contribute and add value. Hence, private sector entities such as the DHI will be invited to participate in the project through competitive procurement process to integrate automation of irrigation and drinking water assets using Supervisory Control and Data Acquisition (SCADA) technologies anchored on IoT, AI, micro-controller and sensor based data science within water intake at source, water storage tanks, WTP facilities, main transmission lines and subsidiary distribution lines; assess, procure, and install sensors, electric valves, gauges, flow meters, fire hydrants, balancing units, and weather monitoring stations linked to main control; facilitate acquisition of real time climatic data such as temperature, humidity, rainfall and soil moisture at the catchment as well as on water levels, flow rates, water pressure, water quality parameters to facilitate critical decision making; establish communication and display of management information on monitoring screens and mobile phones; train and groom Water user groups and youth-based start-up enterprises to manage the technology components and support the overall O&M beyond the project period for a service fee and enable collaboration with agencies on tech driven innovation to enhance water use efficiencies for agriculture, drinking and other domestic use. Activities under this include;

Activity 3.2.1: Assess and integrate innovative IoT and ICT based technologies such as microcontrollers and sensors into water collection, storage conveyance and distribution networks to improve the performance of the water investments made by the project in Gasa, Punakha and Tsirang.

Component 4: Knowledge management

Outcome 4: Strengthened awareness and knowledge sharing mechanism established (LDCF: \$ 918,100Co-financing: \$ 3,416,380)

This component will support documentation and sharing of knowledge and practices and effective capacity for climate-resilient water and watershed management. It will address the barriers related to poor awareness and data availability on climate change impacts on water resources and watershed management by documenting and disseminating successful lessons from the project and other projects in the country, region and internationally. The knowledge sharing component will be gender-responsive and inclusive. Local language will be used in discussions, dialogue and dissemination. Written material will be translated into the local language where possible, including summaries of technical documentation where literal translations are not possible.

Knowledge management activities will lead to basic awareness of water-saving interventions among rural and domestic water users. They will enhance understanding of new technologies and know-how of their application and implementation in water management and in measuring water resources. This includes the measurement of hydro-meteorological and discharges at off-takes, using IoT and ICT devices and installing a GIS based digital platform for water resources management and water service networks. Enabling conditions will be 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. The project's overall impact, including plans to learn from relevant projects, initiatives and evaluations, will be made available on the websites of UNDP and of the MoIT.

The component will also generate and disseminate knowledge on gender and social and environmental safeguards that need to be in place during the implementation of water infrastructure and conveyance projects in the eco-sensitive regions of Bhutan. This will result in a comprehensive review and updating of these safeguards and will generate awareness about their application and mechanisms for reporting grievances and incidents by communities. A comprehensive, quantitative and robust M&E strategy will be put in place, which is gender-responsive and which relies on easy-to-measure indicators and leverages the broad coverage and use of ICT. Indicators will be gender disaggregated where possible and participatory, citizen-based approaches will be instituted in their collection. Information from the M&E process will be shared with stakeholders to ensure inclusive and transparent reporting at all levels.

A number of new approaches and strategies are being piloted or scaled up by the project. These will be carefully documented as part of this component along with strengthening of technical training that is provided for water resource management in tertiary training institutions in Bhutan. This will enhance capacities of staff hired for water resources management and of engineers who design and install water infrastructure and delivery systems. It will create a comprehensive digital platform for managing information pertaining to watershed restoration and water resources and services. This digital platform will be based on open-source technologies and will leverage IoT and ICT systems proposed in components 2 and 3.

Finally, the component meet 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 provide access to water and watershed-related information.

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

This output will develop and implement a gender-responsive communication strategy for water conservation and sustainable management. Awareness will be created at different levels on water efficiency and conservation, watershed and source protection and water use and conservation. Specific attention will be given to issues of climate change impacts on water resources and vulnerabilities of ecosystems, communities and human health and well-being. Institutional and regulatory provisions for climate change adaptation in water resources will be strengthened. The output will result in the documentation of adaptation options, technologies and solutions that are gender-responsive and which will build a case for harmonised data collection and reporting on identified parameters that represent the health of river basins.

The output will result in comprehensive, gender-responsive, process-based documentation of good practices to facilitate scaling up the lessons learned through the course of the project. Study visits, on-site demonstrations and exchange programs to other projects will be conducted on a regular basis for farmers, entrepreneurs and community members in general. Documentation in the form of audio-visual media, brochures, flyers and policy briefs will be generated based on project progress and impacts. This will be disseminated locally and nationally using print and social media in both English and Dzongkha. Activities under this include;

Activity 4.1.1: Develop awareness packages through documentation of good practices on water conservation and sustainable water resources management, lessons learned from the project and policy, regulations and roaches for IWRM

Activity 4.1.2: Establish the PMU and project governance arrangements for efficient coordination, management and M&E of the project

Activity 4.1.3: Align and update technical and engineering curricula and relevant agencies with modern and emerging technologies for climate resilience

Activity 4.1.4: Provide diagnosis, analytical capacity and water quality testing in 21 Primary Health Care Centers of 3 project Dzongkhags

Output 4.2 Publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin institutionalised

The preparation of the State of the Basin Report (SOBR) for the Punatsangchu river basins will be a key result of this output of the knowledge management component at the national level. The SOBR will include an analysis of the 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. The report will further highlight key issues faced in establishing 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). Finally, the report will determine gaps and needs for developing relevant River Basin Management plans and their effective implementation.

This output will also 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. The output will publish and disseminate the SOBR through engagements with government and non-government agencies at the local and national levels.

A framework and SoP for regular reporting and sharing of data and reports on the state of river basin will be put in place. This will result in systematic tracking and documenting of water quality, quantity, availability, assets, and inventory. A digital platform will be designed and deployed to harmonise the data collected. It will streamline the reporting and archival of data on domestic and irrigation water supply and availability. The system will be accessible by stakeholders at the Gewog, Dzongkhag and basin level. Government and community institutions will receive training on data gathering and reporting on this system. Activities under this include;

Activity 4.2.1: Institute mechanisms and build capacities for regular reporting and sharing of data and reports on state of river basin

Activity 4.2.2: Publish and disseminate the State of the Basin Report (SOBR) for the Punatsangchu River Basin

Partnerships

The following table summarises ongoing initiatives and projects of other stakeholders that are relevant to the ACREWAS project. These projects address the development challenge this project is also addressing and their work provides a basis for achieving the results of the ACREWAS project and is therefore critical. The ACREWAS project will collaborate and explore synergies with these initiatives, benefiting from them, and/or adding to their effectiveness by bringing in crucial elements of climate change adaptation. A summary of linkages between the projects and ACREWAS follows the table. A detailed description of these projects is provided in Annex 13g: Partnerships.

Table 3: Relevant projects which could act as baselines for additional climate change interventions or partnerships which could improve efficacy and efficiencies of proposed activities. Note that some of the projects are under review.

SI	Project/Initiative Title	Funding Agency	Implementing Entity	Duration	Grant (mill US\$)	Focal areas/ Relevance	Type of Partnership
1	Enhancing Sustainability and Climate Resilience of Forest and Agricultural Landscape and Community Livelihoods	GEF-Multi Trust Fund	UNDP	2017 to 2023	13.967	Support for SLM, climate-smart agriculture and enhancement of climate-resilient infrastructure.	Collaboration Knowledge sharing

The third and fourth components of the project closely compliment with component two and four of ACREWAS. Both project seek to support SLM, climate-smart agriculture and enhancement of climate-resilient infrastructure. The ACREWAS project would gain from the additional emphasis on livelihood diversification and livestock management that is part of this project's

<p>strategy. At the same time the ACRWAS project's emphasis on climate-proofing water infrastructure and interventions in catchment areas that protect water resources and water infrastructure would complement the impact of the climate resilience project. The M&E and knowledge management components of the two projects would also complement each through cross learning and sharing of data and information.</p>							
2	Supporting Climate Resilience and Transformational Change in the Agriculture Sector project	GCF	GNHC(recently merged under MOF)	2019-2025	24	Climate resilient agriculture	Collaboration
<p>Climate resilient and climate smart agriculture and integration of climate risk into water and land management are areas where the two projects need to ensure cross learning and collaboration as well as preventing duplication of effort. The ACREWAS project would gain significantly from lessons learned and take advantage of the enhanced capacities of local government and farmers in use of climate information and early warning. It will scale up work on climate resilient and climate smart agriculture, and sustainable land management. In turn, the work on catchment restoration, additional protective measures for infrastructure and enhanced surveillance and management of watersheds by the ACREWAS project, will support resilience of water infrastructure by the GCF project as well.</p>							
3	Adaptation to Climate-induced Water Stresses through Integrated Landscape Management in Bhutan	Adaptation Fund	Bhutan Trust Fund for Environmental Conservation	2023-2027	9.999	Climate resilient agriculture and integration of climate risk into water and land management.	Collaboration
<p>Both the project have similar approaches and propose similar interventions through their respective components, namely 1) adaptive management of watershed for enhancing resilience of community; 2) climate resilient water infrastructures for uninterrupted supply of water for drinking and irrigation and 3) climate-smart agriculture through sustainable land management. The two projects will complement each other through cross-learning and collaboration to expand the impact of interventions. The proposed ACREWAS project will benefit from the improved Agro-meteorological services and local Governance for effective Climate Change Adaptation main-streaming with focus on water management at the grass-roots that is proposed by the Adaptation Fund supported project.</p>							
4	Securing Ecological Connectivity of High Conservation Value Areas (HCVAs) in South-Western Bhutan	WWF/IKI	DoFPS	2020-2028	€ 9.7	Watershed restoration, protection of water infrastructure and increased community-based Forest Management	Collaboration
<p>ACREWAS will collaborate with the project in Tsirang Dzongkhag where the ACREWAS project targets 17,654 persons (9110 ♂, 8544 ♀) and 20,420 ha under 21 catchments for watershed restoration, protection of water infrastructure and increased management. The two projects can scale up and co-finance both proposed interventions to cover a wider area for restoration and have higher investments in management, monitoring and wider community mobilisation. The ACREWAS project will benefit from the lessons learned and institutional capacities created by the IKI funded project while results of interventions in water infrastructure and landscape restoration in ACREWAS will increase climate resilience and economic benefits of local communities targeted by both projects.</p>							
5	Preparation of a National Adaptation Plan (NAP) for Bhutan, with a focus on the water sector	GCF	MoENR	2019-2023	2.52	NAP readiness focusing on water sector;	Collaboration Knowledge sharing
<p>The results of this project have contributed substantially to the strategy developed for implementing the ACREWAS project. This includes the selection of sites and the prioritisation of activities under each. The reports have also contributed to the discussion on the climate case for the project presented in the feasibility study (Annex-13a). This project will continue to be an important source of lessons for the ACREWAS project, particularly through its inception phase, through the availability of data, information and the enhanced capacities of staff from the WSD and NEC. In turn, the lessons learned from ACREWAS will contribute to the updating of the NAP for Bhutan through knowledge sharing events and products proposed under component 4.</p>							
6	Bhutan For Life	GCF	MoENRR	2018-2032	26.56	Water governance, watershed management, climate resilient	Collaboration

						infrastructure	
<p>There are a number of areas of overlap between the ACREWAS and this GCF project. There are opportunities to co-finance, collaborate and scale up interventions in the areas of restoration, enhanced monitoring of forest areas and of strengthening communities and local institutions in conservation and NRM. The ACREWAS project will benefit from the ecosystem services that are enhanced and secured by the GCF project while downstream water users benefit from climate-proofing of water infrastructure. The projects will mutually benefit from cross-learning and institutional capacities that are created.</p>							
7	Water Flagship Program	ADB	MoIT	2023-2027	6	Sustainable and inclusive domestic water, and irrigation services; river basin management planning and lessons on the institutional arrangements, particularly at the local level	Collaboration
<p>The project is at its final stages of approval and will provide important lessons and opportunities for cross-learning for the ACREWAS project. One of the Dzogkhags of the project falls under the Punatsangchu Basin which will allow it to contribute to the river basin management plan proposed under output 1.1 of ACREWAS. The ACREWAS project will benefit from lessons on the institutional arrangements, particularly at the local level, and will replicate these structures and arrangements to benefit from past experiences and lessons on smart water management.</p>							
8	Strengthening community-based adaptation and food system resilience for vulnerable communities in Nepal and Bhutan	Adaptation Fund	World Food Programme / GNHC(rssec ently merged under MOF)	5 years (proposed)	14	Capacities for use of climate information and early warnings. Participatory adaptation and mitigation measures for water infrastructure	Collaboration
<p>Stakeholders in sites common to both projects stand to gain from dissemination and capacities for use of climate information and early warnings. Participatory adaptation measures adopted by communities would be extended to mitigating measures that protect water infrastructure and thereby enhance resilience of end-user communities.</p>							
9	Commercial Agriculture and Resilient Livelihoods Enhancement Programme	IFAD	IFAD	2015 - 2025	25.64	Climate-resilient agriculture and technologies to increase agricultural productivity	Collaboration
<p>There are clear overlaps between the two projects, particularly component 2 where ACREWAS also seeks to promote climate-resilient agriculture and promote technologies to increase productivity. The emphasis of ACREWAS on water infrastructure presents room for collaboration wherein the IFAD project could gain from improved irrigation supply.</p>							
10	DHI Research and Innovation Venture Excellence (DRIVE) program	DHI	DHI	Ongoing	Unspecified	ICT and IoT technology application and entrepreneurship in water management.	Capacity building, entrepreneurship, PPP
<p>The project seeks to build collaborations with the DRIVE center in three key areas:</p> <ul style="list-style-type: none"> ◦ Technology development: Development, testing and scaling up the application of ICT and IoT tools in the management of water services, including O&M and metering. ◦ Training and capacity building: Supporting local agencies and municipalities in setting up ICT systems for water distribution, including technical training, supply of IT equipment and hand-holding until the new technologies have been internalized and worked into the regular workflows. ◦ Mentoring and incubation: Providing hands on training to young entrepreneurs on the application of these ICT tools for waters supplies for both domestic and agricultural water users. Mentoring of selected trainees and supporting them to set up private ventures with start-up capital, technical backstopping and linkages to relevant financial services. 							
11	Enhancing Climate Resilience of Water Sources in Bhutan	GCF	NEC	Proposed	1.0	Climate proofing water sources for water supply and sanitation. Climate resilient rural water infrastructure.	Collaboration and knowledge sharing
<p>Key among the similar strategies between the two projects are lessons to be learned from activity 3 of the project on modeling</p>							

climate change scenarios on small local water sources. The ACREWAS project, whose implementation is likely to precede that of the GCF project, could in turn contribute to activities 1, 2 and 4 of the GCF project.

Co-financing sources and program details

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)	Included in project results? Yes/no
Recipient Country Government	Ministry of Energy and Natural Resources	Grant	Investment mobilized	1,200,000	No
		In-kind	Recurrent expenditure	700,000	No
	Ministry of Infrastructure and Transport	Grant	Investment mobilized	6,930,000	No
		In-kind	Recurrent expenditure	700,000	No
	Ministry of Agriculture and Livestock	Grant	Investment mobilized	3,500,000	No
		In-kind	Recurrent expenditure	1,800,000	No
	Local Government-Tsirang District	Grant	Investment mobilized	3,970,000	No
		In-kind	Recurrent expenditure	642,000	No
	Local Government- Gasa District	Grant	Investment mobilized	3,510,000	No
		In-kind	Recurrent expenditure	320,000	No
	Local Government - Punakha District	Grant	Investment mobilized	1,520,000	No
		In-kind	Recurrent expenditure	240,000	No
GEF Agency	United Nations Development Programme	Grant	Investment mobilized	100,000	No
Total Co-financing				25,132,000	

Risks

Risks that threaten the achievements of project results: are summarised below. Risk rating information is provided in Annex 7.

Table 4: Risks that threaten the achievements of results and mitigation measures

Description	Type	Mitigation measures	Risk owner
Risk 1: Climate induced hazards may damage water infrastructure or obstruct and delay work	Environmental	1. Infrastructure constructed as part of the project will be designed in accordance with updated projections of potential climate change induced hazards. Infrastructure will additionally be protected through slope stabilisation and support structure and water conservation measures. 2. In order to minimize impacts of inclement weather on project deliverables, all activities will be planned keeping in mind the likely seasonal weather disruptions. Movement of materials and all infrastructural interventions will be made during the dry season and based on local forecasts.	MoIT
Risk 2: Underdeveloped private sector and weak value and supply chains may hinder adoption and success of private sector engagements	Institutional/ regulatory	The project will involve the private sector to ensure sustainability of the project. The project will further engage with the private sector in a number of income generation and livelihood diversification activities and by also tying up with ongoing initiative thru cross learning and knowledge sharing	MoIT
Risk 3: IoT devices equipment may fail to perform due to poor power supply, network connectivity issues and breakdown	Operational	Equipment's will be procured through established vendors and companies and will comply with the necessary ruggedness standards expected. Finally, all equipment will be purchased under warranties and regular monitoring and maintenance will be carried out with back up plans	MoIT
Risk 4: Beneficiaries' unwillingness to pay for the improved water facilities and supplies may not generate enough funds to sustain delivery of water utility services	Financial	Water user associations will be required to ensure their members are involved in decisions pertaining to tariff, fee or other kind of in-kind payments. Multiple forms of payments will be explored, including provision of labour or time for O&M and monitoring works by the WUA. Multiple sources of income for the WUAs will be explored so that fee collection is not the sole means of financially sustaining the project activities.	MoIT
Risk 5: Emergent risks due to the COVID-19 pandemic	Implementation	Standard health and safety precautions required for protection against COVID-19 will be implemented, including, but not limited to: (i) wearing a face mask, (ii) handwashing regularly, (iii) social distancing, and (iv) enabling as possible for local communities, project staff, government staff and other stakeholders to voluntarily get vaccinated. During lockdown the project will introduce innovative implementation, monitoring and oversight arrangements (refer annex 13f on covid response)	MoIT/MoF

Risk 6: Changes in government may lead to changing priorities causing conflict with the project objectives, such as lesser priority on the water flagship	Political	1. Water is a priority sector and a strong feature of the political manifestoes. The Water Flagship programme of the 12th Plan faced implementation challenges due to the pandemic. The programme must continue in the 13th Plan gaining more momentum and the project will advocate climate rationale. 2.The project’s communication and knowledge management components will ensure adequate advocacy on water.	MoIT
Risk 7: Slow economic recovery may reduce government and partners capacity to co-finance the project	Financial	Co-financing agreements is secured, and contributions will be periodically monitored with partners and discussed in the PSC.	MoIT/MoF
Risk 8 Institutional reorganisation and capacity gaps among IP/RPs may affect project implementation	Institutional and organisational	Clear and regular coordination mechanisms established IP /RP The coordination mechanism will be reviewed both during project inception and through regular meetings of the Steering Committee/Board, to accommodate any changes. During the PPG capacity gap assessments has been conducted in the project areas with the concerned stakeholders. This has informed on inclusion of relevant capacity development activities in the project	MoIT/MoF PMU
Risk 9 Poor connectivity over rugged terrain combined with inclement weather conditions may hinder supply of critical inputs during project implementation.	Operational	This risk will largely be addressed by the presence of Dzongkhag level coordination units for the project which will adequately procure and stock relevant materials in advance of the monsoon season and winters. The high level of mobile connectivity across Bhutan further ensures communications between field teams and administrative offices at different levels. Finally, the project strategy will rely primarily on local supply chains and markets for essential commodities and services.	PMU, Dzongkhag Unit
Risk 10 Price escalation due to the ongoing economic slowdown may exceed budgeted costs, affecting project achievements.	Financial	This risk is largely outside the influence of the project. Workplans and budget allocations will be reviewed on a quarterly basis. Opportunities for cost-cutting and improving efficiencies will be fully exploited. Where possible, additional sources of co-finance and collaboration will be explored.	PMU/ MoF

Summary of the SESP

The SESP (Annex 6) provides a detailed analysis of the project’s social and environmental risks, which examines the risks presented in table 5 and provides a thorough assessment, including measures to avoid the risks where possible and to mitigate and manage them where necessary. The SESP identified 11 risks, of which 8 were scored as moderate and 3 were scored low, resulting in an overall categorisation of Moderate Risk to the project. An additional safeguards screening is provided during the project’s inception. This will ensure the safeguards screening accommodates any new activities that may be proposed based on site-specific conditions.

An Environmental and Social Management Framework attached as Annex 10 sets out the principles, rules, guidelines, and procedures for screening, assessing, and managing the potential social and environmental impacts of forthcoming project interventions. It aims to effectively address risks through thoroughly applying the environmental and social measures, including time-bound action plans for avoiding, and where avoidance is not possible, reducing, mitigating, and managing adverse impacts related to future activities or policies/regulations. It specifies the most likely applicable social and environmental policies and requirements, as well as how those requirements will be met through procedures for the screening, assessment, approval, mitigation, monitoring, and reporting of social and environmental risks and impacts associated with the activities to be supported. It ensures that the activities are screened and assessed, and that appropriate management measures are in place prior to implementation and have been designed to ensure compliance with relevant social and environmental policy frameworks. This includes Bhutan’s legal, policy, and institutional framework, and UNDP’s Social and Environmental Standards. The ESMF outlines steps required in order to ensure full compliance with SES requirements during project implementation. In accordance with the ESMF an environmental and social impact assessment (ESIA) will be carried out for all significant risks. The ESIA process will draw upon the ESMF to assess the associated impacts, and to inform the specific management measures outlined in the ensuing Management

Plans. Downstream interventions, including specifics of rural water infrastructure and interventions in agriculture, rangeland, natural resource and forest management will be specified during the inception phase. The potential direct impacts of each specific intervention will be assessed during this phase.

The project will be implemented using standard good practices such as consultative and community-based selection of sites and design of on-ground activities together with FPIC of the communities. The SESP will be translated into Dzongkha and will be made available to all stakeholders, including women, for their inputs. Further consultations with communities on the field after the activities have been specified will potentially result in updating the SESP in the first six months of the project. A social baseline will be created during the first six months of the project, before any field interventions are implemented. Activities will result in a comprehensive, field based and participatory planning exercise which involves stakeholders from the government, development agencies and communities. The Stakeholder Engagement Plan (SEP-Annex9) be made available to all stakeholders in English and Dzongkha before the activities start. It specifies the need for a full disclosure of information and providing for meaningful participation of stakeholders during the planning and implementation of site-specific activities including as part of site-specific Environmental and Social screenings and assessments. A clear FPIC protocol will be put in place to address conflict resolutions mechanisms. This will be supported by a formal Grievance Redress Mechanism as part of the ESMF. The project will follow a human rights-based approach and contribute to reducing inequalities and improving the livelihoods of poor and vulnerable people⁹⁸.

The following principles and standards are triggered by these risks:

Overarching Principle:

- Leave No One Behind
- Human Rights
- Gender Equality and Women's Empowerment
- Sustainability and Resilience
- Accountability

Standards

- Std. 1. Biodiversity Conservation and Sustainable Natural Resource Management
- Std. 2. Climate Change and Disaster Risks
- Std. 3. Community Health, Safety and Security
- Std 4. Cultural heritage
- Std 5. Displacement and Resettlement
- Std. 6. Indigenous Peoples
- Std. 7. Labour and Working Conditions
- Std. 8. Pollution Prevention and Resource Efficiency

Social and Environmental Safeguard Elements

Below is an overview of the required social and environmental safeguards elements to be designed in the first six months of project implementation. Substantial and moderate risk activities listed in the SESP will only start after the appropriate Management Plans are in place. The relevant safeguard elements are:

- Targeted assessments in accordance with UNDP's SES policy, moderate, substantial and high-risk projects require comprehensive forms of assessment. The targeted assessments will be developed and carried out by independent experts in a participatory manner with stakeholders during the inception phase. This will address all relevant issues related to the SES Overarching Principles and Project-level Standards.
- Environmental and Social Management Plans (ESMP) A key output of the ESIA/targeted assessments is an ESMP, prepared within the first six months of project implementation. The ESMP further refines risk identification and mitigation strategies and establishes a system for monitoring these risks. Necessary management plans will be developed and implemented as appropriate based on the findings of the ESMP.

⁹⁸ We understand 'marginalised/vulnerable communities' and/or 'marginalised/vulnerable groups' as a term which describes both the condition and the processes that prevent individuals or groups from reaching sustainable development goals, or fully participating in social, economic and political life. In this document "vulnerable communities/groups" describes individuals or groups of people that face higher exposure to climate change, disaster risk and poverty, including but not limited to women, youth, children, elderly, differently-able people, disadvantaged families and those living in high risk areas and danger zones. 'Marginalised/Vulnerable' does not mean that the group is vulnerable per se, but that this vulnerability is the result of social, economic and political processes.

- The project's ESMP will be complemented by relevant action plans to supplement the ESMP.
- Technical and feasibility studies Selected outputs and activities to be supported by the project will be subject to technical and feasibility studies according to UNDP guidelines.
- Setting up a robust Grievance Redress Mechanism (GRM) The project will review the project-level GRM prepared during the PPG at the start of implementation. The full details of the GRM will be agreed upon during the inception phase - when the targeted assessments is being conducted. Stakeholder will be in a position to raise a grievance at any time with the Project Management Office, the government party, UNDP, or the GEF.
- Institution of the Gender Action Plan. A Gender Action Plan has been developed during the PPG phase. It will guide all actions pertaining to SES implementation and gender-mainstreaming. The GAP provides specific recommendations to facilitate gender-responsive project implementation and a strategy to ensure meaningful representation in local institutions and CBOs and equitable sharing of its benefits.
- Institution of the Stakeholder Engagement Plan and development of an associated FPIC protocol The Stakeholder Engagement Plan that has been developed during the PPG phase will guide all actions pertaining to SES implementation. The SEP includes a basic FPIC protocol which will be refined further to ensure all potential positive and negative consequences associated with the project are clearly conveyed to local communities in their local language. Community members and their representatives will be encouraged and given the time to explicitly reflect on this information and give their free prior informed consent (FPIC). The FPIC protocol will then be applied to each activity of the project, as communities will be allowed to provide their consent to part of them, ask for modifications, or withdraw their consent

Table 5: SESP

Risk Description (broken down by event, cause, impact)	Impact and Likelihood (1-5)	Significance (Low, Moderate, Substantial, High)	Description of assessment and management measures for risks rated as Moderate, Substantial or High
<p><i>Exclusion of vulnerable groups and marginalized people</i></p> <p>Risk 1: Vulnerable groups¹⁴</p> <p>Members of socio-cultural groups and women-headed households may be excluded from fully participating in project activities, particularly, from membership and leadership roles in the various community-based institutions such as natural resource management and water users association Committees. This may result in these groups not benefiting equitably from project activities, and/or preventing them from participating in the decision making and design roles that these CBOs are expected to perform.</p> <p>(Checklist questions P.4, P5, P6, P.10, P.11, P13, P14)</p> <p>Principle 1: Leave no one behind</p>	<p>I = 4</p> <p>L= 2</p>	<p>Moderate</p>	<p>Communities will be engaged in the design, implementation and monitoring of project activities. During the PPG, local government representatives, village elders as well as women and members of socio-cultural groups living in the areas were invited to participate in the consultative meetings. Free Prior and Informed Consent (FPIC) protocols followed during the PPG process will be adhered to during project implementation to ensure communities, including women and vulnerable groups, participate in the project by their own free will. Furthermore, the project will ensure timely dissemination, and information sharing for informed decision making on matters related to risks and grievances.</p> <p>The Stakeholder Engagement Plan (SEP) and the Gender Analysis and Action Plan (GAP) developed as part of the Environmental and Social Management Framework (ESMF) during the PPG provides a framework for proactive facilitation and inclusive participation of the community, particularly women, vulnerable groups and members of socio-cultural groups on decisions related to all project activities.</p>

<p>Principle 2: Human Rights</p> <p>Principle 3: Gender Equality and Women's Empowerment</p> <p>Principle 5: Accountability</p> <p>Standard 6: Indigenous Peoples</p>			<p>An expanded Stakeholder Engagement Plan, instead of an Indigenous peoples Plan, will answer Standard 6 by including appropriate options for social inclusion and FPIC of all communities in the project's area and area of influence.</p> <p>A framework for the project Grievance Redressal Mechanism (GRM) has been developed that will provide a mechanism to raise and manage programmatic and systematic concerns related to the project, which are to be resolved in a timely, fair and transparent manner. A robust GRM at all levels will be developed and updated periodically to ensure that the grievances and risks are addressed in a timely manner. All complaints and grievances received will be closely recorded and managed by maintaining a risk register with clear accountability</p>
<p><i>Economic displacement and denial of access to natural resources and due to impact on private land</i></p> <p>Risk 2: Watershed restoration and conservation activities may result in temporary or long-term denial of communities or groups to traditional or customary use of forests.</p> <p>Risk 3: During project implementation, some sections of</p>	<p>I = 3</p> <p>L = 3</p>	<p>Moderate</p>	<p>The project has been designed in accordance with FPIC principles, as outlined in the UNDP SES policy which have been adopted to undertake comprehensive consultation with communities while surveying and selection of sites for different interventions and decisions on the design and operation of water infrastructure. Further, the ESMF prepared for the project also includes provisions for FPIC which will be continued during the inception phase of the project and will also be guided by the SEP to ensure in-depth engagement with stakeholders and joint planning and design of the interventions. The latter will include site or activity-specific targeted assessments, which will be prepared during the early phase of the project (i.e. prior to commencing required site activities) and regularly monitored during project progress.</p> <p>There are no communities in the project areas that depend largely on forestry resources from the forest areas identified for catchment watershed restoration, management or protection activities. Minor restrictions to stray grazing of local cattle may occur as result of strengthening existing community based mechanisms to protect critical water catchment areas which is not foreseen to cause significant economic displacement as productive cattle are usually not let out for stray grazing.</p> <p>Only those activities will be implemented which have the full support of the communities and</p>

<p>the pipeline will be routed through some of the private registered land, potentially causing disruption on use of land which is being used for agriculture purpose.</p> <p>(Checklist questions: P6, 1.3, 5.2)</p> <p>Principle 1: Leave no one behind</p> <p>Principle 2: Human Rights</p> <p>Principle 4: Sustainability & Resilience</p> <p>Standard 1: Biodiversity Conservation & Sustainable Natural Resource Management</p> <p>Standard</p> <p>5: Displacement & Resettlement</p> <p>6: Indigenous people</p>	<p>I = 2</p> <p>L = 4</p>	<p>Moderate</p>	<p>target groups reinforced through a participatory approach of proper consultations and consent. Grazing areas and biomass collection areas of communities will be avoided but where this is impossible, alternate viable land in adjacent areas will be identified and provided for community use after consultation with the community for activities related to restoration or reforestation.</p> <p>The GRM developed for the project additionally provides a formal avenue for individuals or groups to raise complaints which are not resolved at their own level to escalate the grievance for resolution at the community/gewog, at the Dzongkhag/PMU and finally at the central level.</p> <p>Project activities do not envisage the acquisition of private land. A detailed survey has been conducted during the PPG. Private land will be avoided during the installation of pipes as far as possible by routing them along the plot boundaries and burying them at least 1 meter into the ground to enable continued use of the land by the owner. Consultations with affected landowners have been carried out, information conveyed of possible temporary impacts and agreement of measures to be implemented has been secured from affected persons during the PPG phase.</p> <p>The water will be conveyed using pressurized pipe which will be buried underground, thus ensuring minimal damage to private land. The project shall ensure coordinated efforts for the construction work along the private land is carried out during the non agriculture season to avoid disruption of agricultural practices for private landowners. These measures will be included in the terms and conditions of the Contractual Agreements of the Contractors.</p> <p>Local processes of negotiation and consensus (consent through signed agreements) have been secured from private landowners led by the Local Government during the PPG phase</p> <p>The project will continue to meaningfully engage private landowners and stakeholders during implementation to address any emerging social-</p>
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			<p>environmental challenges and grievances related to project activities</p> <p>Verified during field consultation there is not going to be any eviction of people, impacts on or changes to land tenure arrangements , however economic displacement during the construction phase is possible, but the district has assured minimal or no economic displacement will be ensured keeping in mind plantation/ harvesting seasons to avoid disruption to their work/ livelihood</p> <p>The expanded SEP includes an FPIC protocol which will apply to all socio-cultural groups and allow the PMU to engage meaningfully with them in order to consult, seek and obtain their free prior informed consent to project activities throughout project implementation.</p>
<p>Risk 4: Plantations to restore degraded lands may follow environmentally inappropriate methods leading to monocultures or promoting the spread of invasive species that threaten local biodiversity.</p> <p>(Checklist questions: 1.6& 1.8)</p> <p>Standard 1: Biodiversity Conservation & Sustainable Natural Resource Management</p>	<p>I = 4</p> <p>L = 2</p>	Moderate	<p>Forest personnel and local staff are well trained in plantation techniques and norms. They will implement plantation activities with Forestry User Group Committee members who will guide communities on appropriate plantation techniques while jointly implementing plantation activities. Forestry regulations and forest management plans require site managers to plant locally viable species. A newly prepared Code of Best Management Practices in forestry defines forest management regimes and standards including prescriptions for plantations. In areas where natural regeneration is promising, local rules encourage natural regeneration. The National Biodiversity Centre has documented a comprehensive list of invasive species in the country including measures to prevent pathways and control them. All site-based plantations will strictly follow the National Plantation Strategy, 2020; and local forest management plans. Measures will also be put in place by local forest offices to monitor plantation establishment as well as their successes to avoid monocultures and prevent pathways for invasive species.</p>
<p><i>Animal and plant species habitat loss and development in/near protected areas and other construction-generated impacts</i></p> <p>Risk 5: The construction of infrastructure such as intake works, alignment of water pipes, reservoirs, BPTs etc. may cause temporary impacts to habitats. The sub-projects will be developed</p>	<p>I=3</p> <p>L=3</p>	Moderate	<p>A Forest/ Environment clearance has been secured for the surveys conducted in the project landscape. t..</p> <p>Based on the Forestry/ Environmental Clearance and the ESMF prepared during the PPG, site or activity-specific targeted assessment will be prepared during the early implementation phase of the project and ESMPs will be prepared, implemented and monitored.</p> <p>The site or activity specific targeted assessments will incorporate measures to address such risks</p>

<p>within or adjacent to protected areas potentially impacting biodiversity resources including endangered species, due to project activities.</p> <p>Risk 6: In the two Payment for Ecosystem Services (PES) schemes planned under the project (at Khuchi, Tsirang and Okolumchu, Punakha) to secure the management of watersheds' natural resources namely forests, water sources and streams among others, the ecosystem providers (landowners) may face insecure tenure rights and restrictions in access to areas for food, fuel and products.</p> <p>(Checklist questions: 1.1,1.2, 1.4,)</p> <p>Principle 4: Sustainability and Resilience</p> <p>Standard 1: Bio-diversity Conservation and Sustainable Natural Resource Management</p>	<p>I=2 L=3</p>	<p>Low</p>	<p>which may emerge from the construction process. Mitigation measures such as manual excavation or minimal use of machinery for trenching to embed drinking and irrigation water pipes will be adopted. Laying of water conveyance pipes underground will further ensure pipes are not exposed and subsequent restoration of excavated soil and regeneration of vegetative material in forested tracts.</p> <p>Communities will be closely involved in the design of the PES and several consultative meetings will be conducted with the providers of ecosystem services and users so that there is adequate information provided and constructive discussion and agreement on the payments for services.</p> <p>The project will facilitate consultative processes between ecosystem providers and users so that they can share information, discuss, enter into written agreements specifying roles and responsibilities and payment for services besides establishing provider and user committees, bylaws etc.</p>
<p><i>Climate change impacts</i></p> <p><i>Risk 7: Infrastructure developed under the project as well as nature-based solutions provided by the project can be damaged or destroyed by natural calamities.</i></p> <p>(Checklist questions: 2.1& 2.2)</p> <p><i>Principle 4: Sustainability & Resilience</i></p> <p><i>Standard 2: Climate Change and Disaster Risks</i></p>	<p>I=3 L=3</p>	<p>Moderate</p>	<p>The project will manage risks related to climate change and natural disasters mainly by incorporating climate-resilient design of infrastructure combining concrete infrastructure along with bio-engineering measures. The pipelines will be installed in trenches and buried to prevent pipes from being obstacles, to prevent damage and to ensure leakages do not erode slopes</p> <p>Designs of structures will incorporate scenarios based on climate projections.</p> <p>Other nature-based solutions such as sustainable land management techniques, spring revival activities, reforestation degraded areas are</p>

			expected to enhance the capacity of the watershed to withstand effects of climate change
<p><i>Health, safety and working conditions</i></p> <p>Risk 8: Recruited workers may spread communicable diseases. Workers also may experience occupational health and safety issues at work because of contractors not providing them safe working conditions. Moreover, contractors may employ children and women at site and women may be paid less than their male counterparts.</p> <p>(Checklist questions: 3.7, 7.1, 7.3, 7.5, 7.6)</p> <p>Principle 2: Human Rights Principle 3: Gender & Equality and Women's Empowerment</p> <p>Standard 3: Community Health, Safety and Security</p> <p>Standard 7: Labour and Working Conditions</p>	<p>I=3 L=3</p>	<p>Moderate</p>	<p>Necessary medical examination for the recruitment and engagement of expatriate labourers at construction sites will be strictly implemented by the Project and adhered to by Contractors. Should a new pandemic emerge, to prevent its spread, standard guidance and operating procedures developed by the government will be followed. The project with the assistance of local health personnel (from hospitals and BHUs) will sensitize workers on STDs and HIV/AIDS. These measures will minimise spreading of diseases to communities resident proximate to labour camps.</p> <p>The Contractor will be informed of the provisions in the Labour & Employment Act as well as the Occupancy Health & safety Regulations on the minimum working conditions to create at site, working hours and occupational safety, prohibition of child labour and parity in wages for men and women workers at the work sites which will also be made explicit in the contract clauses including periodic monitoring for compliance.</p> <p>Proper and well stocked medical first aid kits at site and a SOP to follow in the event of accidents and injury to workers will be prepared and implemented for first aid and where required quick and safe evacuation of injured workers to a medical facility.</p>
<p><i>Impact on cultural heritage</i></p> <p>Risk 9: The construction activities will entail excavation (though mostly as linear trenches) across terrain for laying pipes as well as during the construction of storage tanks, treatment plants, break pressure tanks etc. as well. As such, there may be a risk of chance finds during the construction period.</p> <p>(Checklist questions: 4.2)</p> <p>Standard 4: Cultural Heritage</p>	<p>I=2 L=1</p>	<p>Low</p>	<p>During the implementation phase, in an unlikely event of chance finds, where artifacts are unearthed, procedures for chance find will be followed by informing the relevant authority.</p>
<p><i>Release of pollutants and wastes</i></p> <p>Risk 10</p>	<p>I=2 L=2</p>	<p>Low</p>	<p>The project will advocate use of integrated pest management practices for preventing and managing pests. Bio-pesticides is to be explored under the project for managing pests in paddy</p>

<p>The irrigation provided by the project will increase irrigated farming which in turn may encourage the use of inorganic fertilizers pesticides, weedicides etc. polluting water sources and courses downstream</p> <p>(Checklist questions: 8.1, 8.2, 8.5.)</p> <p>Principle 4: Sustainability and resilience</p> <p>Standard 8: Pollution Prevention and Resource Efficiency</p> <p>Risk 11:</p> <p>Construction activities during project implementation may generate harmful waste and pollutants.</p> <p>(Checklist questions: 8.1, 8.2 & 8.6)</p> <p>Principle 4: Sustainability and resilience</p> <p>(Checklist questions: 3.1, 3.2, 3.3, 3.5, 3.6, 3.7, 8.1, 8.2, 8.3 & 8.6)</p> <p>Standard 3: community, health, safety and security</p> <p>Standard 8: Pollution Prevention and Resource Efficiency</p>	<p>I=3</p> <p>L=3</p>	<p>Moderate</p>	<p>and vegetables as bio-pesticides are benign to human health and to the environment. Nutrient leaching will be addressed by the agriculture extension service recommendations and project activities such as mulching and application of compost in fields.</p> <p>Excavated materials will be safely disposed in designated sites and water sprinkled near residential areas for dust control. Waste generated from the project sites will be managed in accordance with the Waste Prevention and Management Regulations of 2016. A project site specific waste management plan will be developed before implementation</p> <p>Excavated material from trenches will be retained carefully to prevent spilling down the slopes and polluting water bodies and later re-filled in the trenches after laying the pipes. The management of soil will be closely monitored during the construction phase. The project will also implement nature based solutions including bio-engineering works to stabilize slopes where required</p>
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Vulnerable group is a term which describes both the condition and the processes that prevent individuals or groups from reaching sustainable development goals, or fully participating in social, economic and political life. In this document "vulnerable communities/groups" describes individuals or groups of people that face higher exposure to climate change, disaster risk and poverty, including but not limited to women, youth, children, elderly, differently-able people, indigenous peoples, disadvantaged families and those living in high risk areas and danger zones. 'Vulnerable' does not mean that the group is vulnerable per se, but that this vulnerability is the result of social, economic and political processes),

Stakeholder engagement and south-south cooperation:

Stakeholder Engagement

This project has been designed based on extensive consultations with stakeholders in the RGoB from all levels, with local institutions such as the Chiwogs, Gewogs, their associated committees and federations and through directly interacting with communities, with specific attention on the inclusion of women, marginalised/minority groups and vulnerable sections in the consultations.

The stakeholder engagement strategy has five key elements to ensure their active and meaningful involvement throughout the project. These are: 1) Free Prior and Informed Consent of communities engaged in the project; 2) Comprehensive mobilisation and awareness generation to ensure inclusive participation, including that of women and vulnerable groups; 3) Continuous capacity building and training to ensure necessary skills and resources are provided to stakeholders; 4) Creation and strengthening of local institutional structures for the management of water resources and infrastructure; and 5) Continuous and participatory monitoring of project activities and impacts. Details of these consultations are provided in the Stakeholder Engagement Plan (SEP - Annex 9). A summary of the SEP is provided below.

Free Prior and Informed Consent (FPIC)

All stakeholder engagements followed the UNDP criteria for free, prior and informed consent (FPIC)⁹⁹. The following basic procedure was followed.

- Community representatives were informed beforehand of the field visits. Participation of all stakeholders from the community, including women and minority groups, and their representatives was ensured. Information about the proposed project was shared with the community ahead of the meeting, including its proposed beneficiaries.
- The project was introduced in person by the focal person from the Ministry of Works and Human Settlements (MoWHS) and technical staff from local (Dzongkhag and Gewog) departments. This included a detailed description of the types of activities envisaged under the project and their potential impacts and benefits. It was made clear during the introduction that the project was formulating and that the final selection of sites and activities would take place at a later stage. It was clarified that there was no guarantee that the project would be implemented in the village.
- The purpose of the visit was described and all the team members were introduced to the community. This included the need to gather information about climate change impacts, status of water infrastructure and supply for relevant use and potential for income generation and livelihoods. Refer to the Stakeholder Engagement Plan Annex for details of the schedule design.
- The community was informed that they were not compelled to share any information that was sought and that this information was shared willingly. This included photographs and surveys that were part of the field assessments.
- It was confirmed that even if the project was approved, the communities would be interested in participating in its activities, including forming the necessary local institutions and groups as envisaged.
- Finally, it was conveyed to the community that they could formally communicate with the concerned local government agencies or with the project development team to seek clarifications or register any complaints. Names and contact details of the relevant team member were provided.

Mobilisation and Awareness Generation

Community mobilisation and awareness generation, focusing on key individuals including traditional and religious leaders and representatives and based on principles of FPIC. This will cover:

- Awareness of climate change, its impacts and the need for community-based action.
- Need for gender responsive interventions and to identify and engage with the most vulnerable groups and communities in the selected sites.
- Strengthening local institutions and CBOs creating new ones, only when needed, to participate in the implementation of activities.
- Representation of women in mixed gender groups and creation of exclusive CBOs of women and vulnerable groups.

Capacity Building

Capacity building will be done on a rolling basis and will precede relevant physical interventions. Training will leverage mobile ICT and social media channels for dissemination. Hands-on demonstration-based approaches will be used extensively. Capacity building will not just focus on training, but will include provision and strengthening necessary tools, implements and infrastructure of targeted groups and individual as well as establishment of networks for accessing markets, value/supply chains and financial services. Key persons targeted for capacity development will be:

- Representatives and officer bearers from local institutions and CBOs. These groups will receive skill development based on the activities they are involved in. Additionally, they will receive training on leadership, organisational and administrative skills, including financial administration, asset management and monitoring.

⁹⁹ The UN-REDD Programme, 'Guidelines on Free, Prior and Informed Consent'. 2018.

- Project staff from within government extension and development agencies and local NGOs involved with the project will receive support in technical and administrative aspects of delivering climate-smart solutions to communities. They will additionally be sensitised to issues of gender equity and challenges that affect marginalised and minority groups and socioeconomically vulnerable groups.
- CBOs and CSOs selected to coordinate and oversee project activities will include women and members of vulnerable groups. The project will strengthen existing user groups and their cooperatives and federations.
- Private sector players and partners, who will be facilitated in engaging with these CBOs and CSOs.

Strengthening Watershed Committees at Chiwog, Gewog and Dzongkhag level as a Multi-stakeholder Platform

The project will leverage the existing framework for natural resources management defined under the water regulations¹⁰⁰ and strengthen the watershed committees at the different administrative divisions to serve as platforms to organise communities around water and natural resource management and sustainable use of resources. These committees will include representatives from CBOs, CSOs, NGOs and relevant government agencies. The committees will be the primary vehicle for implementing and monitoring project interventions for which specific user groups and teams will be appointed.

Participatory Monitoring

The project has a consistent framework to ensure that impacts and outcomes of interventions are monitored at the level of each Chiwog and Gewog level watershed committee through focal persons and key informants and reported to local coordination bodies and relayed to the PMU. Monitoring of project activities will utilise available mobile ICT and hybrid approaches that capture both the process and the results of activities. Participatory monitoring is expected to facilitate learning and adaptive management within communities and to facilitate constructive dialogue between them and institutional and PMU staff.

South-South Triangular Cooperation

Specific actions are envisaged on south-south and triangular cooperation to present opportunities for stakeholders to share and learn from similar projects and to give them an opportunity to showcase their own achievements and share lessons learned so they may be replicated elsewhere. Past experiences in South-South Triangular cooperation have proven to be highly effective in supporting the sustainable use of bamboo, exploring financial mechanisms for biodiversity conservation and collaborations with Benin and Costa Rica on agriculture, climate risk assessment and adaptation and inclusive development. Agencies and platforms that will be partnered with to facilitate this are: a replication in other countries, and to facilitate dissemination through ongoing global South-South and global platforms. It will approach and build partnerships with regional and international agencies including:

- Global Alliance for Climate Smart Agriculture (GACSA) is an inclusive, voluntary and action-oriented multi-stakeholder platform on Climate-Smart Agriculture (CSS). Bhutan is not presently a member or observer on the network.
- The Global Adaptation Network: An umbrella organisation under whose aegis fora such as the Asia-Pacific Climate Change Adaptation Forum (APAN) operate and the Community-based Adaptation Conference is organised.
 - a. APAN has the objective to equip adaptation actors in the region with the knowledge to design and implement climate change adaptation measures, access to technologies and finance, and capacity building for integrating climate change adaptation into national development policies, strategies and plans.
 - b. The Community Based Adaptation Conference is a practitioner-focused forum on climate adaptation, delivering dialogue and evidence to inform policy and action – from the local to the global scale.
- UN South-South Galaxy knowledge sharing platform: A knowledge hub on South-South and triangular cooperation enabling developing countries to effectively face their development challenges and harness opportunities to address them.
- PANORAMA: An initiative to document and promote inspiring, replicable solutions across conservation and sustainable development topics, enabling cross-sectoral learning.

¹⁰⁰ National Environment Commission, 'The Water Regulation of Bhutan'. 2014.

- In addition, the project will formally liaise with existing technical groups that operate regionally or in a national context to facilitate sharing of technical information as well as field data and analysis. These include:
- ICIMOD: Bhutan is a founding member of ICIMOD and the Ministry of Agriculture and Livestock (MoAL) is the designated nodal agency. There are five programmes of ICIMOD in Bhutan at present.
- The CGIAR is the world's largest global agricultural innovation network and is engaged in developing and dissemination of climate resilient agricultural technologies and research in a number of areas relevant to the project including disaster risk reduction and agricultural biodiversity and ecosystem restoration.
- Partnerships and initiatives that improve access of countries to remote sensing and GIS data focused on disasters such as the Sentinel-Asia initiative of the Asia-Pacific Regional Space Agency Forum (APRSAP) and the International Charter Space and Major Disasters which is a worldwide collaboration, through which satellite data are made available for the benefit of disaster management.

Stakeholders in the ACREWAS project will be facilitated to participate in knowledge sharing events such as those described above. This will facilitate the participation of stakeholders in global and regional fora. The project will also explore opportunities for meaningful participation in events where UNDP could support engagement with the global development discourse in Bhutan. The project will additionally provide opportunities for regional cooperation with countries implementing initiatives on CCA and resilience building among communities in geopolitical, social and environmental contexts relevant to the proposed project in Bhutan.

Gender equality and Women's Empowerment:

A comprehensive Gender Analysis and Action Plan (Annex 11) was developed for the project. The analysis included field data collected during visits to the three districts (Gasa, Punakha and Tsirang). Consultations were held with the project beneficiaries of respective districts, Honorable Governors, the Planning Officers, Environment Officers, Kidu Officers, District Engineers, District Health Officers and the Gender Focal Persons. Discussions with primary beneficiaries during site visits included meetings, focus group discussions (FGD) and Key Informant Interviews (KII). The GAP also includes a comprehensive review of policies and literature on gender and women in Bhutan, on international conventions that Bhutan is signatory to and on best practices and strategies for gender inclusion in project design.

The GAP provides a contextual situation analysis of gender equality in Bhutan, reviews the laws and policies, cultural norms and beliefs, gender roles and responsibilities and analyses gender aspects of access and control over resources. Its findings are summarised below.

- Women in the project area were aware of gender equality and women's empowerment. With the advocacy programs of CSO's like RENEW and the Gender Focal Persons in the Dzongkhag, they understood about gender-based violence, sexual harassment issues etc.
- The study revealed that gender roles in water management are well spelt out with women involved in collection, provision and management of water at the household level. They are responsible for maintaining sanitation and hygiene in the house, while men are more involved maintaining the water source, restoring breakages and repairing water supplies.
- Woman's independent decision-making role was limited to household issues like water use at home, hygiene and sanitation etc. Women contributed to major household decisions like purchase of agriculture machinery, sale and purchase of land while men could take such decisions independently.
- The challenges women faced regarding water use, collection and management are now exacerbated by the consequences of climate change.
- Water Users' Associations (WUAs) were formed in some of the project sites some five years back. However, such groups are working sub-optimally and informally require support capacity building.
- Unequal gender participation was observed both in rural and urban WUAs because of issues of representation, power relations, and culture.
- Women representatives in the Executive Committees of WUAs are minimal.
- The same set of women represented many village groups (like the Community Forestry Management Groups, the Non-Timber Forest Products Groups, the Water Groups, Dairy Farming Groups, Vegetable Groups etc.), hence their participation in many groups/committees was not effective.
- There is a strong presence of age-old cultural and traditional values embedded in the society with varying degree of cultural bias that led women to be considered inferior to men. Proverbs and beliefs exist in the villages that portrays men's superiority over women. Hence, the impact of societal, cultural and gender stereotypes plays a significant role in the participation of women related to the use of water resources and infrastructures. However, women in project areas expressed otherwise.

- District headquarters do not have a water management plan. Water is managed by Municipal sector in urban areas while at Gewog level, users form user group with technical backstopping from the Dzongkhag wherever Chiwogs have water issues.
- Since gender is a cross-cutting issue for the 12th Five Year Plan, gender balance representation is encouraged in decision-making platforms, with equal participation from both genders. Awareness programs are conducted at the Gewog level and information is shared regarding policies about women's participation in meetings and decision-making bodies. However, some KII informants felt that, at the grass root level, people are still not fully aware and confused about how to relate gender with water resource management.

The project aims to incorporate gender analysis and gender concerns into all aspects of project cycle management at planning, implementation, monitoring and evaluation. The GAP facilitates increased participation of women in decision-making processes. Project activities will be designed in a gender-responsive way while facilitating equality and equity for both men and women and youth to the extent possible, given the constraints of systemic barriers that are related to deep-rooted traditions, norms and stereotypes and power structures. The project seeks to enable transformational changes in women's ability to engage in decision-making processes. The project activities will ensure that both men and women are empowered to increase their understanding and appreciation of the importance that both genders play in the everyday management of water resources.

In line with national policies as well as UNDP and GEF guidelines, the project will adopt the following principles in its day-to-day management:

- Demonstrate gender-responsiveness in all interactions with project stakeholders;
- Refrain from using language or behavior bias and disrespect based on gender;
- Avoid gender stereotyping in project documents and communication outputs;
- Support zero tolerance to sexual harassment, gender-based violence and/or sexual exploitation and abuse of men, women, girls and boys that may occur in connection with any of its supported activities; and
- Collect gender -disaggregated data/information under gender-responsive indicators to inform results-based and adaptive M&E; this allows for evidence-based decision-making throughout the project cycle.

The project will allocate resources and time to address gender imbalances and strengthen representation of women in local organisations and institutions within the framework of the project's key objectives. The project will be in-line with government policies and national strategies for women empowerment, and closely aligned with the GEF and UNDP guidelines on gender mainstreaming. Key recommendations from the Gender Analysis are as follows;

Various programs on awareness, trainings and sensitisation on gender issues and gender strategies will be conducted at institutional levels and for communities, including:

- PMU team, partner institutions and responsible parties;
- Local government and technical staff at dzongkhag, gewog and chiwog;
- Community representatives, including Local Government and religious leaders;
- Community-based organisations including Water Users' Associations

A gender focal person will be nominated at the PMU in order to ensure that the consultative processes, planning, development of documents, IEC materials, awareness and sensitisation programs and project implementation, monitoring and evaluation are carried out under the gender lens. Further, Gender Focal points of the 3 districts as well as other responsible parties like MoENR, MoAL are engaged from the very outset of the project in planning, design of activities and project implementation for continued support to enable optimal gender mainstreaming in the project cycle management. The Gender Focal Person will ensure the following:

- Gender concerns are appropriately integrated and that women are facilitated through mobilisation, training and/or representation in management structures,
- Involve women at the design stage of all intervention activities. This includes:
- Siting of installations and infrastructure such as multi-use irrigation systems;
- Prioritisation of areas to be restored;
- Timings, duration and volume/delivery of domestic water supplies;
- Selection of species for woodlots/plantations and seeding of pasturelands.
- To ensure women household representatives from a minimum of 25% households and 25% of Executive committee members in each WUA are women taking up the role of Chairperson heading the WUA.
- Ensure awareness creation of WUA members on gender equality, sexual harassment, promotion of a conducive environment and arrangements to enable women's participation.
- To provide flexibility to women wage earners to nurse/take care of their children when required.

- The project will explore the possibility of establishing daycare facility and supporting the community to efficiently run it both during the project period and beyond.
- Clear policy and system for grievances and complaints for women staff and community members on the project.
- Facilitate formal linkages with government gender focal persons in relevant organisations and with the National Commission for Women and Children.
- Promote Access to information and grant support for startups on agriculture and or water-related businesses targeting vulnerable women- headed households and youth groups.
- Promote agricultural/farming technologies that are women friendly including O&M trainings

A clear and comprehensive communication strategy and plan will be formulated for the project. The plan will cover both gender sensitisation and awareness building in communities as well as institutional mobilisation and support LG officials who will be engaged in project implementation. The plan will ensure that training and awareness materials and modules are designed to be accessible by semi-literate and illiterate audiences and are relevant to the local context, the implementation of which will result in mobilising, raising awareness and building capacities of individuals and institutions as well as communities themselves.

Women facilitators of water projects during training programmes, both hardware and software, serve as role models and an incentive that encourages rural women to take bold initiatives to help them play their required roles. The project shall encourage recruitment for participation of women facilitators and trainers in the capacity development programmes.

Robust and quantitative indicators will be identified to track and monitor gender-related impacts of the project and to trigger interventions, where needed, that ensure women do not face unintended consequences from project activities. Proactive measures will be taken by the project to ensure women are able to access and manage key resources, assets and information that facilitate adoption of measures to mitigate and adapt to climate change impacts on their livelihoods and food security.

Household water usage and collection system. Communities including all women and youth in the project sites will be made aware and trained in the water management system, household water use and collection systems efficiently. Furthermore, most households, especially all women headed and single mother households, will have a drinking water supply connected to their house. They will be supported to implement these activities at household and neighborhood levels. Women, men and youth will be equally involved in related consultation processes, surveys, assessments and especially the water tariff study/determination and women will be engaged in local decision-making.

The PMU staff and the relevant stakeholders will be expected to demonstrate a clear understanding of gender mainstreaming issues and opportunities. Gender statistics, and not only gender-disaggregated indicators, will be integrated into the project's logical framework, and measured during regular M&E processes. Capacity building and gender mainstreaming skills and gender aspects of climate change adaptation and resilience building will be imparted to the PMU, LG, District and other relevant stakeholders (ACREWAS) who will be implementing the project. Their capacity for consultation with partners/stakeholders and processes on reporting, monitoring and evaluation will be strengthened. All project members will take part in gender specific capacity development measures so that the project staff will have gender competencies.

Participatory training programmes will be organised for both men and women at the community level on the important role of women in water projects in general and operation and maintenance in particular. This would enable the men to appreciate women and accord them the recognition; it would also make the men more amenable to changing their stereotyped attitudes concerning women's traditional roles. Such trainings will be conducted throughout the project period in a progressive upscale manner, especially with support of the NCWC, so that respondents are provided required knowledge in order that their attitude and practice change over a period of time.

In order to take into consideration multiple discrimination and special needs, it has to be ensured during the planning and implementation that disadvantaged groups such as women, women headed households, poor households and people with disabilities are always consulted. Women will be recognised as central to the provision, management and safeguarding of water and are involved in the planning and decision making of water management systems making it a gender sensitive participatory planning. This will improve water management scheme performance while strengthening the position of rural women and vulnerable groups.

At least 25% of the households are represented by women members in the WUAs. Furthermore, 25% of the Executive members in the WUAs are women taking up the role of Chairperson, who will be heading the WUAs. At the beginning of the implementation phase of the project, a memorandum of understanding (MoU) will be signed between the PMU and the LG to ensure appropriate women participation in the WUA.

The project will promote women and youth as agents of change, initially by empowering them in the various aspects of local water management, foreseeing them to be future leaders in the community and being instrumental in gender mainstreaming at the local level.

The project will train women – especially economically disadvantaged and female-headed households in water-saving techniques, various operation and maintenance (O&M) measures, water use for home gardening, etc., the knowledge of which could be used in income generation and knowledge sharing with their communities and beyond. Additionally, involvement of women in O&M will empower them, making them less dependent on the expertise of men.

The project will maintain gender disaggregated data collected through surveys, regular record keeping, monitoring etc. This will enable proper monitoring of gender benefits and impacts. Further, there is a need to sensitise and train officials in the PMU detailing how such data is to be collected and maintained. Maintaining gender disaggregated data/information makes it easier for the monitoring and evaluation, future planning as well as attracts the interest of a variety of stakeholders.

The monitoring strategy will include tracking of social and environmental safeguards which includes gender impacts. Focal persons will be identified in each project site and these will preferably be women who are office bearers in the LG, WUA or any other sub-committees. These focal persons will be trained in recording and reporting on specific indicators and events. For instance, maintenance of attendance and financial records, sites selected for local intervention, allocation of saplings, plantation of saplings etc. They will be guided and monitored by the PMU ensuring that such information is correctly recorded and maintained for further use during reporting. Furthermore, this essential information is spelled out as indicators for the GAP which will be referred while monitoring the progress of the project.

Indicators used for the monitoring of project will include gender indicators that capture differences and inequalities in the situation of women and men. Monitoring data will be gender-disaggregated where feasible which will also serve to identify any gender gaps or inequalities in delivery of project benefits or participation. Data collected will be disaggregated by sex and age. Robust and quantitative measures that can capture trends and magnitudes of change or impact will be collected in addition to qualitative measures that provide an understanding of socio-cultural contexts, political alignments and decision-making processes. Reflection of gender issues such as gender differences and biases in ownership, access and decision making and control over benefits and results of project activities will be picked.

Innovativeness, Sustainability and Potential for Scaling Up

The project components re-enforce one another by: 1) Providing a favourable policy and governance environment for the management and restoration of water resources and the sustainable financing of water services; 2) Enhanced ecosystem services, particularly hydrological services from watersheds through their restoration and protection; 3) Climate proofing of water infrastructure and modernising systems for management, O&M and metering; 4) Close engagement with the private sector both with corporate entities and local entrepreneurs to pilot and establish partnerships in watershed management, water services provision and O&M and nature-based income generation activities; and 5) Documentation, dissemination and exchange of lessons, experiences and knowledge generated during the project and cross-fertilisation of solutions and practices from other projects.

Each of the four components brings innovative approaches and mechanisms to sustain and scale up its activities. Close involvement of government institutions and departments in the project's development and implementation processes will ensure the replication of successful approaches. Strengthening of capacities among government stakeholders will ensure the continued mainstreaming of climate considerations into planning and decision-making in the water sector. This will be further strengthened by extensive training and capacity building of local communities and technical staff on adaptation interventions that will align future activities to be climate resilient. Overall, as a result of increased participation, project interventions are more likely to be replicated and/or scaled up.

There is also potential for replicating livelihood diversification interventions, both nationally and internationally. These interventions may be easily replicated in other villages with relatively small investment. The project will actively share experiences about approaches, techniques, successes and failures to facilitate adoption and replication.

The project will pilot and scale up the following innovative strategies for a transformational impact on the management of water resources and the O&M of water infrastructure and services.

Innovativeness

The project will test and adapt relevant technologies and innovative practices to local conditions in Bhutan to ensure water and associated infrastructure management more effective and resilient to climate change risks. This includes those the private sector can play a crucial role in delivering.

- The project proposes a synergetic combination of watershed level restorative work, resilient livelihood development and upgrading and "climate-proofing" water infrastructure coupled with enhanced efficiencies in the system through digital solutions of management.
- Payment for ecosystem services will be used to sustain watershed management and monitoring. These will scale up existing PES arrangements between upstream communities and Damphu town. Furthermore, PES systems will be piloted wherein farmers using irrigation water contribute through in-kind contributions into O&M of water infrastructure and catchment restoration efforts.
- Public-private partnerships will be piloted in the three project Dzongkhags. Two areas of partnerships will be explored: 1) The development and introduction of new technologies in water service management, as well as measurements and monitoring of discharges and off-takes; and 2) Plantations and greening of degraded catchment areas and barren lands.
- Incubators will be set up using the PPP mechanism to facilitate training of entrepreneurs in the water service and O&M sector. Youth and women will be encouraged to participate in these training modules and provided support in establishing commercial units.
- The use of IoT-based sensors and SCADA systems for monitoring and metering water distribution and supply networks will bring a number of new technologies that have the potential to transform the water service sector by bringing in new levels of efficiency and cost effectiveness.
- The project will create a node-based distributed digital data archival and analysis system which leverages ICT technologies. This system will serve as the information backbone of the River Basin Management Plans and will be populated with GIS-based surveys of water resources, water infrastructure and service networks. It will include data collected from WUAs and their committees including data pertaining to O&M and activities. The information system nodes will be located at Gewogs, Dzongkhag and national levels, creating a transparent and localised yet networked solution for information needs of water resource planners and communities.
- Formal collaborations with research and extension agencies for access to the latest technologies and techniques for climate-resilient agriculture. This includes i) new and suitable varieties of crops (cereals, pulses and vegetables); ii) indigenous species of trees, shrubs and grasses for horticulture, agro-forestry and watershed restoration; iii) quick growing varieties of fuel, fodder and multiuse species of trees for plantations in barren areas and homesteads and iv) drought resilient varieties of livestock, milch animals and small ruminants. The project will additionally tie up with research agencies for access to the latest IPM techniques and veterinary and animal health technologies.
- In-situ trials and demonstrations of technologies will be the primary vehicle for imparting training. This will additionally ensure appropriate testing and adaptation of new technologies to local conditions. The project will replicate lead farmer and demonstration-based training models¹⁰¹ for imparting knowledge on climate resilient agriculture and techniques for watershed management, including soil and water conservation measures and vegetative restoration techniques.
- Integration of ICT and IoT technologies with the M&E system proposed will ensure verifiable, quantitative and granular monitoring of project impacts. Citizen sensing approaches will engage volunteers from the WUAs and staff for recording ground conditions using mobile phones. Robust, gender-responsive, quantitative and easily measured indicators will be identified to encompass bio-physical and socioeconomic parameters, including those for environmental and social safeguards. Tools such as the Open Data Kit (ODK), and on registers which can be photographed using smartphones will be used extensively to facilitate efficient and accurate reporting and surveying of field observations, including collection, recording and transmitting data collected by the community facilitators and volunteers.
- The project uses contemporary design and techniques that maximise the use of locally available materials and labour while undertaking repair and enhancement of water infrastructure. This will enhance local incomes and skills and ensure that capacities for O&M are available within communities. Using alternative energy sources and modern lining materials to improve the efficiency of water distribution will be combined with micro-irrigation and water-saving techniques.

Sustainability

The project's sustainability hinges on successful ownership of its activities by local communities, local government agencies and the active engagement with the private sector. In addition, the project will invest both in restoring and enhancing hydrological services from catchments and in constructing highly resilient water infrastructure which is

¹⁰¹ Kinga Chozum, 'Assessment of Lead Farmers Training Model Being Promoted under CARLEP in Four Dzongkhags of Eastern Bhutan'. 2019.

designed to work with minimal O&M for extended periods. Its focus on government policies and cross-sectoral master plans will ensure policy coherence across the sectors for integrated water and land management at watershed scale. It will additionally enhance the capacity of agencies to generate climate risk information (through modeling work) to underpin adaptive strategies for water management, including climate proofing of water infrastructure.

The activities under component 2 are directly related to the investments under component 3 in the following way. Watershed restoration activities under component 2 will include extensive soil and water conservation through water harvesting, retention structures and check dams. It will ensure re-vegetation of slopes through assisted natural regeneration and protective structures around water sources that will reduce erosion in addition to improving recharge. The component will also set up institutional structures and financial mechanism to sustain these activities. This relates to the investments under component 3 as follows:

1. Sustained flows, including during the dry season, improving the efficiency and effectiveness of investments in water infrastructure.
2. Buffering of floods during the peak rainy season, thereby buffering high flows and protecting the water infrastructure downstream.
3. Reduced transportation of sediment and debris along streams, improving efficiencies of water distribution, reducing O&M costs and preventing structural damage.
4. Direct protection by the protective structures around crucial infrastructure, from extreme events which could trigger mud-slides and high debris transport.

The broadening of the financial mechanisms to support O&M of water infrastructure and restoration and protection of catchment areas is another strategy to ensure sustainability of project interventions. The setting a differentiated fee-based system to achieve cost recovery on O&M will be another key mechanism for financial sustainability. These mechanisms will include PES systems, tariffs and user fees and payments. Linking these payment mechanisms to private sector and entrepreneurship-based O&M and management will further increase the sustainability of the enterprises.

Other elements of the sustainability strategy are as follows.

- The project will ensure complete and comprehensive ownership of its strategy and activities by communities and local government partners. The project will ensure long-term sustainability and continuation by investing in the strengthening of community-based institutions and government agencies at the local level. Awareness and sensitisation will be undertaken to facilitate representation of women and vulnerable groups in decision making. Mechanisms will be instituted for training of community facilitators and members of different user groups to coordinate, collaborate, cross-learn and complement each other's activities. WUAs and their committees will be strengthened through training and provision of relevant assets. Communities will consequently be able to organise and pool resources for sustaining and extending project activities.
- Investments in water infrastructure will provide long term benefits to communities, for which small user fees will be collected both in kind and in cash. WUAs and committees engaged in O&M of infrastructure will be assisted in raising finances and resources from PES systems and will be provided necessary training in financial administration and bookkeeping as well as monitoring and O&M, thereby sustaining the impact of the project. This will be complemented through Private sector engagement through PPP and other modalities.
- Climate proofing water infrastructure and construction of climate resilient water infrastructure will ensure long term success of the project's activities. The infrastructure will communities well beyond the five years of the proposed project.
- A comprehensive technical, social and environmental evaluation of the sites and users will be made ahead of project implementation. This will ensure that any negative impacts of the project are identified and addressed well in advance and will therefore directly contribute to the acceptance and longevity of project interventions.
- All construction activities will utilise local materials where possible and employ local manpower. This will enhance local capacities in and skills for subsequent upkeep and O&M. This will also bring down the costs of O&M operations and provide an incentive to communities.
- The types of equipment selected for the project will be determined by the availability of spares and parts among nearby markets and towns. Entrepreneurs who service and repair equipment will be identified and linked to the relevant WUAs.
- Linkages with markets, private sector agencies for sales of produce and accessing financial services as well as extension support such as veterinary care will also be established to increase the financial viability of interventions and ensure the private sector meaningfully engages with the project and contributes to its long-term sustainability.
- Private sector engagement and entrepreneurial interventions will be supported through the PPP model that is being piloted in the three Dzongkhags. The sustainability of entrepreneurial interventions and the role of the private sector

in the project will be ensured by seeking out private sector involvement in the supply of inputs, O&M of equipment and in water service provision for both farmers and domestic use, as described earlier.

Potential for scaling up

Replication and scaling up of project activities will be ensured through the following approaches.

Private actors, including the corporate sector will be engaged in water and watershed management, livelihood development and development, deployment and training of entrepreneurs in setting up businesses for water service delivery. The emphasis on knowledge sharing and dissemination of both successful activities and lessons learned will facilitate adaptive learning in the project. Replication of successful interventions to other areas will also be ensured by strengthening government agencies in their implementation. Knowledge sharing, cross-learning and dissemination within and between stakeholders in the community, local government, national, regional and international levels will be ensured through:

- Exchange visits between WUAs, their committees and their representatives, both horizontally - to other similar agencies, and vertically, to national and site level committees and user groups.
- Bi-annual knowledge sharing events organised at each of three project Dzongkhag and at the national level.
- Training programmes, workshops and awareness generation events conducted throughout the project life cycle and aligned to project activities and workplans.
- Regular meetings at the level of the WUAs and their committees to provide a formal mechanism to report, share and plan project activities. These meetings will also facilitate learning and coordination of projects and programs of the government and other agencies in each project site.
- Formal partnerships with other ongoing projects of the government and development agencies through concerted coordination, knowledge exchange and collaboration to ensure long term sustenance of these activities.

The project will invest in the development and documentation of the new and innovative technologies and techniques described earlier. Training materials and modules will be designed for use by both technical and non-technical users that focus on locally relevant, low-cost techniques and technologies, facilitating their scaling up and replication.

Strengthening of government agencies to implement and replicate the project will be ensured. The project will be implemented through existing governance mechanisms and institutions, thereby strengthening them and contributing to their capacity development, particularly at the local level. Extension and development services will be trained and provided hands-on experience and opportunities for cross learning with experts in the field. Gaps in critical communication systems and facilities will be addressed by basing the local PMU at the Dzongkhag level. Extension and development agencies and staff will be equipped with survey and storage equipment, materials and supplies for extension support. This will ensure lessons from the project are supported over a long term and replicated in other areas within the Dzongkhags.

Digital Solutions

The project will address climate change problem and barriers to adaptation solution using tools that leverage the Internet of Things (IoT) and digital technologies. The project proposes a synergetic combination of watershed level restorative work, resilient livelihood development and upgrading and "climate-proofing" water infrastructure coupled with enhanced efficiencies in the system through digital solutions that uses IoT-based sensors and SCADA systems. The integration of innovative IoT and ICT based monitoring technologies will modernize monitoring, maintenance and metering for efficient water distribution and management in all water related assets created by the project. Overall it will result in improved efficiency in water acquisition, storage, conveyance, distribution, quality assurance and overall operations, monitoring and maintenance of the water infrastructure. This will include:

- Enhancing operational efficiencies of assets created by the project will be automated including detection of leaks and simplifying metering systems..
- Reduce water consumption by improving efficiencies of delivery networks and exploring tariff regimes for both domestic and irrigation water, with community oversight.
- Digitisation of water distribution network and Non-Revenue Water and create digital database, maps and assessment of non-revenue water for Punakha and Gasa
- Installation IoT based telemetric sensors in 74.14km of water transmission and distribution lines across the project sites. Sensors will also be installed in water storage facilities for the 1,266 cum of storage created to help track water levels on a continual basis. The automation will be integrated with GIS systems.

- Create a comprehensive digital platform for managing information pertaining to watershed restoration and water resources and services. This digital platform will be based on open-source technologies and will leverage IoT and ICT systems proposed in components 2 and 3. It will enable a systematic tracking and documenting of water quality, quantity, availability, assets, and inventory. A node-based distributed digital data archival and analysis system which leverages ICT technologies will serve as the information backbone of the River Basin Management Plans and will be populated with GIS-based surveys of water resources, water infrastructure and service networks. It will include data collected from WUAs and their committees including data pertaining to O&M and activities. The information system nodes will be located at Gewogs, Dzongkhag and national levels, creating a transparent and localised yet networked solution for information needs of water resource planners and communities.
- Private sector partnership through introduction of technology and innovation, optimizing resource use and cost savings and reinforce sustainability during and beyond the project period. During the PIF and PPG design phase consultations have been held with all key stakeholders including DHI. DHI offers extensive homegrown experience in setting up water management systems within Bhutan which meets the expectation of the ACREWAS project to contribute and add value. Hence, private sector entities such as the DHI will be invited to participate in the project through competitive procurement process to integrate automation of irrigation and drinking water assets using Supervisory Control and Data Acquisition (SCADA) technologies anchored on IoT, AI, micro-controller and sensor based data science within water intake at source, water storage tanks, WTP facilities, main transmission lines and subsidiary distribution lines; assess, procure, and install sensors, electric valves, gauges, flow meters, fire hydrants, balancing units, and weather monitoring stations linked to main control; facilitate acquisition of real time climatic data such as temperature, humidity, rainfall and soil moisture at the catchment as well as on water levels, flow rates, water pressure, water quality parameters to facilitate critical decision making; establish communication and display of management information on monitoring screens and mobile phones; train and groom Water user groups and youth-based start-up enterprises to manage the technology components and support the overall O&M beyond the project period for a service fee and enable collaboration with agencies on tech driven innovation to enhance water use efficiencies for agriculture, drinking and other domestic use. Activities under this include;
- Further, knowledge management activities will enhance understanding of new technologies and know-how of their application and implementation in water management and in measuring water resources. This includes the measurement of hydro-meteorological and discharges at off-takes, using IoT and ICT devices and installing a GIS based digital platform for water resources management and water service networks. Enabling conditions will be 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.

V. PROJECT RESULTS FRAMEWORK

<p>This project will contribute to the following Sustainable Development Goal (s): SDG 1: No Poverty (target 1.5 - resilience of those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events); SDG 2: sustainable agriculture (target 2.4 - strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters); SDG 5: Gender Equality (target 5.a: equal rights to economic resources, access to ownership and control natural resources, in accordance with national laws); SDG6: Clean Water and Sanitation (target 6.1 -universal and equitable access to safe and affordable domestic water; 6.4 - increase water-use efficiency and reduce number of people suffering from water scarcity; 6.5 - integrated water resources management; 6.6 - protect and restore water-related ecosystems; 6.b - participation of local communities in improving water and sanitation management); SDG 13: Climate Action (target 13.1 - resilience and adaptive capacity to climate-related hazards and natural disasters); SDG 15: Life on Land (Target 15.1- conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services)</p>				
<p>The project also contributes to UNDP Strategic Plan (2022-2025) and five of the six signature solutions viz. 1: Poverty and Inequality; 2: Governance; 3: Resilience; 4: Environment and 6: Gender Equality</p>				
<p>This project will contribute to the following country outcome (UNSDPF):</p>				
<p>Outcome 2: access to water sanitation and hygiene services (2.3- Improved policies and strategies for health, nutrition, water, sanitation and hygiene); Outcome 4: communities and its economy are more resilient to climate-induced and other disasters (4.1: Inclusive, risk-informed systems and capacities to benefit from sustainable management of natural resources; 4.2- innovative financing, inclusive business environment and improved livelihoods through climate resilient and nature-based solutions)</p>				
	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target
Project Objective: To enhance resilience for sustainable economic well-being of the people of Bhutan through climate adaptation of the water sector	Mandatory Indicator 1: People benefitting from GEF financed investments (disaggregated by gender) GEF Indicator 11	0	11,200 people (male = 5,840 & female =5,361)	37,334 people (Male =19,465 & Female = 17,869)
	Mandatory Indicator 2: Area of land and ecosystem under restoration (Ha under climate-resilient management): GEF Indicator 3	0	16,746 Ha	41,910 Ha
Project Component 1	Water governance and institutions			
Project Outcome 1: Strengthened water governance, institutions and financing mechanism in support of climate-resilient water management	Indicator 3: Number of local level institutions established for adaptive management of water resources	0	18	18
	Indicator 4: No of district and basin level climate-risk informed policies and strategies developed and endorsed	0	9	13
Outputs to achieve Outcome 1	<p>1.1 Relevant national and local policies and strategies aligned with sustainable and climate resilient water management.</p> <p>1.2 Institutional & community level capacity for climate-smart water and watershed management strengthened.</p> <p>1.3 Innovative financing mechanisms for both watershed management and water infrastructure introduced</p>			
Project Component 2	Nature-based solutions for sustainable and climate-resilient watersheds, and livelihood enhancement			
Outcome 2 Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and their ecosystem conditions improved	Indicator 5: Area of watersheds restored and protected (Ha)	0 Ha	15,407 Ha	38,518 Ha
	Indicator 6: Number of watershed and local level climate-risk informed policies and strategies	0	6	6
	Indicator 7: Hectares of agricultural land under climate-resilient practices	8 = 0	8 = 1,357 Ha	8 = 3,392 Ha
Outputs to achieve Outcome 2	<p>2.1 Nature-based solutions for watershed restorations implemented aimed at yielding stable spring/stream flows.</p> <p>2.2 Forest/Ground cover in catchment watersheds managed and maintained through the engagement of local communities and private/corporate sector</p>			
Project Component 3	Efficient, adequate, sustainable supply, distribution, and utilisation of water			

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	Indicator 8: Number of persons with assured access to irrigation and domestic water through climate-proofing and enhancement of water infrastructure	0	5,817 (2,824 females)	9: 19,391 (9,413 females)
	Indicator 9: water infrastructure more resilient to climate variability and change 9a: Km of domestic and irrigation water transmission and distribution lines climate proofed and automated with IoT and ICT based technologies Cum. of domestic and irrigation water storage established	9 a: = 0	9a: = 55.6 km	9a: = 74.14 Km
	9b: Cumecs of domestic and irrigation water storage established	9b: = 0	9b: = 949.25 Cum	9b: = 1,266 Cum
Outputs to achieve Outcome 3	3.1 Climate proofing measures implemented in multi-purpose storage, conveyance, and distribution network of domestic and irrigation water 3.2 Efficient drought-resilient water management technology tested and upscaled through private sector (youth-based start-up enterprises)			
Project Component 4	Knowledge management			
Outcome 4 Strengthened awareness and knowledge sharing mechanism established	Indicator 10: Number of knowledge products generated and disseminated	0	8	16
Outputs to achieve Outcome 4	4.1 Communication strategy developed and implemented on water conservation and sustainable management developed and implemented 4.2 Publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin institutionalised			

VI. MONITORING AND EVALUATION (M&E) PLAN

The project results, corresponding indicators and mid-term and end-of-project targets in the project results framework will be monitored annually and evaluated periodically during project implementation. If baseline data for some of the results indicators is not yet available, it will be collected during the first year of project implementation. The Monitoring Plan included in Annex details the roles, responsibilities, and frequency of monitoring project results.

Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the UNDP POPP (including guidance on GEF project revisions) and UNDP Evaluation Policy. The UNDP Country Office is responsible for ensuring full compliance with all UNDP project M&E requirements including project monitoring, UNDP quality assurance requirements, quarterly risk management, and evaluation requirements.

Additional mandatory GEF-specific M&E requirements will be undertaken in accordance with the GEF Monitoring Policy and the GEF Evaluation Policy and other relevant GEF policies¹⁰². The M&E plan and budget included below will guide the GEF-specific M&E activities to be undertaken by this project.

In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed during the Project Inception Workshop and will be detailed in the Inception Report.

Additional GEF monitoring and reporting requirements:

Inception Workshop and Report:

A project inception workshop will be held within 2 months from the First disbursement date, with the aim to:

- a. Familiarise key stakeholders with the detailed project strategy and discuss any changes that may have taken place in the overall context since the project idea was initially conceptualised that may influence its strategy and implementation.
- b. Discuss the roles and responsibilities of the project team, including reporting lines, stakeholder engagement strategies and conflict resolution mechanisms.
- c. Review the results framework and monitoring plan.
- d. Discuss reporting, monitoring and evaluation roles and responsibilities and finalise the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP and other stakeholders in project-level M&E.
- e. Update and review responsibilities for monitoring project strategies, including the risk log; SESP report, Social and Environmental Management Framework and other safeguard requirements; project grievance mechanisms; gender strategy; knowledge management strategy, and other relevant management strategies.
- f. Review financial reporting procedures and budget monitoring and other mandatory requirements and agree on the arrangements for the annual audit.
- g. Plan and schedule Project Board meetings and finalise the first-year annual work plan.
- h. Formally launch the Project.

GEF Project Implementation Report (PIR):

The annual GEF PIR covering the reporting period July (previous year) to June (current year) will be completed for each year of project implementation. UNDP will undertake quality assurance of the PIR before submission to the GEF. The PIR submitted to the GEF will be shared with the Project Board. UNDP will conduct a quality review of the PIR, and this quality review and feedback will be used to inform the preparation of the subsequent annual PIR.

LDCF/SCCF Core Indicators:

The LDCF/SCCF Core indicators included as Annex 15 will be used to monitor global environmental benefits and will be updated for reporting to the GEF prior to MTR and TE. Note that the project team is responsible for updating the indicator status. The updated monitoring data should be shared with MTR/TE consultants prior to required evaluation

¹⁰² See https://www.thegef.org/gef/policies_guidelines

missions, so these can be used for subsequent ground truthing. The methodologies to be used in data collection have been defined by the GEF and are available on the GEF website.

Independent Mid-term Review section(MTR):

An independent mid-term review (MTR) will be completed by the mid-point of the project. The terms of reference, the MTR process and the final MTR report will follow the standard templates and MTR guidance for UNDP-supported GEF-financed projects available on the [UNDP Evaluation Resource Center](#). The MTR must be submitted to the GEF by the mid-point of the project but no later than 48 months after CEO Endorsement. To meet the submission deadline, final MTR reports must be completed and submitted to BPPS NCE team no later than 2 months in advance of the submission deadline to allow sufficient time for internal review/clearance that is required prior to submission.

Provisions must be taken to complete and submit the MTR within the submission deadline. Therefore, the MTR process must start no later than 8 months before the expected date of submission of the MTR.

The MTR will be 'independent, impartial and rigorous'. The evaluator(s) that UNDP will hire to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be reviewed. Equally, the evaluators should not be in a position where there may be the possibility of future contracts regarding the project under review.

The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the MTR process. Additional quality assurance support is available from BPPS/NCE.

The final MTR report will be publicly available in English and will be posted on the UNDP ERC by the MTR submission date included on cover page of this project document. A management response to MTR recommendations will be posted in the ERC within six weeks of the MTR report's submission to the GEF.

Terminal Evaluation (TE):

An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terms of reference, the evaluation process and the final TE report will follow the standard templates and guidance for GEF-financed projects available on the [UNDP Evaluation Resource Center](#). TE must be submitted to the GEF no later than 6 months after the Completion Date. This is a hard deadline that, if not met, can only be extended through a formal extension request. To meet the submission deadline, final TE reports must be completed and submitted to BPPS NCE team no later than 2 months in advance of the deadline to allow sufficient time for internal review/clearance that is required prior to submission.

Provisions must be taken to complete and submit the TE within the submission deadline. Therefore, TE must start no later than 8 months before the expected date of submission of the TE (or 11 months prior to the estimated operational closure date).

The evaluation will be 'independent, impartial and rigorous'. The evaluator(s) that UNDP will hire to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. Equally, the evaluators should not be in a position where there may be the possibility of future contracts regarding the project being evaluated.

The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the terminal evaluation process. Additional quality assurance support is available from BPPS NCE.

The final TE report will be publicly available in English and posted on the UNDP ERC by the TE submission date included on cover page of this project document. A management response to the TE recommendations will be posted to the ERC within six weeks of the TE report submission to the GEF.

Per the GEF Terminal Evaluation requirements, for cancelled full-sized projects, Terminal Evaluations are required if the GEF grant expenditure exceeds more than US\$ 2 million.

Final Report:

The project's terminal GEF PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the Project Board during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.

Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information:

To accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy¹⁰³ and the GEF policy on public involvement¹⁰⁴.

Monitoring and Evaluation Budget for project execution:		
GEF M&E requirements to be undertaken by Project Management Unit (PMU)	Indicative costs (US\$)	Time frame
Inception Workshop and Report	10,000	Inception Workshop within 2 months of the First Disbursement
M&E required to report on progress made in reaching GEF core indicators and project results included in the project results framework	19,000	Annually and at mid-point and closure.
Preparation of the annual GEF Project Implementation Report (PIR)	NA	Annually typically between June-August
Monitoring of <ul style="list-style-type: none">• Review of implementation of Gender Action Plan• Review of implementation of Social and Environmental Safeguards	103,000	On-going.
Supervision missions	NA	Annually
Learning missions	NA	As needed
Independent Mid-term Review (MTR)	56,500	June 2025
Independent Terminal Evaluation (TE)	61,000	January 2028
TOTAL indicative COST	249,500	

¹⁰³ See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/

¹⁰⁴ See https://www.thegef.org/gef/policies_guidelines

Monitoring Plan: The project results, corresponding indicators and mid-term and end-of-project targets in the project results framework will be monitored by the Project Management Unit annually, and will be reported in the GEF PIR every year, and will be evaluated periodically during project implementation. If baseline data for some of the results indicators is not yet available, it will be collected during the first year of project implementation. Project risks, as outlined in the risk register, will be monitored quarterly.

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ¹¹	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
Project objective: To enhance resilience for sustainable economic well-being of the people of Bhutan through climate adaptation of the water sector	Indicator 1: People benefitting from GEF financed investments (disaggregated by gender) (GEF Indicator 11)	EOP: 37,334 people (Male =19,465 & Female = 17,869)	EOP: 37,334 (a+b+c+d) a) 7,533 = Male and female population (PHCB, 2017) benefiting from domestic water scheme (population of Mendrelgang town, Damphu town, Toedpisa Gewog, Lobesa town, Goen Khatoed, Gasa town); b) 11,362 = Male and female population (PHCB, 2017) benefiting from integrated domestic and irrigation water (population of rural Mendrelgang, Patshaling, Tsholingkhar, Kikorthang, Rangthangling, Barshong and Sergithang Gewogs) c) 496 = Male and female population (PHCB, 2017) benefiting from irrigation water (population of rural Geon Khame) d) 17943 = Male and female population	Beneficiary list from Population and Housing Census of Bhutan (PHCB), 2017 Sample survey of beneficiaries	MTR and TE MTR and TE Annual	PMU M&E Officer M&E Officer	MTR and TE report Beneficiary Survey report	Risk: Not foreseen Assumption: all communities living in the area will benefit from water services

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
		MTR: 11,200 people (male = 5840 & female =5361)	(PHCB, 2017) benefiting from watershed services (population of Phuentenchhu, Tsiangtoe, rural Baapisa, Talo, Guma Gewogs and Punakha town). These areas do not access domestic or irrigation water from the project assets but benefit from climate resilient water shed management of their water catchments. MTR: 30% of EOP Target					
	Indicator 2: Area of land restored (under climate-resilient management) (ha): (GEF Indicator 3)	EOP: 41,910 Ha MTR: 16,746 Ha	EOP: 41,910 Ha (a+b+c+d+e+f) a) 14,762 Ha = area under watershed protection b) 7094 Ha = area under Watershed management c) 16662 Ha = area under watershed restoration d) 1816 Ha = cultivated dryland area that can be brought under winter cropping e) 1057 Ha under improved agriculture practices to conserve soil water such as mulching and efficient water use	Data source for watershed areas: Project maps Collection method: Field verification	Annual	PMU	MTR/TE	Risk: Covid-19 pandemic norms may constrain implementation of SLM and watershed activities Assumption: beneficiaries are willing to cultivate on fallow land and adopt winter cultivation

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
			(Mendrelgang – 296 Ha; Tsholongkhar-405 Ha; Sergithang – 49 Ha; Kikhorthang – 59 Ha; Rangthanling – 41 Ha; Barshong – 207 Ha) f) 519 ha = Fallow wetland and dryland (Ha) that can be brought under cultivation due to assured irrigation water MTR: 16,746 Ha (40% of EOP)					
Project Outcome 1: Strengthened water governance, institutions, and financing mechanism in support of climate-resilient water management	Indicator 3: Number of local level institutions established for management of water resources	EOP: 18 MTR: 18	EOP = 18 Punatsangchhu River Basin Committee = 1 RBC Secretariat = 1 (at MoENR) Water User Associations registered and strengthened = 5 (Kuchi Khola scheme; Lareychhu Scheme; Okalum Scheme; Gasa Khatoe scheme; Gasa Khame) Water User Groups = 11 (Tsholingkhar, Kikhorthang, Rangthanling, Barshong, Patshaling, Mendrelgang, Sergithang, Toedpisa, Lobeysa, Khame, Khatoe) MTR: 18 (same as EOP)	Data source: Dzongkhag records and PHCB Data collection method: field monitoring	Annual	M&E Officer	Geog and Dzongkhag records	Risk: Not foreseen Assumption: River basin stakeholders including in non-project Dzongkhags agree to adopt RBC approach

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
	Indicator 4: No of district and basin level climate-risk informed policies and strategies	EOP: 13 MTR: 9	EOP: 13 1. Guideline for Water Resources Assessment = 1; 2. Revised national water quality standards including the Domestic Water Quality Standard = 1; 3. Water master plan for Gasa, Punakha and Tsirang Dzongkhags = 3; 4. River basin management plan for Punatsangchhu river basin = 1; 5. Water tariff system for Gasa town and provide feedback on national water tariff guidelines/criteria = 1; 6. LFM for Shingtalum; Kuchu Khola; Okalum; Chedachhu/Bulkey/Lareychu = 4 7. Community Forest Management plans for Rangzhin Kuenphen and Tashi Thogmen Community Forest Group in Khatoed Gewog of Gasa = 2 MTR: 9 1. Water master plan for Gasa, Punakha and Tsirang Dzongkhags = 3 2. LFM for Shingtalum; Kuchu Khola; Okalum;	Data Source: Dzongkhag and project records Data collection method: field verification	MTR and TE	M&E Officer	MTR and TE Report.	Risk: None Assumption: River basin stakeholders including non-project Dzongkhags agree to adopt RBC approach

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
			Chedachhu/Bulkey/Lareychu = 4 3. Community Forest Management plans for angzhin Kuenphen and Tashi Thogmen Community Forest Group in Khatoed Gewog of Gasa = 2					
Outcome 2 Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and their ecosystem conditions improved	Indicator 5: Area of watersheds restored and protected (Ha)	EOP: 38,518 Ha MTR: 15,407 Ha	EOP = 38,518 (a+b+c) Hectares of watersheds managed (existing forest and watersheds under enhanced surveillance and management) = 14,762 Hectares of watersheds restored (protected from erosion and mud-slips through soil conservation measures such as check dams, terraces, retaining walls, gabion walls, gully plugs combined with vegetative measures) = 7,094 Hectares of watersheds protected (protection to water infrastructure from floods,	Data source for watershed areas: Project maps and field visits	Annual	PMU	MTR and TE report	Risk: Covid-19 pandemic norms may constrain implementation of project activities Assumption: Local adopt communities project interventions

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
			landslides and mud-slips) = 16,662 MTR = 40% of EOP <ul style="list-style-type: none"> = 5,905 Ha = 2,837Ha = 6,665 Ha 					
	Indicator 6: Number of water-shed and local level climate-risk informed policies and strategies	EOP = 6 (a+b) MTR = 6	EOP: 6 (a+b) a; catchment level watershed level Local Forest Management Plans developed based on local resource assessments and mapping (Kuchu khola, Lareychhu, Okalum, Shingtalum) = 4 b; Local Community Forest Management revised (Rangzhin Kuenphen and Tashi Thongmen CF in Gasa) = 2 MTR: 6	Data source: Gewog and project records Data collection method: field monitoring	Annual	M&E Officer	Geog and PMU	Risk: Not foreseen Assumption: None
	Indicator 7: Hectares of agricultural land under climate-resilient practices	EOP = 3392Ha MTR = 1357 Ha	EOP = 3392Ha 9+b+c) <ul style="list-style-type: none"> Hectares of Cultivated dryland area that can be brought under winter cropping = 1816 Hectares of agr. under improved agriculture practices to conserve soil water such as mulching 	Data source: Dzongkhag Agriculture sector; project records Collection method: Field verification and progress reporting	Annual	PMU	MTR/TE	Assumption: farmers are willing to adopt the new technologies

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
			<p>and efficient water use (Mendrelgang – 296 Ha; Tsholongkhar-405 Ha; Sergithang – 49 Ha; Kikhorthang – 59 Ha; Rangthanling – 41 Ha; Barshong – 207 Ha) = 1057</p> <ul style="list-style-type: none"> Hectres of fallow wetland and dryland that can be brought under cultivation due to assured irrigation water = 519 <p>MTR = 40% of EOP (a+b+c) 1. = 726 2. = 423 3. = 208</p>					
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	Indicator 8: Number of persons with assured access to irrigation and domestic water through climate-proofing and enhancement of water infrastructure 9a: Population benefiting from domestic water scheme	EOP = 19,391 (9,413 females) MTR = 5817 (2824 females)	EOP = 19,391 (a+b+c) <ul style="list-style-type: none"> Male and female population (PHCB, 2017) benefiting from domestic water scheme (population of Mendrelgang town, Damphu town, Toedpisa Gewog, Lobesa town, Goen Khatoed, Gasa town) = 7533 (3578 females) Male and female population (PHCB, 2017) benefiting from integrated 	Data source: PHCB, 2017, Geog records Collection methods: Sample survey of HH	MTR and TE	PMU / M&E Officer	MTR and TE report Beneficiary Survey report	Risk: Not foreseen Assumption: None

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
	<p>9b: Population benefiting from integrated domestic water and irrigation</p> <p>9c: Population benefiting from irrigation</p>		<p>domestic and irrigation water (population of rural Mendrelgang, Patshaling, Tsholingkhar, Kikorthang, Rangthangling, Barshong and Sergithang Gewogs = 11363 (5571 females)</p> <ul style="list-style-type: none"> Male and female population (PHCB, 2017) benefiting from irrigation water (population of rural Geon Khame) = 496 (264 females) <p>NTR = 5817 (2824 females) ; 30% of EOP</p> <p>a = 2260 (1073 females) b = 3409 (1671 females) c = 149 (79 females)</p>					
	<p>Indicator 9: water infrastructure more resilient to climate variability and change</p> <p>9a: Km of domestic and irrigation water transmission and</p>	<p>EOP</p> <p>9a: 74.14 Km</p>	<p>EOP</p> <p>9a: Total length of pipe, underground-laid or suspended lines with reliable support structures along the transmission and distribution lines of domestic and irrigation schemes</p>	Data source for agricultural land: Project maps and field visits	Annual	PMU	Project work completion report	<p>Risk: new Covid-variant induced restriction might delay implementation</p> <p>Assumption- none</p>

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
	<p>distribution lines climate proofed and automated with IoT and ICT based technologies</p> <p>9b: Cum. of domestic and irrigation water storage established</p>	<p>9b: 1266 Cum</p> <p>MTR</p> <p>9a = 55.6 km</p> <p>9b = 949.5 Cum</p>	<p>9b: Total volume of water storage in established along the transmission and distribution lines of domestic and irrigation schemes (excluding WTP volume)</p> <p>MTR</p> <p>9a: 75% of total length of pipe, underground-laid or suspended lines with reliable support structures along the transmission and distribution lines of domestic and irrigation schemes</p> <p>9b: 75% of total volume of water storage established along the water conveyance and distribution lines of domestic and irrigation schemes (excluding WTP volume)</p> <p>10c= Not indicated in the monthly water quality monitoring report for Gasa and Lobeyasa</p>	<p>Water quality monitoring report</p> <p>Progress report</p>	<p>Monthly</p> <p>MTR/TE</p>	<p>Health centers of Gasa and Lobeyasa</p> <p>PMU</p>	<p>Monthly Water quality monitoring report</p> <p>PIRs/MTR/TE</p>	<p>Youth in the locality are interested in being trained and keen in establishing enterprises for technology management and O&M components of water infrastructure</p>
Outcome 4: Strengthened awareness and knowledge sharing mechanism established	Indicator 10: Number of knowledge products generated and disseminated	EOP: 16	EOP = 16 (a+b+c+8+e+f) a).Water resource management curriculum = 1	Project records Dzongkhag records	MTR and TE	PMU	Project reports	

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
		MTR = 8	<p>b) Dzongkhag surface and ground water assessment reports for Gasa, Tsirang and Punakha= 3</p> <p>c) Policy feedback for institution of local utility services providers generated =1</p> <p>d) Number of applications developed for communication and display of water management information on monitoring screens and mobile phones = 1</p> <p>e) Number of State of the Basin Report (SOBR) for the Punatsangchu River Basin from year 3 onwards = 3</p> <p>f) Baseline Survey and assessment report on all indicators in the results framework (year 1 and year 5) =2</p> <p>f) Annual lesson learning report = 5</p> <p>MTR = 8 (a+b+c+d+e)</p>					

Results Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods ^[1]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
			<p>a) Water resource management curriculum = 1</p> <p>b) Dzongkhag surface and ground water assessment reports for Gasa, Tsirang and Punakha= 3</p> <p>c) Number of State of the Basin Report (SOBR) for the Punatsangchu River Basin from year 3 onwards = 1</p> <p>d) Baseline Survey and assessment report on all indicators in the results framework (year 1 and year 5) = 1</p> <p>e) Annual lesson learning report = 2</p>				<p>Report on piloting of water utility services</p> <p>workshop proceedings and report</p>	<p>Assumptions: local private water utility service providers are interested</p>

^[1] Data collection methods should outline specific tools used to collect data and additional information as necessary to support monitoring. The PIR cannot be used as a source of verification.

VII. GOVERNANCE AND MANAGEMENT ARRANGEMENTS

General roles and responsibilities in the projects governance mechanism

Implementing Partner: The Implementing Partner (IP) for this project is the Ministry of Infrastructure and Transport (MoIT). Following Government protocols all reporting and requests to and from the MoIT will be made through the Ministry of Finance (MOF).

The Implementing Partner is the entity to which the UNDP Administrator has entrusted the implementation of UNDP assistance specified in this signed project document along with the assumption of full responsibility and accountability for the effective use of UNDP resources and the delivery of outputs, as set forth in this document.

The Implementing Partner is responsible for executing this project. Specific tasks include:

- Project planning, coordination, management, monitoring, evaluation and reporting. This includes providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes and is aligned with national systems so that the data used and generated by the project supports national systems.
- Risk management as outlined in this Project Document;
- Procurement of goods and services, including human resources;
- Financial management, including overseeing financial expenditures against project budgets;
- Approving and signing the multiyear workplan;
- Approving and signing the combined delivery report at the end of the year; and,
- Signing the financial report or the funding authorisation and certificate of expenditures.

Responsible Parties: The Responsible Parties (RPs) are entities entrusted with the responsibility of implementing specific project components. The RPs for this project include the **Ministry of Agriculture and Livestock and the Ministry of Energy and Natural Resources.**)

These agencies will ensure technical support and timely delivery of project components as indicated. The roles of the RPs are:

The Ministry of Agriculture and Livestock will manage component two of the project relating to resilient agriculture practices.

The Ministry of Energy and Natural Resource will manage component two of the project relating to nature based solutions on water source catchments. It will have the overall responsibility of water governance and climate change policy and regulations. It will support planning, development, coordination and piloting of local water utilities and services. The MoENR will also be involved in the establishment of RBC for the Punatsangchhu basin and support establishment of DWMCs in Dzongkhags of Gasa, Punakha and Tsirang. Finally the ministry will support preparation of Dzongkhag Water Master Plan for Gasa, Punakha and Tsirang and River Basin Management Plan for Punatsangchhu .

Project stakeholders and target groups: The primary or key stakeholder in the project fall under four broad groups: 1) Communities, specifically including farmers (both women and men) as well as vulnerable groups; 2) WUAs, their committees and other community based organisations responsible for managing water resources and catchments and organisations of farmers; 3) Local government institutions, particularly agencies directly responsible for O&M of water infrastructure, agricultural extension and forestry; and 4) Entrepreneurs and private sector players involved in the O&M of water distribution networks.

Local communities: Communities, specifically water users, both farmers and domestic, as well as residents of catchments that drain into water sources, are the key beneficiaries of the project and are expected to participate and benefit the most from its outcomes.

Local institutions: Communities, through their local institutions, namely WUAs and their committees, will participate in the planning, design, implementation and monitoring of results from on-ground project activities.

Local government institutions: Staff from local government agencies, particularly staff from the MoIT, MoENR, DoA, ARDC, Bajo and DoFPS will be assigned to the project. Engineers engaged by the project will receive training in the design and restoration of water infrastructure and rural infrastructure for flood control, water harvesting and soil and water conservation. Finally, the staff will be provided training to impart organisational support to communities and their

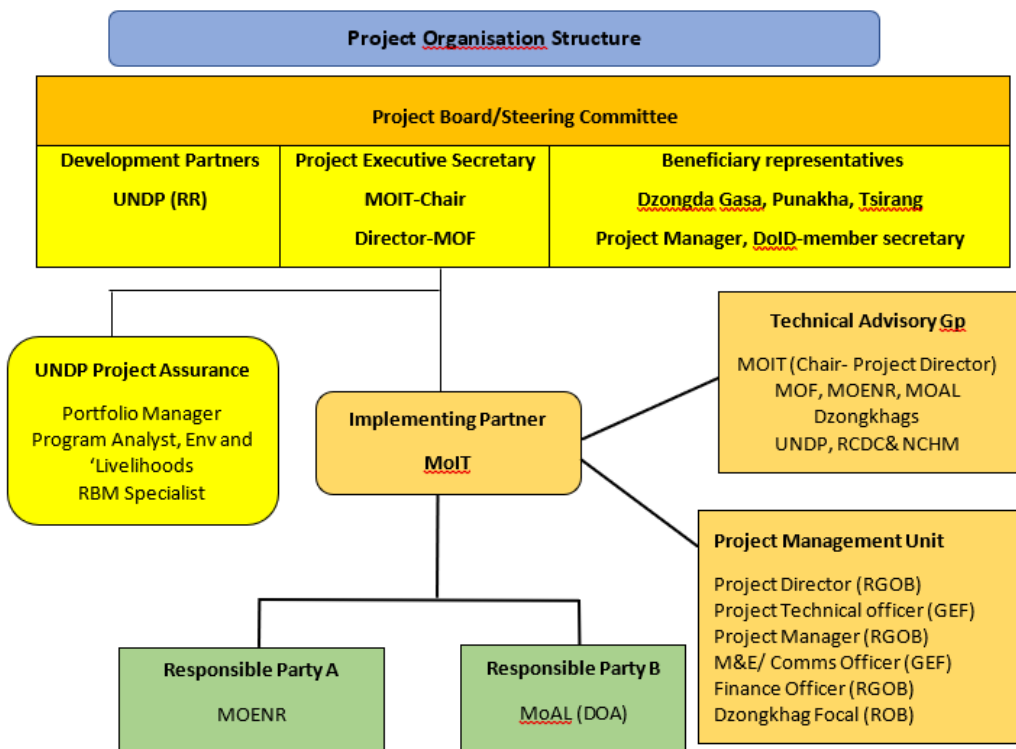
organisations that ensures gender-responsive design of activities and representation of women and vulnerable groups in community organisations.

Entrepreneurs and private sector: PPP and private sector engagement will be explored in the integration of technology based applications in the operation and maintenance of the climate resilient infrastructure installed by the project and in training and hand holding of young entrepreneurs interested in application of IT tools for monitoring and metering of water supply. Entrepreneurs will be encouraged and equipped to take up management of domestic and irrigation supply systems along with their respective WUAs and committees.

UNDP: UNDP is accountable to the GEF for the implementation of this project. This includes overseeing project execution undertaken by the Implementing Partner to ensure that the project is being carried out in accordance with UNDP and GEF policies and procedures and the standards and provisions outlined in the Delegation of Authority (DOA) letter for this project. **The UNDP GEF Executive Coordinator, in consultation with UNDP Bureaus and the Implementing Partner, retains the right to revoke the project DOA, suspend or cancel this GEF project.** UNDP is responsible for the Project Assurance function in the project governance structure and presents to the Project Board and attends Project Board meetings as a non-voting member.

Project Governance structure

Project is NIM implementation by the Ministry of Infrastructure and Transport



Second line of Defense

- Regional Bureau oversees RR and Country Office compliance at portfolio level
- BPPS NCE RTA oversees technical quality assurance and GEF compliance. BPPS NCE PTA oversees RTA functions
- UNDP GEF Executive Coordinator and Regional Bureau Deputy Director can revoke DOA/cancel/suspend project or provide enhanced oversight

The UNDP Resident Representative assumes full responsibility and accountability for oversight and quality assurance of this Project and ensures its timely implementation in compliance with the GEF-specific requirements and UNDP's Programme and Operations Policies and Procedures (POPP), its Financial Regulations and Rules and Internal Control Framework. A representative of the UNDP Country Office will assume the assurance role and will present assurance findings to the Project Board, and therefore attends Project Board meetings as a non-voting member.

Segregation of duties and firewalls vis-à-vis UNDP representation on the project board

As noted in the Minimum Fiduciary Standards for GEF Partner Agencies, in cases where a GEF Partner Agency (i.e. UNDP) carries out both implementation oversight and execution of a project, the GEF Partner Agency (i.e. UNDP) must separate its project implementation oversight and execution duties, and describe in the relevant project document a: 1) Satisfactory institutional arrangement for the separation of implementation oversight and executing functions in different departments of the GEF Partner Agency; and 2) Clear lines of responsibility, reporting and accountability within the GEF Partner Agency between the project implementation oversight and execution functions. In this project UNDP is only performing an implementation oversight role in the project vis-à-vis our role in the project board and in the project assurance function and therefore a full separation of project implementation oversight and execution duties has been assured.

Roles and Responsibilities of the Project Organisation Structure

- a) **Project Board:** All UNDP projects must be governed by a multi-stakeholder board or committee established to review performance based on monitoring and evaluation, and implementation issues to ensure quality delivery of results. The Project Board (also called the Project Steering Committee) is the most senior, dedicated oversight body for a project.

The two main (mandatory) roles of the project board are as follows:

- 1) **High-level oversight of the execution of the project by the Implementing Partner** (as explained in the [“Provide Oversight”](#) section of the POPP). This is the primary function of the project board and includes annual (and as-needed) assessments of any major risks to the project, and decisions/agreements on any management actions or remedial measures to address them effectively. The Project Board reviews evidence of project performance based on monitoring, evaluation and reporting, including progress reports, evaluations, risk logs and the combined delivery report. The Project Board is responsible for taking corrective action as needed to ensure the project achieves the desired results.
- 2) **Approval of strategic project execution decisions of the Implementing Partner** with a view to assess and manage risks, monitor and ensure the overall achievement of projected results and impacts and ensure long term sustainability of project execution decisions of the Implementing Partner (as explained in the [“Manage Change”](#) section of the POPP).

Requirements to serve on the Project Board:

- Agree to the Terms of Reference of the Board and the rules on protocols, quorum and minuting.
- Meet annually; at least once.
- Disclose any conflict of interest in performing the functions of a Project Board member and take all measures to avoid any real or perceived conflicts of interest. This disclosure must be documented and kept on record by UNDP.
- Discharge the functions of the Project Board in accordance with UNDP policies and procedures.
- Ensure highest levels of transparency and ensure Project Board meeting minutes are recorded and shared with project stakeholders.

Responsibilities of the Project Board:

- Consensus decision making:
 - The project board provides overall overall guidance and direction to the project, ensuring it remains within any specified constraints, and providing overall oversight of the project implementation.
 - Review project performance based on monitoring, evaluation and reporting, including progress reports, risk logs and the combined delivery report;
 - The project board is responsible for making management decisions by consensus.
 - In order to ensure UNDP’s ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.
 - In case consensus cannot be reached within the Board, the UNDP representative on the board will mediate to find consensus and, if this cannot be found, will take the final decision to ensure project implementation is not unduly delayed.
- Oversee project execution:
 - Agree on project manager’s tolerances as required, within the parameters outlined in the project document, and provide direction and advice for exceptional situations when the project manager’s tolerances are exceeded.

- Appraise annual work plans prepared by the Implementing Partner for the Project; review combined delivery reports prior to certification by the implementing partner.
- Address any high-level project issues as raised by the project manager and project assurance;
- Advise on major and minor amendments to the project within the parameters set by UNDP and the donor and refer such proposed major and minor amendments to the UNDP BPPS Nature, Climate and Energy Executive Coordinator (and the GEF, as required by GEF policies);
- Provide high-level direction and recommendations to the project management unit to ensure that the agreed deliverables are produced satisfactorily and according to plans.
- Track and monitor co-financed activities and realisation of co-financing amounts of this project.
- Approve the Inception Report, GEF annual project implementation reports, mid-term review and terminal evaluation reports.
- Ensure commitment of human resources to support project implementation, arbitrating any issues within the project.
- Risk Management:
 - Provide guidance on evolving or materialized project risks and agree on possible mitigation and management actions to address specific risks.
 - Review and update the project risk register and associated management plans based on the information prepared by the Implementing Partner. This includes risks related that can be directly managed by this project, as well as contextual risks that may affect project delivery or continued UNDP compliance and reputation but are outside of the control of the project. For example, social and environmental risks associated with co-financed activities or activities taking place in the project's area of influence that have implications for the project.
 - Address project-level grievances.
- Coordination:
 - Ensure coordination between various donor and government-funded projects and programmes.
 - Ensure coordination with various government agencies and their participation in project activities

Composition of the Project Board : The composition of the Project Board must include individuals assigned to the following three roles:

1. **Project Executive:** This is an individual who represents ownership of the project and chairs the Project Board. The Executive is normally the national counterpart for nationally implemented projects. In exceptional cases, two individuals from different entities can co-share this role and/or co-chair the Project Board. If the project executive co-chairs the project board with representatives of another category, it typically does so with a development partner representative.

The Project Executive is the **Secretary of the Ministry of Infrastructure and Transport and the Director of Ministry of Finance**. The MoIT acts as the chair of the PSC and is responsible for the project supported by representative from other agencies. The Executive's role is to ensure that the project is focused throughout its life cycle on achieving its objectives and delivering outputs that will contribute to higher-level outcomes. The executive has to ensure that the project gives value for money, ensuring a cost-conscious approach to the project, balancing the demands of beneficiary and supplier.

2. **Beneficiary Representative(s):** Individuals or groups representing the interests of those who will ultimately benefit from the project. Their primary function within the board is to ensure the realisation of project results from the perspective of project beneficiaries. The Beneficiary representatives are: the Dzongdags (Governors) of Gasa, Punakha and Tsirang Dzongkhag
3. **Development Partner(s):** Individuals or groups representing the interests of the parties concerned that provide funding and/or technical expertise to the project. The Development Partner(s) is Resident Representative of UNDP Bhutan.

Project Assurance: Project assurance is the responsibility of each project board member; however, UNDP has a distinct assurance role for all UNDP projects in carrying out objective and independent project oversight and monitoring functions. UNDP performs quality assurance and supports the Project Board (and Project Management Unit) by carrying out objective and independent project oversight and monitoring functions, including compliance with the risk management and social and environmental standards of UNDP. The Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. Project assurance is totally independent of project execution.

A designated representative of UNDP playing the project assurance role is expected to attend all board meetings and support board processes as a non-voting representative. It should be noted that while in certain cases UNDP's project

assurance role across the project may encompass activities happening at several levels (e.g. global, regional), at least one UNDP representative playing that function must, as part of their duties, specifically attend board meeting and provide board members with the required documentation required to perform their duties. The UNDP representative playing the main project assurance function is the Resident Representative

Project Management – Execution of the Project: The Project Manager (PM) (also called project coordinator) is the representative of the Project Management Unit (PMU) and is responsible for the overall day-to-day management of the project on behalf of the Implementing Partner, including the mobilization of all project inputs, supervision over project staff, responsible parties, consultants and sub-contractors. The project manager typically presents key deliverables and documents to the board for their review and approval, including progress reports, annual work plans, adjustments to tolerance levels and risk registers. A designated representative of the PMU is expected to attend all board meetings and support board processes as a non-voting representative. The primary PMU representative attending board meetings is: Project manager as member secretary

Direct Project Services as requested by the Government: Following the standard practices, the project will organize joint annual progress review(s) to explore measures that may be needed to accelerate the implementation by the partners. The review will include the Implementing Partner, Responsible Parties, and Ministry of Finance and UNDP. While the NIM modality will be default implementation arrangement, UNDP may, on the basis of the annual review findings and at the request of the government, require to, in compliance with LDCF¹⁰⁵ and UNDP policies, provide implementation support to ensure timely achievement of project results and financial delivery. Upon such a request, the estimated costs for such support services will be based on the UPL/LPL and agreed to in a standard agreement signed between the Implementation partner and UNDP.

VIII. FINANCIAL PLANNING AND MANAGEMENT

The total cost of the project is USD 34,064,420. This is financed through a LDCF grant of USD 8,932,420 and UNDP TRAC resource co-finance of USD 100,000 administered by UNDP, and USD 25,032,000 in kind co-finance from the Royal Government of Bhutan UNDP, as the Implementing Agency, is responsible for the oversight of the LDCF resources and the cash co-financing transferred to UNDP bank account only. With the restructuring of the Government in December 2022, co-finance commitment under the newly titled ministries will be secured¹⁰⁶.

Confirmed Co-financing: The actual realisation of project co-financing amounts will be monitored by the UNDP Country Office and the PMU on an annual basis in the PIR and will be reported to the LDCF during the mid-term review and terminal evaluation process as follows:

Co-financing source	Co-financing type	Co-financing amount
RGOB (Local Governments)	In cash	9,000,000
RGOB (Local Governments)	In kind	1,202,000
RGOB (MoENR: Office establishment cost)	In kind	470,000
RGOB (MoENR: E-flow and Water resources management program; Program on Management of invasive species for agro-biodiversity and livelihood; Waste Flagship; Environment Services and Regulations)	Cash	1,200,000
RGOB (MoENR: E-flow and Water resources management program)	In kind	230,000
RGOB (MoIT);WUA training, Watershed management training, Skilling, O and M of Water Infrastructures, Water Quality Testing Training and Water Discharge Assesment training, Wetland assessment training; Smart water management; WUA formulation and water shed management and maintenance)	Cash	6,930,000
RGOB (MoIT); HR management and PMU	In kind	700,000
RGOB (DoFPS-MOENR): Conservation of National Parks)	Cash	3,500,000
RGOB (DoFPS-MOENR): HR and Professional Services	In kind	1,800,000
UNDP	Cash	100,000
	Total	25,132,000

Budget Revision and Tolerance: As per UNDP POPP, the project board may agree with the project manager on a tolerance level for each detailed plan under the overall multi-year workplan. The agreed tolerance should be written in the project document or approved project board meeting minutes. It should normally not exceed 10 percent of the

¹⁰⁵ UNDP Execution services must be discussed and approved by the GEF Secretariat prior to providing execution support

¹⁰⁶ <https://moha.gov.bt/wp-content/uploads/2022/12/PR-on-reorganization-of-CSA.pdf>

agreed annual budget at the activity level, but within the overall approved multi-year workplan at the activity level. Within the agreed tolerances, the project manager can operate without intervention from the project board. Restrictions apply as follows:

Should the following deviations occur, the Project Manager/IP through UNDP Country Office will seek the approval of the BPPS/NCE-VF team to ensure accurate reporting to the GEF. It is strongly encouraged to maintain the expenditures within the approved budget at the budgetary account and at the component level:

Budget reallocations must prove that the suggested changes in the budget will not lead to material changes in the results to be achieved by the project. A strong justification is required and will be approved on an exceptional basis.

- a) Budget re-allocations among the components (including PMC) of the approved Total Budget and Work Plans (TBWP) that represent a value greater than 10% of the total GEF grant.
- b) Introduction of new outputs/activities (i.e. budget items) that were not part of the agreed project document and TBWP that represent a value greater than 5% of the total GEF grant. The new budget items must be eligible as per the GEF and UNDP policies.
- c) Project management cost (PMC): budget under PMC component is capped and cannot be increased.

UNDP is not in a position to increase the total budget above the amount approved by the donor, therefore any over-expenditure would have to be absorbed from non-GEF resources by the Implementing Partner (GEF Executing Entity)

Project extensions: The UNDP-BPPS-NCE team Executive Coordinator must approve all requests for extension of the Project Completion Date and for other milestone extensions with hard deadlines. All extensions impose additional time and cost burdens at all levels and the GEF project budget cannot be increased beyond its originally approved amount. A single extension may be granted on an exceptional basis and subject to the conditions and maximum durations set out in the UNDP POPP. The project management costs during the extension period must remain within the originally approved amount, and any increase in PMC costs shall be covered by non-GEF resources; the additional UNDP oversight costs during the extension period must be covered by non-GEF resources, in accordance with UNDP's policy as set out in UNDP POPP.

For any extension request, UNDP CO and IP will consult and jointly present a clear plan indicating how and from which specific sources the additional oversight costs that will be incurred by UNDP will be covered during the extended period. The BPPS-NCE Executive Coordinator will consult the Regional Bureaux (RBX) and may reject the extension request if no (external co-financing by the IP or internal UNDP CO resources) can be identified.

All extension requests, along with all supporting documentation, shall be submitted by the IP to the UNDP CO in line with the requirements and within the deadlines set out in the UNDP SOPs and policies in UNDP POPP.

Audit: The project will be audited as per UNDP Financial Regulations and Rules and applicable audit policies. Audit cycle and process must be discussed during the Inception workshop. If the Implementing Partner is an UN Agency, the project will be audited according to that Agencies applicable audit policies.

Transfer or disposal of assets: In consultation with the Implementing Partner and other parties of the project, UNDP is responsible for deciding on the transfer or other disposal of assets. Transfer or disposal of assets is recommended to be reviewed and endorsed by the project board following UNDP rules and regulations. Assets may be transferred to the government for project activities managed by a national institution at any time during the life of a project, however, must be done before the operational closure date. In all cases of transfer, a transfer document must be prepared and kept on file¹⁰⁷. The transfer should be done before Project Management Unit complete their assignments.

Completion Date: The project completion date is the date of Project Document Signature plus project duration. This date can only be extended through a formal extension request. Prior to completion date, all UNDP-financed inputs must be provided and related activities for the Project completed. No activities, except for the final clearance of the Terminal

¹⁰⁷ See

https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PPM_Project%20Management_Closing.docx&action=default.

Evaluation Report and the corresponding management response and the end-of-project review Project Board Meeting should take place after the Completion Date.

Project Closure: Project closure will be conducted as per UNDP requirements outlined in the UNDP POPP. All costs incurred to close the project must be included in the project closure budget and reported as final project commitments presented to the Project Board during the final project review. The only costs a project may incur following the final project review are those included in the project closure budget.

Operational Closure: Operational closure must happen within 9 months from project completion date. Prior to operational closure, the Terminal Evaluation must have been submitted and the corresponding TE management response and the end-of-project review Project Board meeting must have been completed. The Implementing Partner through a Project Board decision will notify the UNDP Country Office when operational closure has been completed. Before Operational Closure, the project must have completed the transfer or disposal of any equipment that is still the property of UNDP.

Financial Closure: Financial closure must happen within 6 months of operational closure or after the date of cancellation. The project will be financially closed when the following conditions have been met: a) the project is operationally completed or has been cancelled; b) the Implementing Partner has reported all financial transactions to UNDP; c) UNDP has closed the accounts for the project; d) UNDP and the Implementing Partner have certified a final Combined Delivery Report (which serves as final budget revision).

Between operational and financial closure, the implementing partner will identify and settle all financial obligations and prepare a final expenditure report. The UNDP Country Office will send the final signed closure documents including confirmation of final cumulative expenditure and unspent balance to BPPS/NCE for confirmation before the project will be financially closed in Quantum by the UNDP Country Office.

Cancellation and Suspension: All projects considering going through cancellation or suspension must follow UNDP and GEF requirements. Guidance can be found in the UNDP POPP ([SOPs for management actions of Vertical Fund projects escalated to the Executive Coordinator](#) and [Guidance for GEF project revisions](#)).

Refund to GEF: Should a refund of unspent funds to the GEF be necessary, this will be managed directly by the BPPS/GEF Directorate in New York. No action is required by the UNDP Country Office on the actual refund from UNDP project to the GEF Trustee. Unspent project balance is not permitted to be transferred to any other projects.

IX. TOTAL BUDGET AND WORK PLAN

Total Budget and Work Plan			
Quantum Business Unit	UNDP-BTN		
Quantum Project ID:	01000556	Quantum Project Title:	Advancing Climate Resilience of Water Sector in Bhutan (ACREWAS)
Quantum Award ID:	1067009	Quantum Award Title:	Advancing Climate Resilience of Water Sector in Bhutan (ACREWAS)
UNDP-GEF PIMS No.	6647		
Implementing Partner	Ministry of Infrastructure and Transport (MoIT)		

Quantum Outcome (GEF Component)	Quantum Output (GEF Outcome)	Quantum Activity (GEF Output)	Quantum Responsible Party (UNDP, IP, or Responsible Party)	Quantum Fund ID	Quantum Donor ID	Quantum Budgetary Account Code	Quantum Budget Account Description	Amount Year {2023} (USD) Year 1	Amount Year {2024} (USD) Year 2	Amount Year {2025} (USD) Year 3	Amount Year {2026} (USD) Year 4	Amount Year {2027} (USD) Year 5	Total (USD)	Budget note		
Component 1 Water Governance and Institutions (as per Table B of the CEO Endorsement request)	Outcome 1 Strengthened water governance, institutions and financing mechanism in support of climate-resilient water management	Output 1.1 Relevant national and local policies and strategies aligned with sustainable and climate resilient water management (as per Table B of the CEO Endorsement request)	MOIT	62160	10003	71800	Contractual Services	-	9,000	9,000	-	-	18,000	1		
						72100	Contractual Services - Companies	-	-	24,000	-	-	24,000	2		
						75700	Training workshop	35,400	29,000	15,600	-	13,500	93,500	3		
		Total Output 1.1														
		Output 1.2 Institutional & community level capacity for climate-	MOIT	62160	10003	72200	Equipment & Furniture	7,000	-	-	-	-	-	7,000	4	

	(as per Table B of the CEO Endorsement request)	<i>smart water and watershed management strengthened (as per Table B of the CEO Endorsement request)</i>				75700	Training workshop											10,800	49,200	-	-	-	60,000	5			
Total Output 1.2								17,800	49,200	-	-	-	67,000														
		<i>Output 1.3 Innovative financing mechanisms for both watershed management and water infrastructure introduced</i>	MOIT	62160	10003	71300	Local Consultants	-	-	19,200	28,800	-	48,000	6													
						71800	Contractual Services	-	-	-	5,000	-	5,000	7													
						75700	Training workshop	-	12,000	5,000	14,500	-	31,500	8													
Total output 1.3								-	12,000	24,200	48,300	-	84,500														
Total Component 1								53,200	99,200	72,800	48,300	13,500	287,000														
Component 2: Nature-based solutions for sustainable & climate-resilient watersheds, and livelihood enhancement	Outcome2 Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and their ecosystem conditions improved	<i>2.1 Nature based solutions for watershed restorations implemented aimed at yielding stable spring/stream flows.</i>	MOIT	62160	10003	71600	Travel	-	3,000	3,000	3,000	3,000	12,000	9													
						72100	Contractual Services - Companies		48,300	1,500	-	-	49,800	10													
						72200	Equipment and Furniture	22,500	6,000	-	-	-	28,500	11													
						72300	Materials and Goods	-	37,380	37,380	-	-	74,760	12													
						75700	Training workshop	50,250	28,000	4,500	1,500	1,500	85,750	13													
		Total output 2.1								72,750	122,680	46,380	4,500	4,500	250,810												
		<i>2.2 Forest/Ground cover in catchment watersheds managed and maintained through the engagement of local communities and</i>	MOIT	62160	10003	71600	Travel	625	625	625	625	-	-	2,500	14												
						72100	Contractual Services - Companies	3,150					3,150	15													
						72300	Materials and Goods	46,350	67,625	67,625	45,000	-	226,600	16													

		<i>private/corporate sector</i>				75700	<i>Training workshop</i>										
								3,550	1,750	15,750	750				21,800	17	
		Total output 2.1						53,675	70,000	84,000	46,375	-		254,050			
Total Component 2								126,425	192,680	130,380	50,875	4,500	504,860				
Component3 Efficient, adequate, sustainable supply, distribution, and utilization of water (as per Table B of the CEO Endorsement request) following the example above	Outcome3 Enhanced adaptive capacity of water infrastructure to climate-induced water shortages and quality deterioration through climate-proofing, private sector engagement, and technology deployment (as per Table B of the CEO Endorsement request)	3.1 <i>Climate proofing measures implemented in multi-purpose storage, conveyance, and distribution network of drinking and irrigation water</i>	MOIT	62160	10003	72100	<i>Contractual Services - Companies</i>										
							75700	<i>Training workshop</i>									
									9,000	9,000	9,000	12,000	6,000	45,000	19		
				Total Output 3.1						473,958	3,628,047	2,229,617	77,400	6,000	6,415,022		
		3.2 <i>Efficient drought-resilient water management technology tested and upscaled through private sector (youth-based start-up enterprises)</i>	MOIT	62160	10003	72100	<i>Contractual Services - Companies</i>										
								-	101,600	152,400	-	-	254,000	20			
		Total Output 3.2						-	101,600	152,400	-	-	254,000				
Total Component 3								473,958	3,729,647	2,382,017	77,400	6,000	6,669,022				
Component 4 Knowledge Management	Outcome4 Strengthened awareness and knowledge	4.1 <i>Communication strategy developed and implemented on water conservation and sustainable</i>	MOIT	62160	10003	71200	<i>International Consultants</i>	7,875	22,875	22,875	7,875	-	61,500	21			
						71300	<i>Local Consultants</i>	12,000	12,000	12,000	12,000	12,000	60,000	22			

	sharing mechanism established	management developed and implemented				71800	Contractual Services-Imp Partner	2,400	2,400	4,800	8,400	6,000	24,000	23					
						72100	Contractual Services - Companies	-	9,000	29,400	-	-	38,400	24					
						75700	Training workshop	147,250	384,500	34,250	52,750	49,950	668,700	25					
						Total Output 4.1							169,525	430,775	103,325	81,025	67,950	852,600	
						4.2 Publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin institutionalized	MOIT	62160	10003	72100	Contractual Services - Companies	-	-	18,000	-	-	18,000	26	
75700	Training workshop	-	-	38,590	4,455					4,455	47,500	27							
Total Output 4.2										-	-	56,590	4,455	4,455	65,500				
Total Component 4							169,525	430,775	159,915	85,480	72,405	918,100							
Monitoring and Evaluation (M&E)	M&E (as per Table B of the CEO Endorsement Request)	M&E (as per Table B of the CEO Endorsement Request)	MOIT	62160	10003	75700	Training and Workshops	34,400	24,400	24,400	24,400	24,400	132,000	28					
						71200	International Consultants	-	-	30,000	-	30,000	60,000	29					
						71300	Local Consultants	-	-	14,000	-	16,000	30,000	30					
						75700	Training and Workshops	-	-	12,500	-	15,000	27,500	31					
Total M&E							34,400	24,400	80,900	24,400	85,400	249,500							
Project Management Cost (PMC)	PMC	PMC	MOIT	62160	10003	71600	Travel	12,000	15,300	17,400	16,800	13,500	75,000	32					
						71800	Contractual Services-Imp Partn	30,000	30,000	30,000	30,000	30,000	150,000	33					
						74200	Audio Visual & Print Prod Costs	1,306	1,306	1,306	1,306	1,307	6,531	34					
						72500	Supplies	2,081	2,081	2,081	2,081	2,083	10,407	35					

				72800	Information Technology Equip	19,200	-	4,800	-	-	24,000	36	
				72400	Communication & Audio-Visual Equipment	12,000	3,000	-	-	-	15,000	37	
				75700	Training and Workshops	7,000	2,000	2,000	2,000	2,000	15,000	38	
		UNDP	62160	10003	74100	Professional services	-	2,000	2,000	2,000	2,000	8,000	39
			04000	00012	75700	Training and Workshops	20,000	20,000	20,000	20,000	20,000	100,000	40
Total PMC						103,587	75,687	79,587	74,187	70,890	403,938		
Total Project Cost						961,095	4,552,389	2,905,599	360,642	252,695	9,032,420		

Budget Note No.	Budget Note (Description)
1	Output 1.1, Activity 1.1.3: Water master plan for Gasa, Punakha and Tsirang Dzongkhags for each project site (3 Dzongkhag Master Plans) Item: Short term expert– water master plan including travels. Calculation: unit cost @ 400 X 45 (No of days) No. years: 2 (Year 2: 9000 Year 3: 9000) Sub-total = 18000 Total = 18000
2	Output 1.1, Activity 1.1.3: Formulate River basin management plan for Punatsangchhu river basin (1 RBMP) Item: Contractual services for development river basin plan including travel costs. Calculation: unit cost @ 400 X 60 (No of days) No. years: 1 (Year 3: 24000) Sub-total = 24000 Total = 24000
3	Output 1.1, Activity 1.1.1: Develop gender responsive water safety plan for Gasa, Punakha and Tsirang including training on gender safeguards Item: Workshops and travels on water safety plan (1 workshop in each dzongkhag including training on gender safeguards = 3 days' workshop for * 30 persons each). Calculation: unit cost @ 4500 X 3 (No of workshops) No. years: 1 (Year 5: 13500) Sub-total = 13500

	<p>Output 1.1, Activity 1.1.1: Develop guiding tool for Development of Water Master Plan Item: Meetings/Workshops on guiding tool for Development of Water Master Plan. Calculation: unit cost @ 7500 X 2 (LS) No. years: 1 (Year 1: 15000) Sub-total = 15000</p>
	<p>Output 1.1, Activity 1.1.1: Revise Drinking Water Quality Standard Item: Meetings and workshops (2 for revision of standards) and for sensitization (3 for sensitization). Calculation: unit cost @ 4000 X 3 (No of workshops) No. years: 2 (Year 1: 3000 Year 2: 9000) Sub-total = 12000</p>
	<p>Output 1.1, Activity 1.1.2: Undertake participatory assessment of water resources and water issues within local watersheds Item: Survey and assessment of surface and ground water for 3 dzongkhags including training of enumerators. Calculation: unit cost @ 29000 X 1 (LS) No. years: 2 (Year 1: 17400 Year 2: 11600) Sub-total = 29000</p>
	<p>Output 1.1, Activity 1.1.3: Formulate river basin management plan for Punatsangchhu river basin (1 RBMP) Item: Meetings/Workshops for RBMP. Calculation: unit cost @ 4000 X 3 (No of Meetings/Workshops) No. years: 2 (Year 2: 2400 Year 3: 9600) Sub-total = 12000</p>
	<p>Output 1.1, Activity 1.1.3: Water master plan for Gasa, Punakha and Tsirang Dzongkhags for each project site (3 Dzongkhag Master Plans) Item: Meetings/Workshops for Dzongkhag water master plans. Calculation: unit cost @ 4000 X 3 (No of workshops) No. years: 2 (Year 2: 6000 Year 3: 6000) Sub-total = 12000 Total = 93500</p>
4	<p>Output 1.2, Activity 1.2.1: Establishment of RBC secretariat for Punatsangchhu Item: Office equipment for RBC Secretariat. Calculation: unit cost @ 7000 X 1 (LS) No. years: 1 (Year 1: 7000) Sub-total = 7000 Total = 7000</p>
5	<p>Output 1.2, Activity 1.2.1: Establish River Basin Committee (RBC) for Punatshangchhu Item: Meetings/Workshops to establish River Basin Committee (RBC) and the RBC Secretariat for Punatsangchhu river basin (1 workshop involving 5 dzongkhags+2 preparatory workshops with central agencies). Calculation: unit cost @ 4000 X 4 (No of workshops) No. years: 2 (Year 1: 4800 Year 2: 11200) Sub-total = 16000</p>
	<p>Output 1.2, Activity 1.2.2: Form/Strengthen of WUAs and enable their representation at the Gewog level Item: Community level Meetings/workshops to form/Strengthen of WUAs and enable their representation at the Gewog level including training of WUA members. Calculation: unit cost @ 2000 X 7 (No of workshops) No. years: 1 (Year 2: 14000) Sub-total = 14000</p>
	<p>Output 1.2, Activity 1.2.2: Form/Strengthen of WUAs and enable their representation at the Gewog level Item: Sensitization and TOT workshops for Dzongkhags, Gewogs and community leaders on strengthening and formal registration of WUAs. Calculation: unit cost @ 4000 X 3 (No of workshops) No. years: 2 (Year 1: 6000 Year 2: 6000) Sub-total = 12000</p>

	<p>Output 1.2, Activity 1.2.2: Strengthen Dzongkhag Environment Committee to bear the role of water management committee at Dzongkhag level (Train DEC on legal and technical matters related to water governance, water allocation and management)</p> <p>Item: Training Workshops for Dzongkhag Environment Committee to Gasa, Punakha, Tsirang and Wangdue.</p> <p>Calculation: unit cost @ 4500 X 4 (No of workshops) No. years: 1 (Year 2: 18000) Sub-total = 18000</p> <p>Total = 60000</p>
6	<p>Output 1.3, Activity 1.3.1: Study and recommend tariff system for Gasa town and Lobeyisa, and document lessons learnt for policy feedback</p> <p>Item: National Consultancy – Study and recommend tariff system for Gasa town and Lobeyisa, and document lessons learnt for policy feedback.</p> <p>Calculation: unit cost @ 400 X 60 (No of days) No. years: 2 (Year 3: 7200 Year 4: 16800) Sub-total = 24000</p>
	<p>Output 1.3, Activity 1.3.2: Study and pilot two water utility service provisions through private or PPP arrangement (1 study and 1 pilot)</p> <p>Item: Local Consultancy-PPP model assessment and training.</p> <p>Calculation: unit cost @ 400 X 60 (No of days) No. years: 2 (Year 3: 12000 Year 4: 12000) Sub-total = 24000</p> <p>Total = 48000</p>
7	<p>Output 1.3, Activity 1.3.2: Study and pilot two water utility service provisions through private or PPP arrangement (1 study and 1 pilot)</p> <p>Item: Contractual services for water utility service provider start up capacity support.</p> <p>Calculation: unit cost @ 5000 X 1 () No. years: 1 (Year 4: 5000) Sub-total = 5000</p> <p>Total = 5000</p>
8	<p>Output 1.3, Activity 1.3.2: Study and pilot two water utility service provisions through private or PPP arrangement (1 study and 1 pilot)</p> <p>Item: Training.</p> <p>Calculation: unit cost @ 7000 X 1 (No of Training Workshops) No. years: 1 (Year 4: 7000) Sub-total = 7000</p> <p>Total = 31500</p>
9	<p>Output 2.1, Activity 2.1.2: SMART patrolling capacity and system in four project sites</p> <p>Item: SMART Patrolling system monitoring costs.</p> <p>Calculation: unit cost @ 12000 X 1 (LS) No. years: 4 (Year 2: 3000 Year 3: 3000 Year 4: 3000 Year 5: 3000) Sub-total = 12000</p> <p>Total = 12000</p>
10	<p>Output 2.1, Activity 2.1.2: SMART patrolling capacity and system in four project sites</p> <p>Item: Contractual work on establishment of patrolling outpost.</p> <p>Calculation: unit cost @ 20000 X 1 (No of outposts) No. years: 1 (Year 2: 20000) Sub-total = 20000</p>
	<p>Output 2.1, Activity 2.1.2: SMART patrolling capacity and system in four project sites</p> <p>Item: SMART Patrolling system acquiring.</p> <p>Calculation: unit cost @ 4000 X 4 (LS) No. years: 1 (Year 2: 16000) Sub-total = 16000</p>

	<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Shingtalum watershed Item: Signages. Calculation: unit cost @ 150 X 10 (No of signages) No. years: 1 (Year 3: 1500) Sub-total = 1500</p>
	<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Okalum watershed in Toepisa Gewog, Punakha Item: Signages. Calculation: unit cost @ 150 X 2 (No of signages) No. years: 1 (Year 2: 300) Sub-total = 300</p>
	<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Okalum watershed in Toepisa Gewog, Punakha Item: Waste facilities along the highway within watershed. Calculation: unit cost @ 6000 X 2 (No of waste drop off facilities) No. years: 1 (Year 2: 12000) Sub-total = 12000 Total = 49800</p>
11	<p>Output 2.1, Activity 2.1.2: Establish data monitoring met stations to be managed by local forest divisions Item: Flow gauges. Calculation: unit cost @ 1500 X 4 (No of Flow gauges) No. years: 1 (Year 2: 6000) Sub-total = 6000</p>
	<p>Output 2.1, Activity 2.1.2: Establish data monitoring met stations to be managed by local forest divisions Item: Portable meteorological stations. Calculation: unit cost @ 4500 X 5 (No of Met stations) No. years: 1 (Year 1: 22500) Sub-total = 22500 Total = 28500</p>
12	<p>Output 2.1, Activity 2.1.1: Implementation of infrastructure protection intervention or climate proofing measures to enable climate resilience of physical assets Item: Length of drainage protection interventions. Calculation: unit cost @ 1200 X 12.3 (KM) X Km (ha) No. years: 2 (Year 2: 7380 Year 3: 7380) Sub-total = 14760</p>
	<p>Output 2.1, Activity 2.1.1: Revival of springs/streams/ponds and rehabilitation/restoration of degraded watershed areas through afforestation and assisted natural regeneration to enhance re-charge areas including sensitization and training on spring shed assessment and management Item: Watershed area under physical and biological measures to enhance re-charge areas. Calculation: unit cost @ 1200 X 50 (Area) X Ha (ha) No. years: 2 (Year 2: 30000 Year 3: 30000) Sub-total = 60000 Total = 74760</p>
13	<p>Output 2.1, Activity 2.1.1: Revival of springs/streams/ponds and rehabilitation/restoration of degraded watershed areas through afforestation and assisted natural regeneration to enhance re-charge areas including sensitization and training on spring shed assessment and management Item: Sensitization and training on spring shed assessment and management. Calculation: unit cost @ 2000 X 4 (No of trainings) No. years: 1 (Year 1: 8000) Sub-total = 8000</p>

<p>Output 2.1, Activity 2.1.2: SMART patrolling capacity and system in four project sites Item: Meetings/Workshops. Calculation: unit cost @ 1500 X 1 (LS) No. years: 1 (Year 1: 1500) Sub-total = 1500</p>
<p>Output 2.1, Activity 2.1.2: Training on data monitoring and management of monitoring stations Item: Training on data retrieval. Calculation: unit cost @ 150 X 15 (No of people trained) No. years: 1 (Year 1: 2250) Sub-total = 2250</p>
<p>Output 2.1, Activity 2.1.3: Assessment and Review of CF management plan for Rangzhin Kuenphen CF and Tashi Thogmen CF, Shingtalum, Gasa Item: Survey, assessment with mapping and training workshop (CF). Calculation: unit cost @ 2000 X 2 (LS) No. years: 1 (Year 1: 4000) Sub-total = 4000</p>
<p>Output 2.1, Activity 2.1.3: Assessment and Review of CF management plan for Rangzhin Kuenphen CF and Tashi Thogmen CF, Shingtalum, Gasa Item: Workshops/Meetings. Calculation: unit cost @ 1000 X 4 (No of workshops) No. years: 1 (Year 1: 4000) Sub-total = 4000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Shingtalum watershed Item: Advocacy workshop. Calculation: unit cost @ 1000 X 1 (No of workshops) No. years: 1 (Year 1: 1000) Sub-total = 1000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Shingtalum watershed Item: LFM Planning workshop. Calculation: unit cost @ 1500 X 2 (No of workshops) No. years: 1 (Year 1: 3000) Sub-total = 3000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Shingtalum watershed Item: Support to community based waste management during cordyceps collection season. Calculation: unit cost @ 1500 X 4 (LS for no. of seasons) No. years: 4 (Year 2: 1500 Year 3: 1500 Year 4: 1500 Year 5: 1500) Sub-total = 6000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Shingtalum watershed Item: Survey, assessment with mapping and training workshop (Shingtalum). Calculation: unit cost @ 6500 X 1 (LS) No. years: 1 (Year 1: 6500) Sub-total = 6500</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Okalum watershed in Toepisa Gewog, Punakha Item: Advocacy workshops. Calculation: unit cost @ 1500 X 1 (No of workshops) No. years: 1 (Year 1: 1500) Sub-total = 1500</p>

<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Okalum watershed in Toepisa Gewog, Punakha Item: LFM Planning workshop. Calculation: unit cost @ 3500 X 2 (No of workshops) No. years: 2 (Year 1: 3500 Year 2: 3500) Sub-total = 7000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Okalum watershed in Toepisa Gewog, Punakha Item: Support to initiate community-based waste management. Calculation: unit cost @ 3000 X 1 (LS) No. years: 1 (Year 3: 3000) Sub-total = 3000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plan for Okalum watershed in Toepisa Gewog, Punakha Item: Survey, assessment with mapping and training workshop (Okalum). Calculation: unit cost @ 7000 X 1 (LS) No. years: 2 (Year 1: 3500 Year 2: 3500) Sub-total = 7000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plans for Kuchi watershed, Thakorling, Tsirang including biodiversity assessment Item: Advocacy workshop. Calculation: unit cost @ 1500 X 1 (No of workshops) No. years: 1 (Year 1: 1500) Sub-total = 1500</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plans for Kuchi watershed, Thakorling, Tsirang including biodiversity assessment Item: LFM Planning workshop. Calculation: unit cost @ 2500 X 2 (No of workshops) No. years: 1 (Year 2: 5000) Sub-total = 5000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plans for Kuchi watershed, Thakorling, Tsirang including biodiversity assessment Item: Survey, assessment with mapping and training workshop. Calculation: unit cost @ 7000 X 1 (LS) No. years: 2 (Year 1: 3500 Year 2: 3500) Sub-total = 7000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plans for Chedachhu, Bulkey and Larichhu watershed in Sergithang, Tsirang including biodiversity assessment Item: Advocacy workshops . Calculation: unit cost @ 1500 X 1 (No of workshops) No. years: 1 (Year 1: 1500) Sub-total = 1500</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plans for Chedachhu, Bulkey and Larichhu watershed in Sergithang, Tsirang including biodiversity assessment Item: LFM Planning workshop. Calculation: unit cost @ 3000 X 2 (No of workshops) No. years: 1 (Year 2: 6000) Sub-total = 6000</p>
<p>Output 2.1, Activity 2.1.3: Prepare Local Forest Management Plans for Chedachhu, Bulkey and Larichhu watershed in Sergithang, Tsirang including biodiversity assessment Item: Survey, assessment with mapping and training workshop (Laraychhu). Calculation: unit cost @ 10000 X 1 (LS) No. years: 2 (Year 1: 5000 Year 2: 5000) Sub-total = 10000 Total = 85750</p>

14	<p>Output 2.2, Activity 2.2.2: Promote of mulching technologies to conserve soil water in Kuchi watershed gewogs and Sergithang Item: Field monitoring of mulching activities. Calculation: unit cost @ 2500 X 1 (Yearly) No. years: 4 (Year 1: 625 Year 2: 625 Year 3: 625 Year 4: 625) Sub-total = 2500 Total = 2500</p>
15	<p>Output 2.2, Activity 2.2.2: terracing of farmland on slopes (Bulkey, 7 Ha; Sathmulay, 5 Ha; Rangbari, 1.5 Ha;), Sergithang Item: Labor saving equipment charges. Calculation: unit cost @ 450 X 7 (Ha) No. years: 1 (Year 1: 3150) Sub-total = 3150 Total = 3150</p>
16	<p>Output 2.2, Activity 2.2.2: Develop fodder/pasture on private land (25 acres, Khuchi-Thakorling; 2 Ha in Bulkey and Chedachhu Item: Area under fodder. Calculation: unit cost @ 300 X 7.5 (Ha) No. years: 2 (Year 2: 1125 Year 3: 1125) Sub-total = 2250</p> <p>Output 2.2, Activity 2.2.2: Install sprinklers and drip irrigation to improve water efficiency in Mendrelgang and Sergithang (Training and supply of sprinklers materials)Item: Smart irrigation materials supply. Calculation: unit cost @ 43000 X 1 (LS) No. years: 2 (Year 2: 21500 Year 3: 21500) Sub-total = 43000</p> <p>Output 2.2, Activity 2.2.2: Plant Grass slip/hedgerow in dryland agriculture for integrated fodder and soil stability measures (7 – Chedachhu, 7 Ha)Item: Planting materials per area. Calculation: unit cost @ 450 X 3 (Ha) No. years: 1 (Year 1: 1350) Sub-total = 1350</p> <p>Output 2.2, Activity 2.2.2: Promote of mulching technologies to conserve soil water in Kuchi watershed gewogs and Sergithang Item: Area under mulching. Calculation: unit cost @ 600 X 300 (Ha) No. years: 4 (Year 1: 45000 Year 2: 45000 Year 3: 45000 Year 4: 45000) Sub-total = 180000 Total = 226600</p>
17	<p>Output 2.2, Activity 2.2.1: Establish a new PES scheme for Okalum watershed between catchment communities of Toedpisa Gewog and downstream communities of Toepisa and Barp Gewogs and institutions within the gewogs including Lobeyisa township. Item: Establishment of PES scheme in Okalum. Calculation: unit cost @ 10000 X 1 (No PES scheme) No. years: 1 (Year 3: 10000) Sub-total = 10000</p> <p>Output 2.2, Activity 2.2.1: up-scale existing PES scheme between Thakhorling Community Forest Group of Patsaling gewog and residents of Damphu town, additional six gewogs, Mendrelgang satellite town and institutions within these gewogs Item: Upscaling of existing PES scheme in Tsirang. Calculation: unit cost @ 5000 X 1 (No PES scheme) No. years: 1 (Year 3: 5000) Sub-total = 5000</p> <p>Output 2.2, Activity 2.2.2: Promote of mulching technologies to conserve soil water in Kuchi watershed gewogs and Sergithang Item: Consultation and training on use and management of mulching materials, on water harvesting promotion, on water harvesting, efficient use of water, use of sprinklers and drip irrigation. Calculation: unit cost @ 30 X 100 (No of farmers trained) No. years: 4 (Year 1: 750 Year 2: 750 Year 3: 750 Year 4: 750) Sub-total = 3000</p>

	<p>Output 2.2, Activity 2.2.3: Planning meetings and workshops Item: Planning meetings/workshops. Calculation: unit cost @ 2800 X 1 (No of Meetings/Workshops) No. years: 1 (Year 1: 2800) Sub-total = 2800</p>
	<p>Output 2.2, Activity 2.2.3: Planning meetings and workshops Item: Training on plantation and maintenance of plantation. Calculation: unit cost @ 20 X 50 (No of people trained) No. years: 1 (Year 2: 1000) Sub-total = 1000 Total = 21800</p>
18	<p>Output 3.1, Activity 3.1.1: Occupational health safety (OHS) measures Item: Occupational health and safety measures for Gasa. Calculation: unit cost @ 21500 X 1 (LS) X LS (ha) No. years: 1 (Year 2: 21500) Sub-total = 21500</p>
	<p>Output 3.1, Activity 3.1.1: Operation and maintenance for one year as liability period Item: Operation and maintenance for one year as liability period. Calculation: unit cost @ 1600 X 12 (No of months) X LS (ha) No. years: 1 (Year 4: 19200) Sub-total = 19200</p>
	<p>Output 3.1, Activity 3.1.1: Water distribution network (valves, thrust blocks, pipes and supports, fire hydrants, HH meter connections, distribution tanks and augmentation) Item: Water distribution network (valves, thrust blocks, pipes and supports, fire hydrants, HH meter connections, distribution tanks and augmentation). Calculation: unit cost @ 297100 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 29710 Year 2: 133695 Year 3: 133695) Sub-total = 297100</p>
	<p>Output 3.1, Activity 3.1.1: water intake at Shingtalum (reinforced cement concrete/RCC) with intake protection structures (Gabion walls upstream of intake to block debris during monsoon) Item: Contractual services for water Intake, sand trap and intake protection. Calculation: unit cost @ 63100 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 6310 Year 2: 28395 Year 3: 28395) Sub-total = 63100</p>
	<p>Output 3.1, Activity 3.1.1: water transmission line (2.5kms of 150mm DI pipe laid through 1.2 m trenching (to avoid pipe breakage and to protect from freezing during winters); Suspended pipes to be supported with pipe support pillars, bends and slopes protected by thrust blocks Item: Contractual service for water conveyance line (clearing, materials, trenching, pipe laying , valves and fittings, thrust blocks, pipe supports, sand bedding. Calculation: unit cost @ 116 X 2500 (Meters) X M (ha) No. years: 3 (Year 1: 29000 Year 2: 130500 Year 3: 130500) Sub-total = 290000</p>
	<p>Output 3.1, Activity 3.1.1: Water treatment plant with a capacity of 1.4 MLD (Stilling chamber; sand filter, Tanks, Disinfection unit, LAB and office, Monitoring outpost, site development including access road to the WTP) Item: Contractual service for Water treatment plant with a capacity of 1.4 MLD (Stilling chamber; sand filter, Tanks, Disinfection unit, LAB and office, Monitoring outpost, site development including access road to the WTP). Calculation: unit cost @ 164100 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 16410 Year 2: 73845 Year 3: 73845) Sub-total = 164100</p>
	<p>Output 3.1, Activity 3.1.2: Consolidation of water intake at the catchment Item: Contractual service for consolidation of water intake at the catchment. Calculation: unit cost @ 34650 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 3465 Year 2: 15592 Year 3: 15593) Sub-total = 34650</p>

<p>Output 3.1, Activity 3.1.2: Contractual service for distribution augmentation including tanks in Lobeyasa Item: Contractual service for distribution augmentation including tanks. Calculation: unit cost @ 67000 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 6700 Year 2: 30150 Year 3: 30150) Sub-total = 67000</p>
<p>Output 3.1, Activity 3.1.2: Contractual service for Water treatment plant with a capacity of 2 MLD (Stilling chamber; sand filter, Tanks, Disinfection unit, LAB and office, Monitoring outpost, site development including access road to the WTP) Item: Contractual service for Water treatment plant with a capacity of 2 MLD (Stilling chamber; sand filter, Tanks, Disinfection unit, LAB and office, Monitoring outpost, site development including access road to the WTP). Calculation: unit cost @ 400000 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 40000 Year 2: 180000 Year 3: 180000) Sub-total = 400000</p>
<p>Output 3.1, Activity 3.1.2: Establish 17 Kms transmission main line from Okalum source to WTP with DT points for supply to communities within Toedpisa upto Lobeyasa in Barp gewog Item: Contractual service for water transmission line (clearing, materials, trenching, pipe laying, valves and fittings, thrust blocks, pipe supports, sand bedding. Calculation: unit cost @ 64.5 X 17000 (Meters) X LS (ha) No. years: 3 (Year 1: 109650 Year 2: 493425 Year 3: 493425) Sub-total = 1096500</p>
<p>Output 3.1, Activity 3.1.2: Occupational health safety (OHS) measures Item: Occupational health safety (OHS) measures. Calculation: unit cost @ 24354 X 1 (LS) X LS (ha) No. years: 1 (Year 1: 24354) Sub-total = 24354</p>
<p>Output 3.1, Activity 3.1.2: Operation and maintenance for one year as liability period Item: Operation and maintenance for one year as liability period. Calculation: unit cost @ 1600 X 12 (No months) X LS (ha) No. years: 1 (Year 4: 19200) Sub-total = 19200</p>
<p>Output 3.1, Activity 3.1.3: Intake Structure, Collection Tank, Gabion Wall and Barbed wire fencing with gate at the Source/Catchment Area of Khuchi Khola; Main Pipe Line from Khuchi Khola Source to Dhupi and 2 RCC Main Reservoir of 250 Cum each) Item: Contractual service for Intake structures and protection at Kuchi source. Calculation: unit cost @ 35726 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 3572 Year 2: 25008 Year 3: 7146) Sub-total = 35726</p>
<p>Output 3.1, Activity 3.1.3: Intake Structure, Collection Tank, Gabion Wall and Barbed wire fencing with gate at the Source/Catchment Area of Khuchi Khola; Main Pipe Line from Khuchi Khola Source to Dhupi and 2 RCC Main Reservoir of 250 Cum each) Item: Contractual service for materials and laying of raw water pipe line. Calculation: unit cost @ 69.5 X 13210 (Meters) X LS (ha) No. years: 3 (Year 1: 91809 Year 2: 642666 Year 3: 183620) Sub-total = 918095</p>
<p>Output 3.1, Activity 3.1.3: Intake Structure, Collection Tank, Gabion Wall and Barbed wire fencing with gate at the Source/Catchment Area of Khuchi Khola; Main Pipe Line from Khuchi Khola Source to Dhupi and 2 RCC Main Reservoir of 250 Cum each) Item: Contractual service for RCC reservoir (250 cum) at Dhubi. Calculation: unit cost @ 54120 X 2 (Numbers) X LS (ha) No. years: 3 (Year 1: 10824 Year 2: 75768 Year 3: 21648) Sub-total = 108240</p>

<p>Output 3.1, Activity 3.1.3: Main from the proposed Service Reservoirs at Dhupi to Existing FCRs of Barshong Gewog Item: Contractual service fo Pipe and pipe installation from Dhupi to Barshong gewog, FCR, lower Chuzomsa, Pangthang Chiwog under Patshaling Gewog. Calculation: unit cost @ 14.5 X 8080 (Meters) X LS (ha) No. years: 3 (Year 1: 11716 Year 2: 82012 Year 3: 23432) Sub-total = 117160</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the reservoirs at Dhupi to Existing FCRs of Mendrelgang High School & Primary School and 2 RCC reservoirs of 250Cum each Item: Contractual service for providing and laying of pipes from Dhupi to Mendrelgang PS & CS. Calculation: unit cost @ 38.5 X 4990 (Meters) X LS (ha) No. years: 3 (Year 1: 19211 Year 2: 134480 Year 3: 38424) Sub-total = 192115</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the reservoirs at Dhupi to Existing FCRs of Mendrelgang High School & Primary School and 2 RCC reservoirs of 250Cum each Item: Contractual service for RCC reservoir (250 cum) at Mendrelgang. Calculation: unit cost @ 14256 X 2 (Numbers) X LS (ha) No. years: 3 (Year 1: 2851 Year 2: 19958 Year 3: 5703) Sub-total = 28512</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the reservoirs at Dhupi to Y - Point of Rangthangling, Tsholingkhar, Kilkhorthang Ge-wogs & then to Y-Point of Drugchugang, Tsholingkhar and Menchuna, Kilkhorthang and 1 RCC Main reser-voir of 250Cum. Item: Contractual service for providing and laying of pipes. Calculation: unit cost @ 63 X 3884 (Meters) X LS (ha) No. years: 3 (Year 1: 24469 Year 2: 171284 Year 3: 48939) Sub-total = 244692</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the reservoirs at Dhupi to Y - Point of Rangthangling, Tsholingkhar, Kilkhorthang Ge-wogs & then to Y-Point of Drugchugang, Tsholingkhar and Menchuna, Kilkhorthang and 1 RCC Main reser-voir of 250Cum. Item: Contractual service for RCC Main Reservoir (250Cum) and protection works at Rangthangling Y Point. Calculation: unit cost @ 51360 X 1 (Numbers) X LS (ha) No. years: 3 (Year 1: 5136 Year 2: 35952 Year 3: 10272) Sub-total = 51360</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the service reservoirs at Dhupi to Existing FCRs of Trashipang Chiwog under Mendrel-gang Gewog and 2 RCC Break Pressure Tank (BPT - 5 cum) Item: Contractual service for providing and laying of pipes from Dhupi to Tashipang. Calculation: unit cost @ 23.5 X 2840 (Meters) X LS (ha) No. years: 3 (Year 1: 6674 Year 2: 46718 Year 3: 13348) Sub-total = 66740</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the service reservoirs at Dhupi to Existing FCRs of Trashipang Chiwog under Mendrel-gang Gewog and 2 RCC Break Pressure Tank (BPT - 5 cum) Item: RCC BPT (5Cum) along the line. Calculation: unit cost @ 8945 X 2 (Numbers) X LS (ha) No. years: 3 (Year 1: 1789 Year 2: 12523 Year 3: 3578) Sub-total = 17890</p>
<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the Y-Point of Drugchugang, Tsholingkhar and Menchuna, Kilkhorthang to the existing FCR (for Upper Menchuna) below IB Guest House Item: Contractual service for providing and laying of pipes from Y point of Drupchugang to Menchuna (above IB). Calculation: unit cost @ 10 X 3814 (Meters) X LS (ha) No. years: 3 (Year 1: 3814 Year 2: 26698 Year 3: 7628) Sub-total = 38140</p>

<p>Output 3.1, Activity 3.1.3: Main Pipe Line from the Y-Point of Drugchugang, Tsholingkhar and Menchuna, Kikhorthang to the pro-posed FCR (for Drugchugang, Batasay & Lower Menchuna) below VVIP Guest House Item: Contractual service for providing and laying of pipes from Y point of Drupchugang to VVIP GH & one FCR. Calculation: unit cost @ 174940 X 1 (LS) X LS (ha) No. years: 3 (Year 1: 17494 Year 2: 122458 Year 3: 34988) Sub-total = 174940</p>
<p>Output 3.1, Activity 3.1.3: Occupational health safety (OHS) measures Item: Occupational health safety (OHS) measures. Calculation: unit cost @ 16455 X 1 (LS) No. years: 1 (Year 2: 16455) Sub-total = 16455</p>
<p>Output 3.1, Activity 3.1.3: Operation and maintenance for one year as liability period Item: O&M. Calculation: unit cost @ 1600 X 12 (Months) X LS (ha) No. years: 2 (Year 3: 9600 Year 4: 9600) Sub-total = 19200</p>
<p>Output 3.1, Activity 3.1.4: 1 RCC Main Reservoir (250Cum) at Bhulkay top Item: 1 RCC Main Reservoir (250Cum) at Bhulkay top. Calculation: unit cost @ 61730 X 1 (LS) No. years: 2 (Year 2: 37038 Year 3: 24692) Sub-total = 61730</p>
<p>Output 3.1, Activity 3.1.4: Intake structure and Collection Tank, with gate at the Source/Catchment Area of Kharpani Khola, RCC sand trap and protection Item: Contractual service for Intake at Kharpani Khola source. Calculation: unit cost @ 50950 X 1 (LS) X LS (ha) No. years: 2 (Year 2: 30570 Year 3: 20380) Sub-total = 50950</p>
<p>Output 3.1, Activity 3.1.4: Main Pipe Line (Integrated-Drinking & Irrigation) from the Source to proposed Reservoir Area at Bhulkay Top for Tashithang Item: Pipe & pipe installations. Calculation: unit cost @ 126.7 X 8950 (Meters) X LS (ha) No. years: 2 (Year 2: 680379 Year 3: 453586) Sub-total = 1133965</p>
<p>Output 3.1, Activity 3.1.4: O&M, Sergithang Item: O&M. Calculation: unit cost @ 1600 X 12 (Months) No. years: 2 (Year 3: 4800 Year 4: 14400) Sub-total = 19200</p>
<p>Output 3.1, Activity 3.1.4: OHS, Sergithang Item: Occupational health safety (OHS) measures. Calculation: unit cost @ 20137 X 1 (LS) No. years: 1 (Year 2: 20137) Sub-total = 20137</p>
<p>Output 3.1, Activity 3.1.4: Pipe Lines to Bhotay Kholcha, Dajay Irrigation Channel, Sathmolay Kholcha, Mocaray Dara and Sathmulay Irrigation Intake Point in Tashithang Chiwog including 1 RCC Main Reservoir (250Cum), 1 RCC Break Pres-sure Tank (BPT - 5 cum) and 16 delivery chambers and outlet chambers Item: BPT – 5 Cum. Calculation: unit cost @ 8945 X 1 (LS) X LS (ha) No. years: 2 (Year 2: 5367 Year 3: 3578) Sub-total = 8945</p>

	<p>Output 3.1, Activity 3.1.4: Pipe Lines to Bhotay Kholcha, Dajay Irrigation Channel, Sathmolay Kholcha, Mokaray Dara and Sathmulay Irrigation Intake Point in Tashithang Chiwog including 1 RCC Main Reservoir (250Cum), 1 RCC Break Pres-sure Tank (BPT - 5 cum) and 16 delivery chambers and outlet chambers Item: Delivery chambers. Calculation: unit cost @ 13738 X 16 (Numbers) X LS (ha) No. years: 2 (Year 2: 131884 Year 3: 87924) Sub-total = 219808</p>
	<p>Output 3.1, Activity 3.1.4: Pipe Lines to Bhotay Kholcha, Dajay Irrigation Channel, Sathmolay Kholcha, Mokaray Dara and Sathmulay Irrigation Intake Point in Tashithang Chiwog including 1 RCC Main Reservoir (250Cum), 1 RCC Break Pres-sure Tank (BPT - 5 cum) and 16 delivery chambers and outlet chambers Item: Pipe & pipe installations. Calculation: unit cost @ 59 X 5116 (Meters) X LS (ha) No. years: 2 (Year 2: 181106 Year 3: 120738) Sub-total = 301844</p>
	<p>Output 3.1, Activity 3.1.4: Supervision and Monitoring, Sergithang Item: Supervision and monitoring. Calculation: unit cost @ 3000 X 5 (No of years) X LS (ha) No. years: 3 (Year 2: 6000 Year 3: 6000 Year 4: 3000) Sub-total = 15000</p>
	<p>Output 3.1, Activity 3.1.4: Two Drinking Water Supply Distribution main pipe lines Item: Pipe & pipe installations for domestic water. Calculation: unit cost @ 4.05 X 3080 (Meters) X LS (ha) No. years: 2 (Year 2: 7484 Year 3: 4990) Sub-total = 12474 Total = 6370022</p>
19	<p>Output 3.1, Activity 3.1.1: Local consultations, travels and assessments Item: Local consultations, travels and assessments. Calculation: unit cost @ 3000 X 5 (No of years) No. years: 4 (Year 1: 3000 Year 3: 3000 Year 4: 6000 Year 5: 3000) Sub-total = 15000</p>
	<p>Output 3.1, Activity 3.1.2: Local consultations, travels and assessments Item: Local consultations, travels and assessments. Calculation: unit cost @ 3000 X 5 (No of years) No. years: 5 (Year 1: 3000 Year 2: 3000 Year 3: 3000 Year 4: 3000 Year 5: 3000) Sub-total = 15000</p>
	<p>Output 3.1, Activity 3.1.3: Local consultations, travels and assessments Item: Local supervision & monitoring. Calculation: unit cost @ 3000 X 5 (Years) No. years: 4 (Year 1: 3000 Year 2: 6000 Year 3: 3000 Year 4: 3000) Sub-total = 15000 Total = 45000</p>
20	<p>Output 3.2, Activity 3.2.1: Integrate, in collaboration with private sector entities, automation of irrigation and drinking water assets using IoT, AI, micro-controller and sensor-based data science within water intake at source, water storage tanks, WTP facilities, main transmission lines and subsidiary distribution lines. It will involve use of sensors, electric valves, gauges, flow meters, fire hydrants, balancing units, and weather monitoring stations that are linked to main control Item: Installation of IoT/ICT based system for automated management of water supply, Punakha. Calculation: unit cost @ 94000 X 1 (LS) X LS (ha) No. years: 2 (Year 2: 37600 Year 3: 56400) Sub-total = 94000</p>

	<p>Output 3.2, Activity 3.2.1: Integrate, in collaboration with private sector entities, automation of irrigation and drinking water assets using IoT, AI, micro-controller and sensor-based data science within water intake at source, water storage tanks, WTP facilities, main transmission lines and subsidiary distribution lines. It will involve use of sensors, electric valves, gauges, flow meters, fire hydrants, balancing units, and weather monitoring stations that are linked to main control</p> <p>Item: Installation of IoT/ICT based system for automated management of water supply, Gasa.</p> <p>Calculation: unit cost @ 160000 X 1 (LS) X LS (ha) No. years: 2 (Year 2: 64000 Year 3: 96000) Sub-total = 160000</p> <p>Total = 254000</p>
21	<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards</p> <p>Item: International consultant Safeguards Expert.</p> <p>Calculation: unit cost @ 700 X 45 (No of days) No. years: 4 (Year 1: 7875 Year 2: 7875 Year 3: 7875 Year 4: 7875) Sub-total = 31500</p>
	<p>Output 4.1, Activity 4.1.4: Support implementation of water resource management curriculum at tertiary education level including (2 tertiary institutions)</p> <p>Item: International Consultant – Training of trainers on engineering curriculum.</p> <p>Calculation: unit cost @ 1000 X 30 (No of days) No. years: 2 (Year 2: 15000 Year 3: 15000) Sub-total = 30000</p> <p>Total = 61500</p>
22	<p>Output 4.1, Activity 4.1.3: Gender safeguards</p> <p>Item: Local consultant – Gender expert.</p> <p>Calculation: unit cost @ 4000 X 6 (No of months) No. years: 5 (Year 1: 4800 Year 2: 4800 Year 3: 4800 Year 4: 4800 Year 5: 4800) Sub-total = 24000</p>
	<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards</p> <p>Item: Local consultant Safeguards Expert.</p> <p>Calculation: unit cost @ 4000 X 9 (No of months) No. years: 5 (Year 1: 7200 Year 2: 7200 Year 3: 7200 Year 4: 7200 Year 5: 7200) Sub-total = 36000</p> <p>Total = 60000</p>
23	<p>Output 4.1, Activity 4.1.1: Prepare videos / brochures/ flyers/poster and other communication materials on project success stories, progress, impacts, knowledge and practices for climate resilient water and watershed management, standards and tools based on output 1.3</p> <p>Item: Service contract for communication expert including travel.</p> <p>Calculation: unit cost @ 400 X 60 (No of days) No. years: 5 (Year 1: 2400 Year 2: 2400 Year 3: 4800 Year 4: 8400 Year 5: 6000) Sub-total = 24000</p> <p>Total = 24000</p>
24	<p>Output 4.1, Activity 4.1.4: Support implementation of water resource management curriculum at tertiary education level including (2 tertiary institutions)</p> <p>Item: Water analysis equipment.</p> <p>Calculation: unit cost @ 4500 X 2 (LS (no of institutes)) No. years: 1 (Year 2: 9000) Sub-total = 9000</p>

	<p>Output 4.1, Activity 4.1.5: Support diagnosis, analytical capacity and water quality testing capacities at 21 Primary Health Care Centers of 3 Dzongkhags Item: E. coli test sets. Calculation: unit cost @ 1400 X 21 (No of sets) No. years: 1 (Year 3: 29400) Sub-total = 29400 Total = 38400</p>
25	<p>Output 4.1, Activity 4.1.1: Document good practices on water conservation and sustainable water resources management and approaches for scale up Item: Workshops/Meetings. Calculation: unit cost @ 7500 X 4 (No of workshops) No. years: 4 (Year 2: 7500 Year 3: 7500 Year 4: 7500 Year 5: 7500) Sub-total = 30000</p>
	<p>Output 4.1, Activity 4.1.1: Document information on the successes and lessons learned from innovative nature based solutions and financing mechanisms, implementation of PPP arrangements and private sector partnerships to deliver water utility services and Community based water and infrastructure management for climate resilience Item: Consultation workshop. Calculation: unit cost @ 7500 X 2 (No of workshops) No. years: 2 (Year 4: 7500 Year 5: 7500) Sub-total = 15000</p>
	<p>Output 4.1, Activity 4.1.1: Prepare a communication plan on dissemination of lessons, best practices and other information to stakeholders Item: Communication planning workshop. Calculation: unit cost @ 5000 X 1 (No of workshops) No. years: 1 (Year 1: 5000) Sub-total = 5000</p>
	<p>Output 4.1, Activity 4.1.1: Study visit and exchange programs among farmers, community and local government functionaries Item: Study tour. Calculation: unit cost @ 7000 X 1 (No of Study tours) No. years: 1 (Year 4: 7000) Sub-total = 7000</p>
	<p>Output 4.1, Activity 4.1.2: conferences and workshops to strengthen south-south cooperation and knowledge sharing Item: Conferences and workshops to strengthen south-south cooperation and knowledge sharing (5 person per conference/workshop). Calculation: unit cost @ 12500 X 4 (No of conferences) No. years: 4 (Year 2: 12500 Year 3: 12500 Year 4: 12500 Year 5: 12500) Sub-total = 50000</p>
	<p>Output 4.1, Activity 4.1.2: exhibitions, workshops, events Item: Events for dissemination and awareness. Calculation: unit cost @ 5000 X 3 (No of events) No. years: 1 (Year 5: 15000) Sub-total = 15000</p>
	<p>Output 4.1, Activity 4.1.2: publication in websites of UNDP, MOWHS, NECS and Dzongkhag Item: Publication in websites of UNDP, MOWHS, NECS and Dzongkhag. Calculation: unit cost @ 300 X 4 (Web publication design) No. years: 1 (Year 5: 1200) Sub-total = 1200</p>
	<p>Output 4.1, Activity 4.1.2: Study visit and exchange programs among local government functionaries Item: Study visit and exchange programs among local government functionaries, local technical staff. Calculation: unit cost @ 10000 X 2 (No of Study tours) No. years: 2 (Year 1: 10000 Year 4: 10000) Sub-total = 20000</p>

<p>Output 4.1, Activity 4.1.3: Gender safeguards Item: Review and revise GAP during the first 6 months of implementation period. Calculation: unit cost @ 15000 X 1 (LS) No. years: 1 (Year 1: 15000) Sub-total = 15000</p>
<p>Output 4.1, Activity 4.1.3: Gender safeguards Item: Training on gender safeguards (i. Understanding basic gender terms, changing attitudes, norms, stereotypes, basic gender parental responsibilities, behaviors and practices to promote gender equality and prevent domestic and gender-based violence (GBV) ii. Awareness on sexual harassment - various Acts and regulations related to sexual harassment and reporting mechanism iii. Awareness on the need for gender mainstreaming). Calculation: unit cost @ 8000 X 4 (No workshops) No. years: 3 (Year 1: 16000 Year 2: 8000 Year 3: 8000) Sub-total = 32000</p>
<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards Item: ESMF Archeological and chance find mechanism cost. Calculation: unit cost @ 25000 X 1 (LS) No. years: 4 (Year 2: 6250 Year 3: 6250 Year 4: 6250 Year 5: 6250) Sub-total = 25000</p>
<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards Item: ESMF Updating the social and environmental management framework and Stakeholder engagement plan during first six months of the project (Stakeholders and community consultations, participation of communities in assessments, GRM etc.). Calculation: unit cost @ 20000 X 1 (LS) No. years: 1 (Year 1: 20000) Sub-total = 20000</p>
<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards Item: ESMP for activity and location water supply scheme. Calculation: unit cost @ 6500 X 9 (workshops/writeshop) No. years: 2 (Year 1: 29250 Year 2: 29250) Sub-total = 58500</p>
<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards Item: KM - Training on Safeguards and gender orientation to project staff and stakeholders. Calculation: unit cost @ 7000 X 1 (No of Training Workshops) No. years: 1 (Year 1: 7000) Sub-total = 7000</p>
<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards Item: KM - Training to project staff and local stakeholders on the project GRM process. Calculation: unit cost @ 100 X 110 (No of participants) No. years: 1 (Year 1: 11000) Sub-total = 11000</p>
<p>Output 4.1, Activity 4.1.3: Social and environmental safeguards Item: Site and activity specific ESIA for the four schemes after finalization of activity designs Calculation: unit cost @ 4000 X 4 (LS per sites) No. years: 1 (Year 1: 16000) Sub-total = 16000</p>
<p>Output 4.1, Activity 4.1.4: Support implementation of water resource management curriculum at tertiary education level including (2 tertiary institutions) Item: Meetings/Workshops – water resource management curriculum at tertiary education level including (2 tertiary institutions). Calculation: unit cost @ 4500 X 4 (No of meetings/workshops) No. years: 1 (Year 1: 18000) Sub-total = 18000</p>

	<p>Output 4.1, Activity 4.1.4: Support technical capacity and skills in water supply engineering and Climate and hydrological modeling (5 officials) Item: Training – Technical capacity and skills in water supply engineering and Climate and hydrological modeling. Calculation: unit cost @ 21400 X 5 (No of people trained) No. years: 1 (Year 2: 107000) Sub-total = 107000</p>
	<p>Output 4.1, Activity 4.1.4: Training of trainers on climate resilient water infrastructure design, planning, implementation and O&M (10 officials, Ex country training) Item: Training of trainers - on climate resilient water infrastructure design, planning, implementation and O&M. Calculation: unit cost @ 21400 X 10 (No of people trained) No. years: 1 (Year 2: 214000) Sub-total = 214000</p>
	<p>Output 4.1, Activity 4.1.5: Support diagnosis, analytical capacity and water quality testing capacities at 21 Primary Health Care Centers of 3 Dzongkhags Item: Training on water testing. Calculation: unit cost @ 40 X 50 (No of people trained) No. years: 1 (Year 4: 2000) Sub-total = 2000 Total = 668700</p>
26	<p>Output 4.2, Activity 4.2.1: Develop harmonized comprehensive database on water resources and infrastructure within the Punatshangchhu river basin (for water security index system on water for urban, rural, economic, environment, disaster and climate resilience) Item: Local Consultant – System development expert. Calculation: unit cost @ 400 X 45 (No of days) No. years: 1 (Year 3: 18000) Sub-total = 18000 Total = 18000</p>
27	<p>Output 4.2, Activity 4.2.1: Develop harmonized comprehensive database on water resources and infrastructure within the Punatshangchhu river basin (for water security index system on water for urban, rural, economic, environment, disaster and climate resilience) Item: Training Workshop-information sharing and reporting mechanism and information system (30 participants*5 days*3 times*. Calculation: unit cost @ 4500 X 3 (No of workshops) No. years: 1 (Year 3: 13500) Sub-total = 13500</p>
	<p>Output 4.2, Activity 4.2.2: Carry out overall situation analysis 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 Wa-ter User Associations (WUAs) Item: Survey/workshop – situational analysis 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;. Calculation: unit cost @ 4500 X 3 (No of workshops) No. years: 1 (Year 3: 13500) Sub-total = 13500</p>
	<p>Output 4.2, Activity 4.2.2: Develop a commonly agreed SOBR format and document SoBR for Punatsangchhu river basin and institute mechanism for regular reporting and sharing of data and reports on state of river basin Item: Workshop/meetings for SOBR format and process. Calculation: unit cost @ 7000 X 1 (No workshops) No. years: 1 (Year 3: 7000) Sub-total = 7000</p>

	<p>Output 4.2, Activity 4.2.2: Publish and disseminate State of the Basin Report (SOBR) for the Punatsangchu River Basin Item: Workshop on SOBR finalization. Calculation: unit cost @ 4500 X 3 (No of workshops) No. years: 3 (Year 3: 4590 Year 4: 4455 Year 5: 4455) Sub-total = 13500 Total = 47500</p>
28	<p>Output M&E, Activity 4.1.3: Gender safeguards Item: Annual implementation review of Gender Action Plan. Calculation: unit cost @ 2500 X 8 (No of Meetings/Workshops (4 meeting each for safeguards and gender)) No. years: 4 (Year 1: 5000 Year 2: 5000 Year 3: 5000 Year 4: 5000) Sub-total = 20000</p>
	<p>Output M&E, Activity 4.1.3: Project governance and monitoring Item: Annual Planning and review workshop which includes plan preparation and monitoring of indicators in project results framework for adaptive management, annual lesson learning session among project stakeholders; Complete annual PIR and conduct mid-year review of annual work plan implementation status for adaptive management of project activities. Calculation: unit cost @ 3000 X 20 (No of workshops) No. years: 5 (Year 1: 12000 Year 2: 12000 Year 3: 12000 Year 4: 12000 Year 5: 12000) Sub-total = 60000</p>
	<p>Output M&E, Activity 4.1.3: Project governance and monitoring Item: Baseline Survey and assessment as necessary to update all indicators in the results framework at mid-term and end of project. Calculation: unit cost @ 10000 X 2 (Baseline surveys) No. years: 2 (Year 1: 10000 Year 5: 10000) Sub-total = 20000</p>
	<p>Output M&E, Activity 4.1.3: Project governance and monitoring Item: Technical Advisory Committee meetings and sessions. Calculation: unit cost @ 1200 X 10 (No of meetings/workshops) No. years: 5 (Year 1: 2400 Year 2: 2400 Year 3: 2400 Year 4: 2400 Year 5: 2400) Sub-total = 12000</p>
	<p>Output M&E, Activity 4.1.3: Social and environmental safeguards Item: Annual implementation review of social and environment safeguards and GRM. Calculation: unit cost @ 2500 X 8 (No of Meetings/Workshops (4 meeting each for safeguards and gender)) No. years: 4 (Year 1: 5000 Year 2: 5000 Year 3: 5000 Year 4: 5000) Sub-total = 20000 Total = 132000</p>
29	<p>Output M&E, Activity 4.1.3: MTR and TE Item: International Consultant to conduct independent Terminal Evaluation of GEF-financed and co-financed activities in line with UNDP/GEF requirements. Calculation: unit cost @ 1000 X 30 (No of days, including travel) No. years: 1 (Year 5: 30000) Sub-total = 30000</p>
	<p>Output M&E, Activity 4.1.3: MTR and TE Item: International consultant for 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). Calculation: unit cost @ 1000 X 30 (No of days, including travel) No. years: 1 (Year 3: 30000) Sub-total = 30000 Total = 60000</p>

30	Output M&E, Activity 4.1.3: MTR and TE Item: Local consultant to support MTR process. Calculation: unit cost @ 400 X 35 (No of days, including travel) No. years: 1 (Year 3: 14000) Sub-total = 14000
	Output M&E, Activity 4.1.3: MTR and TE Item: Local Consultant to support Terminal Evaluation process. Calculation: unit cost @ 400 X 40 (No of days, including travel) No. years: 1 (Year 5: 16000) Sub-total = 16000 Total = 30000
31	Output M&E, Activity 4.1.3: MTR and TE Item: Field consultations and meetings related to MTR. Calculation: unit cost @ 2500 X 5 (No of workshops/consultations) No. years: 1 (Year 3: 12500) Sub-total = 12500
	Output M&E, Activity 4.1.3: MTR and TE Item: Field consultations and meetings related to Terminal Evaluation. Calculation: unit cost @ 2500 X 6 (No of workshops/consultations) No. years: 1 (Year 5: 15000) Sub-total = 15000 Total = 27500
32	Output PMC, Activity 4.1.3: Establish PMU Item: Project Transport Hire. Calculation: unit cost @ 750 X 60 (No of months) No. years: 5 (Year 1: 9000 Year 2: 9000 Year 3: 9000 Year 4: 9000 Year 5: 9000) Sub-total = 45000
	Output PMC, Activity 4.1.3: Establish PMU Item: Staff travels. Calculation: unit cost @ 500 X 60 (No of months) No. years: 5 (Year 1: 3000 Year 2: 6300 Year 3: 8400 Year 4: 7800 Year 5: 4500) Sub-total = 30000 Total = 75000
33	Output PMC, Activity 4.1.3: Establish PMU Item: Project M&E/Coms. Calculation: unit cost @ 1250 X 60 (No of months) No. years: 5 (Year 1: 15000 Year 2: 15000 Year 3: 15000 Year 4: 15000 Year 5: 15000) Sub-total = 75000
	Output PMC, Activity 4.1.3: Establish PMU Item: Project Officer/Technical Expert. Calculation: unit cost @ 1250 X 60 (No of months) No. years: 5 (Year 1: 15000 Year 2: 15000 Year 3: 15000 Year 4: 15000 Year 5: 15000) Sub-total = 75000 Total = 150000
34	Output PMC, Activity 4.1.3: Establish PMU Item: Advertisements, notifications, announcements. Calculation: unit cost @ 6531 X 1 (LS) No. years: 5 (Year 1: 1306 Year 2: 1306 Year 3: 1306 Year 4: 1306 Year 5: 1307) Sub-total = 6531 Total = 6531

35	<p>Output PMC, Activity 4.1.3: Establish PMU Item: Stationary. Calculation: unit cost @ 10407 X 1 (local staff) No. years: 5 (Year 1: 2081 Year 2: 2081 Year 3: 2081 Year 4: 2081 Year 5: 2083) Sub-total = 10407 Total = 10407</p>
36	<p>Output PMC, Activity 4.1.3: Establish PMU Item: IT equipment. Calculation: unit cost @ 3000 X 8 (No of staff) No. years: 2 (Year 1: 19200 Year 3: 4800) Sub-total = 24000 Total = 24000</p>
37	<p>Output PMC, Activity 4.1.3: Establish PMU Item: Audiovisual equipment. Calculation: unit cost @ 15000 X 1 (local staff) No. years: 2 (Year 1: 12000 Year 2: 3000) Sub-total = 15000 Total = 15000</p>
38	<p>Output PMC, Activity 4.1.3: Project governance and monitoring Item: Convene project inception workshop within first 60 days of the project to review, update and elaborate project plans and management arrangements. Calculation: unit cost @ 5000 X 1 (No of workshops) No. years: 1 (Year 1: 5000) Sub-total = 5000</p>
	<p>Output PMC, Activity 4.1.3: Project governance and monitoring Item: SC sessions. Calculation: unit cost @ 1000 X 10 (No of workshops) No. years: 5 (Year 1: 2000 Year 2: 2000 Year 3: 2000 Year 4: 2000 Year 5: 2000) Sub-total = 10000 Total = 15000</p>
39	<p>Output PMC, Activity 4.1.3: Project governance and monitoring Item: Conduct Annual NIM Audit. Calculation: unit cost @ 2000 X 4 (No of audit sessions) No. years: 4 (Year 2: 2000 Year 3: 2000 Year 4: 2000 Year 5: 2000) Sub-total = 8000 Total = 8000</p>
40	<p>Output PMC, Activity 4.1.1: UNDP Project & knowledge management support Item: meetings, workshops, field/mission visits and communication. Calculation: unit cost @ 20000 X 5 (LS, annually) No. years: 5 (Year 1: 20000 Year 2: 20000 Year 3: 20000 Year 4: 20000 Year 5: 20000) Sub-total = 100000 Total = 100000</p>

X. LEGAL CONTEXT

This project document shall be the instrument referred to as such in Article 1 of the Standard Basic Assistance Agreement between the Government of (Bhutan) and UNDP, signed on 14th July 1978. All references in the SBAA to “Executing Agency” shall be deemed to refer to “Implementing Partner.”

This project will be implemented by Ministry of Infrastructure and Transport (“Implementing Partner”) in accordance with its financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

XI. RISK MANAGEMENT

1. Consistent with the Article III of the SBAA [or the Supplemental Provisions to the Project Document], the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP’s property in the Implementing Partner’s custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:
 - a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried; b) assume all risks and liabilities related to the Implementing Partner’s security, and the full implementation of the security plan.
2. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner’s obligations under this Project Document.
3. The Implementing Partner agrees to undertake all reasonable efforts to ensure that no UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the United Nations Security Council Consolidated Sanctions List, and that no UNDP funds received pursuant to the Project Document are used for money laundering activities. The United Nations Security Council Consolidated Sanctions List can be accessed via <https://www.un.org/securitycouncil/content/un-sc-consolidated-list>.
4. The Implementing Partner acknowledges and agrees that UNDP will not tolerate sexual harassment and sexual exploitation and abuse of anyone by the Implementing Partner, and each of its responsible parties, their respective sub-recipients and other entities involved in Project implementation, either as contractors or subcontractors and their personnel, and any individuals performing services for them under the Project Document.
 - a. In the implementation of the activities under this Project Document, the Implementing Partner, and each of its sub-parties referred to above, shall comply with the standards of conduct set forth in the Secretary General’s Bulletin ST/SGB/2003/13 of 9 October 2003, concerning “Special measures for protection from sexual exploitation and sexual abuse” (“SEA”).
 - b. Moreover, and without limitation to the application of other regulations, rules, policies and procedures bearing upon the performance of the activities under this Project Document, in the implementation of activities, the Implementing Partner, and each of its sub-parties referred to above, shall not engage in any form of sexual harassment (“SH”). SH is defined as any unwelcome conduct of a sexual nature that might reasonably be expected or be perceived to cause offense or humiliation, when such conduct interferes with work, is made a condition of employment or creates an intimidating, hostile or offensive work environment. SH may occur in the workplace or in connection with work. While typically involving a pattern of conduct, SH may take the form of a single incident. In assessing the reasonableness of expectations or perceptions, the perspective of the person who is the target of the conduct shall be considered
5. a) In the performance of the activities under this Project Document, the Implementing Partner shall (with respect to its own activities), and shall require from its sub-parties referred to in paragraph 4 (with respect to their activities) that they, have minimum standards and procedures in place, or a plan to develop and/or improve such standards and procedures in order to be able to take effective preventive and investigative action. These should

include: policies on sexual harassment and sexual exploitation and abuse; policies on whistleblowing/protection against retaliation; and complaints, disciplinary and investigative mechanisms. In line with this, the Implementing Partner will and will require that such sub-parties will take all appropriate measures to:

- i. Prevent its employees, agents or any other persons engaged to perform any services under this Project Document, from engaging in SH or SEA;
- ii. Offer employees and associated personnel training on prevention and response to SH and SEA, where the Implementing Partner and its sub-parties referred to in paragraph 4 have not put in place its own training regarding the prevention of SH and SEA, the Implementing Partner and its sub-parties may use the training material available at UNDP;
- iii. Report and monitor allegations of SH and SEA of which the Implementing Partner and its sub-parties referred to in paragraph 4 have been informed or have otherwise become aware, and status thereof;
- iv. Refer victims/survivors of SH and SEA to safe and confidential victim assistance; and
- v. Promptly and confidentially record and investigate any allegations credible enough to warrant an investigation of SH or SEA. The Implementing Partner shall advise UNDP of any such allegations received and investigations being conducted by itself or any of its sub-parties referred to in paragraph 4 with respect to their activities under the Project Document, and shall keep UNDP informed during the investigation by it or any of such sub-parties, to the extent that such notification (i) does not jeopardise the conduct of the investigation, including but not limited to the safety or security of persons, and/or (ii) is not in contravention of any laws applicable to it. Following the investigation, the Implementing Partner shall advise UNDP of any actions taken by it or any of the other entities further to the investigation.

b) The Implementing Partner shall establish that it has complied with the foregoing, to the satisfaction of UNDP, when requested by UNDP or any party acting on its behalf to provide such confirmation. Failure of the Implementing Partner, and each of its sub-parties referred to in paragraph 4, to comply of the foregoing, as determined by UNDP, shall be considered grounds for suspension or termination of the Project.

6. Social and environmental sustainability will be enhanced through application of the UNDP Social and Environmental Standards (<http://www.undp.org/ses>) and related Accountability Mechanism <http://www.undp.org/secu-srm>.
7. The Implementing Partner shall: (a) conduct project and programme-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project or programme to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.
8. All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any programme or project-related commitments or compliance with the UNDP Social and Environmental Standards. This includes providing access to project sites, relevant personnel, information, and documentation.
9. The Implementing Partner will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, responsible parties, subcontractors and sub-recipients in implementing the project or using UNDP funds.
10. In the implementation of the activities under this Project Document, UNDP places reasonable reliance upon the Implementing Partner for it to apply its laws, regulations and processes, and applicable international laws regarding anti money laundering and countering the financing of terrorism, to ensure consistency with the principles of then in force the UNDP Anti-Money Laundering and Countering the Financing of Terrorism Policy.
11. The Implementing Partner will ensure that its financial management, anti-corruption, anti-fraud and anti-money laundering and countering the financing of terrorism policies are in place and enforced for all funding received from or through UNDP.
12. The requirements of the following documents, then in force at the time of signature of the Project Document, apply to the Implementing Partner: (a) UNDP Policy on Fraud and other Corrupt Practices and (b) UNDP Office of Audit and Investigations Investigation Guidelines. The Implementing Partner agrees to the requirements of the above documents, which are an integral part of this Project Document and are available online at www.undp.org.

13. In the event that an investigation is required, UNDP has the obligation to conduct investigations relating to any aspect of UNDP projects and programmes in accordance with UNDP's regulations, rules, policies and procedures. The Implementing Partner shall provide its full cooperation, including making available personnel, relevant documentation, and granting access to the Implementing Partner's (and its consultants', responsible parties', subcontractors' and sub-recipients') premises, for such purposes at reasonable times and on reasonable conditions as may be required for the purpose of an investigation. Should there be a limitation in meeting this obligation, UNDP shall consult with the Implementing Partner to find a solution.

14. The signatories to this Project Document will promptly inform one another in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

Where the Implementing Partner becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, the Implementing Partner will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). The Implementing Partner shall provide regular updates to the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

15. UNDP shall be entitled to a refund from the Implementing Partner of any funds provided that have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document. Such amount may be deducted by UNDP from any payment due to the Implementing Partner under this or any other agreement. Recovery of such amount by UNDP shall not diminish or curtail the Implementing Partner's obligations under this Project Document.

Where such funds have not been refunded to UNDP, the Implementing Partner agrees that donors to UNDP (including the Government) whose funding is the source, in whole or in part, of the funds for the activities under this Project Document, may seek recourse to the Implementing Partner for the recovery of any funds determined by UNDP to have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document.

Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors and sub-recipients.

16. Each contract issued by the Implementing Partner in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or in contract execution, and that the recipient of funds from the Implementing Partner shall cooperate with any and all investigations and post-payment audits.

17. Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.

18. The Implementing Partner shall ensure that all of its obligations set forth under this section entitled "Risk Management" are passed on to each responsible party, subcontractor and sub-recipient and that all the clauses under this section entitled "Risk Management Standard Clauses" are included, mutatis mutandis, in all sub-contracts or sub-agreements entered into further to this Project Document.

XII. MANDATORY ANNEXES

Annex 1: GEF Budget

Annex 2: Co-finance letters

Annex 3: Project Map and Geospatial coordinates

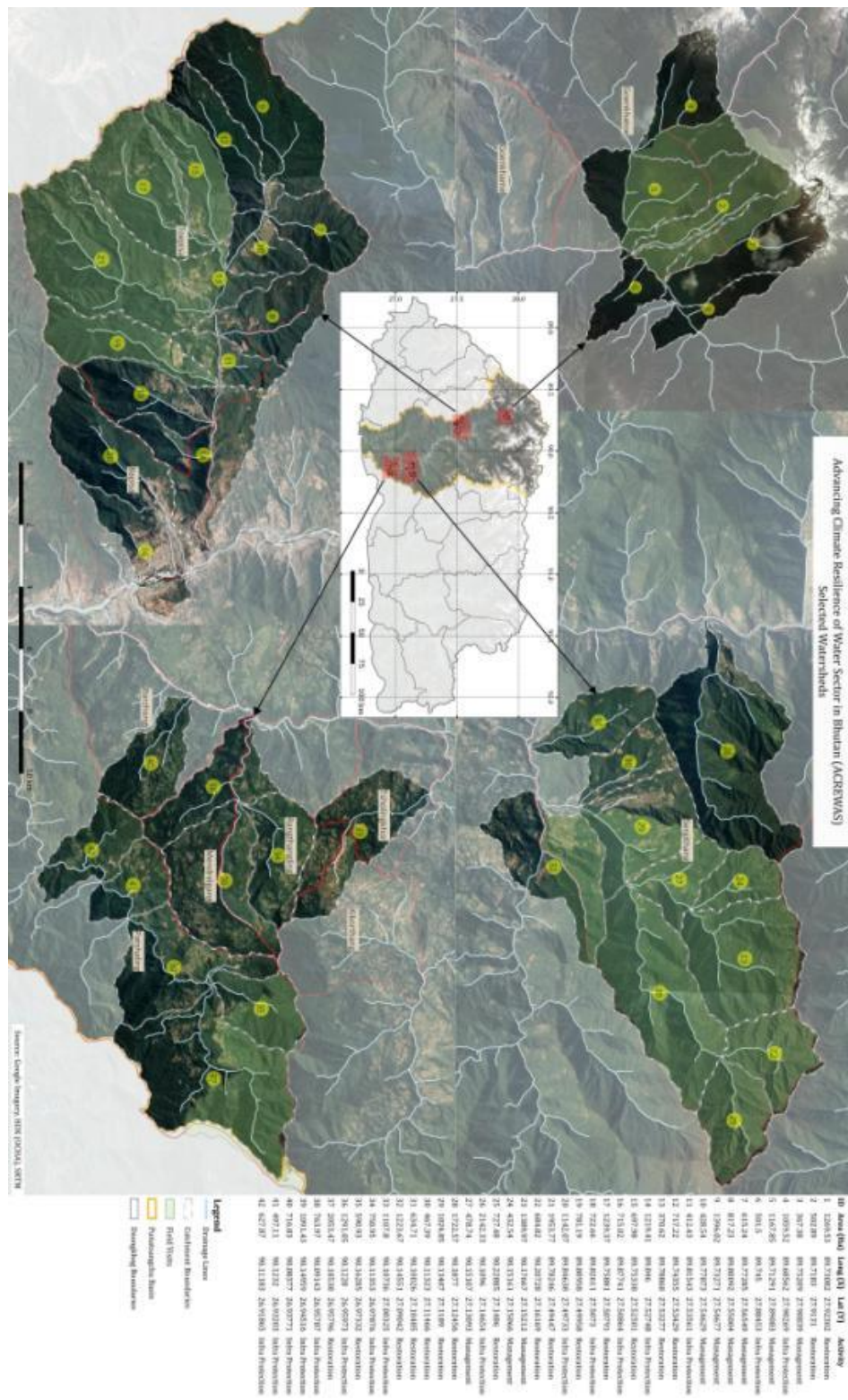


Figure 9: Punatsangchu basin with the four watersheds and 42 micro-watersheds selected for the project

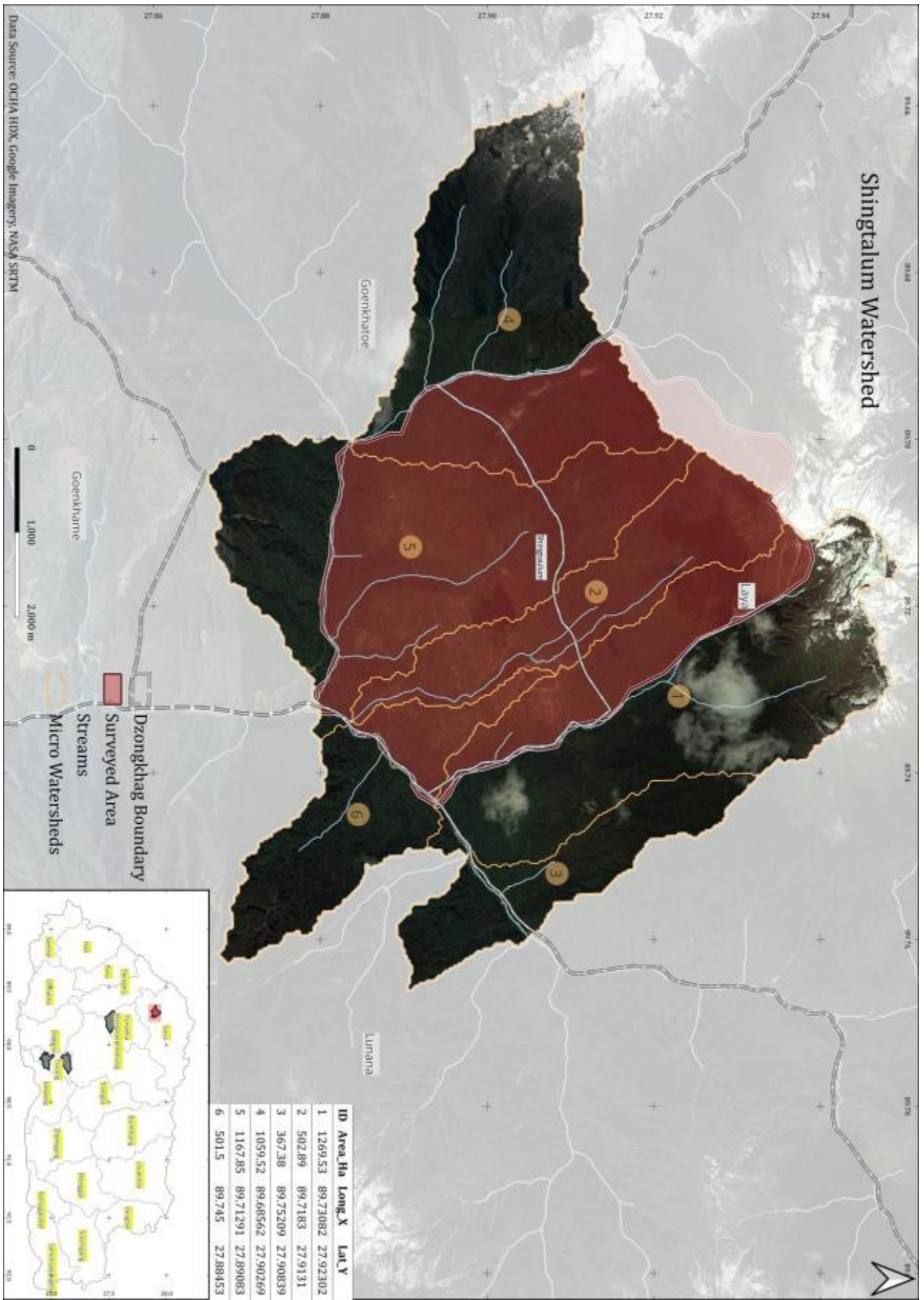


Figure 10: Shingtalum watershed

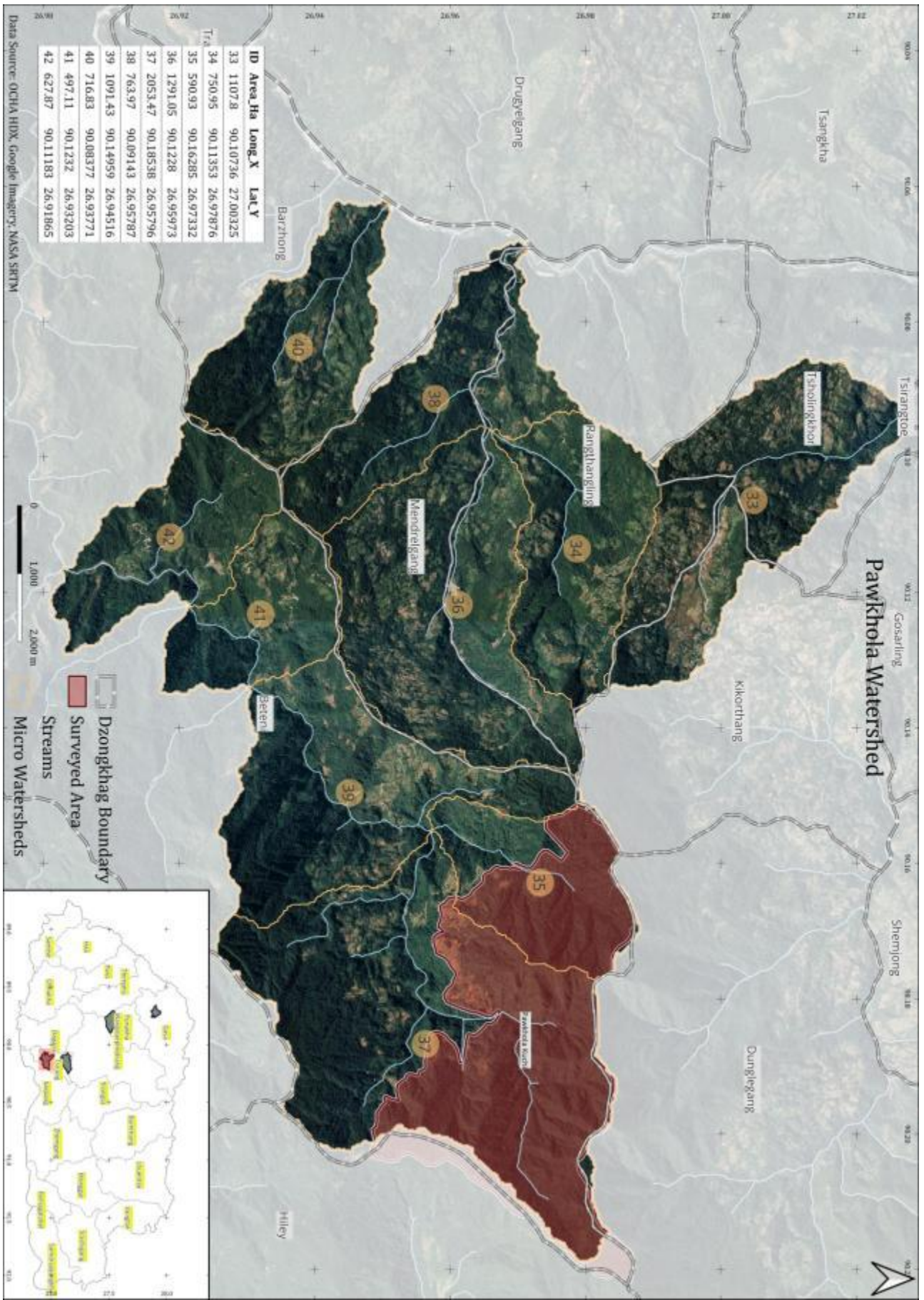


Figure 11: Pawkhola watershed

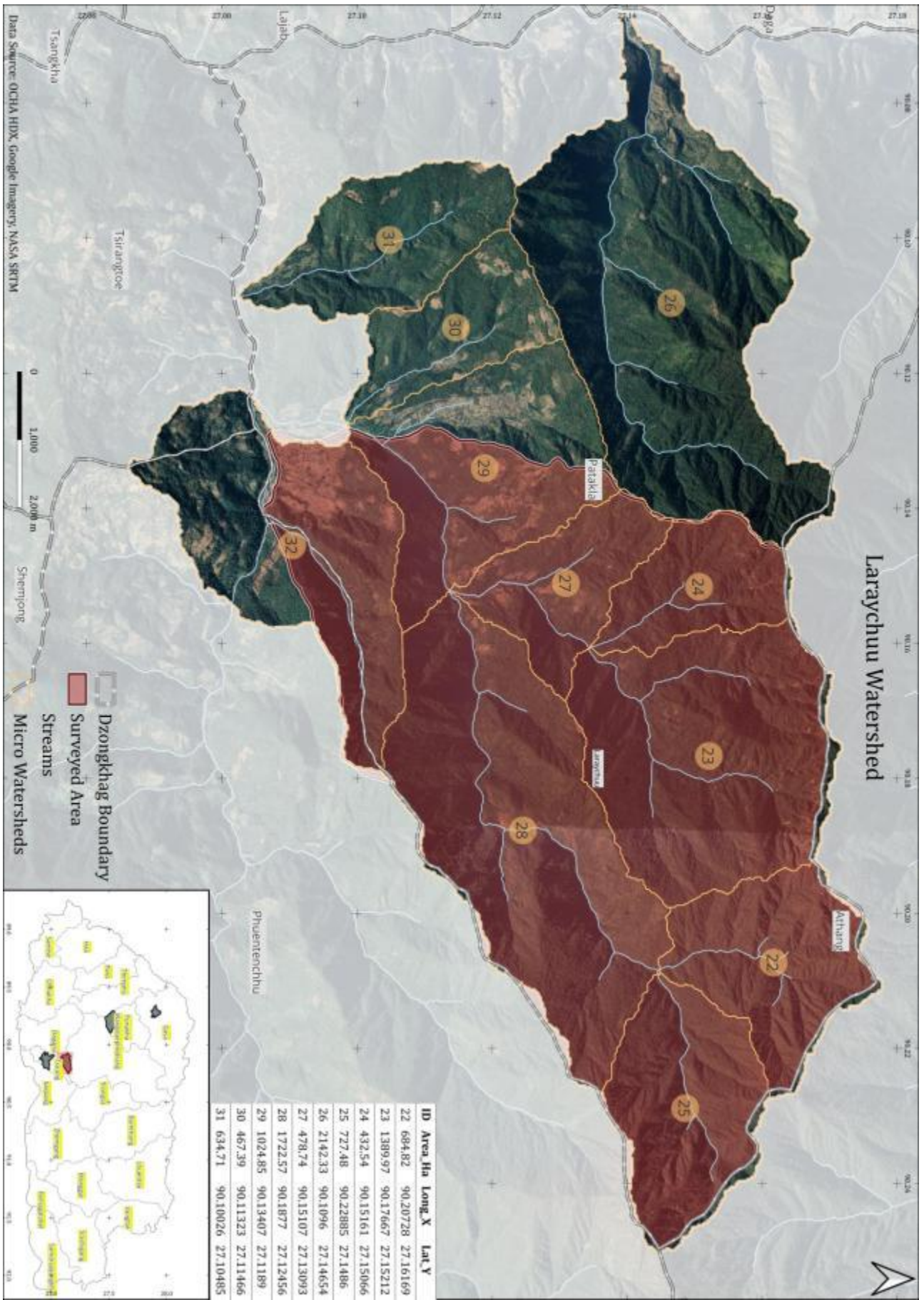


Figure 12: Larachuu watershed

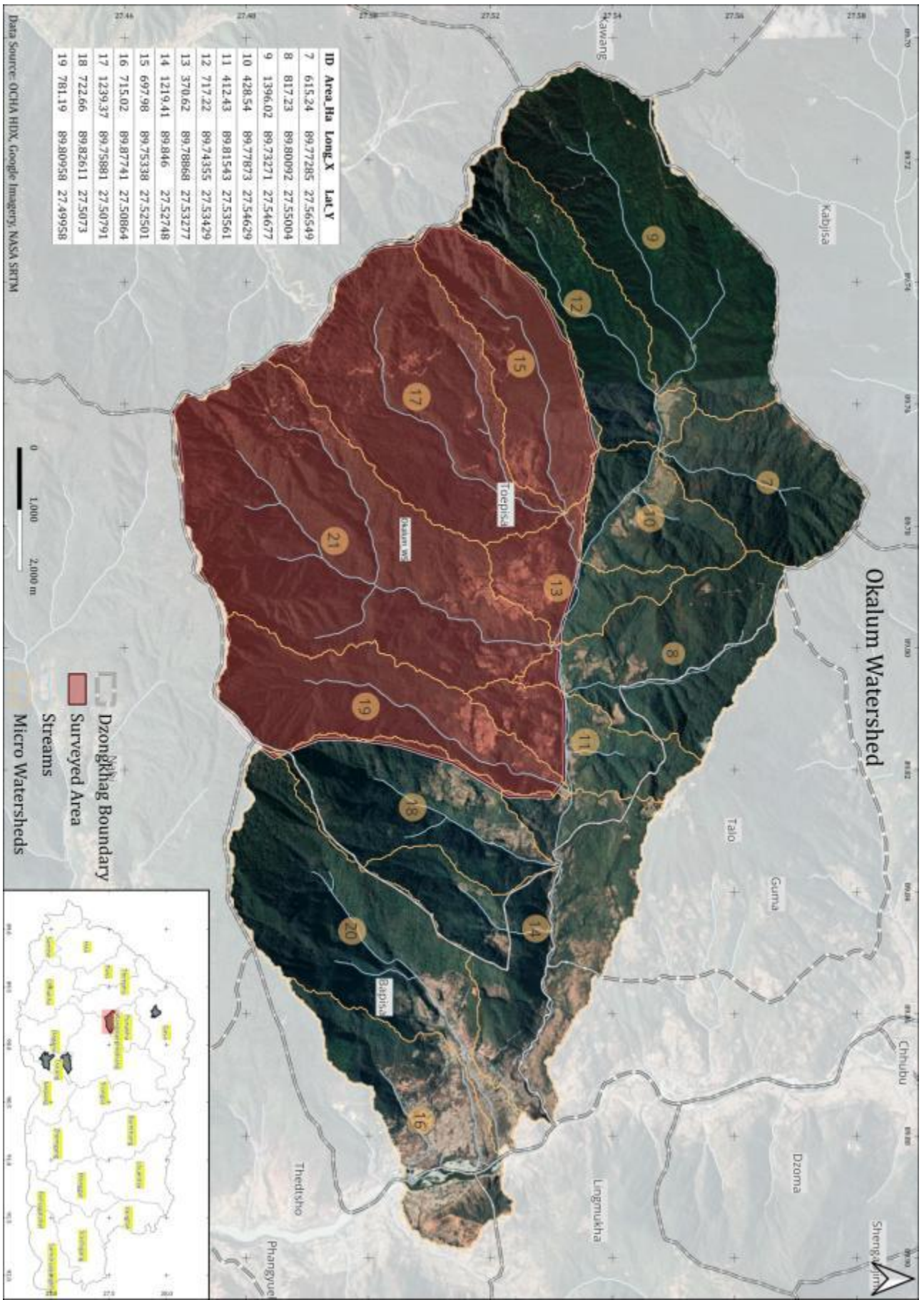


Figure 13: Okalum watershed

Annex 4: Multi Year Work Plan

C. No.	Component	Outcome	O. No.	Output	Y1 Q1	Y1 Q2	Y1 Q3	Y2 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4	Y3 Q1	Y3 Q2	Y3 Q3	Y3 Q4	Y4 Q1	Y4 Q2	Y4 Q3	Y4 Q4	Y5 Q1	Y5 Q2	Y5 Q3	Y5 Q4		
1	Water Governance and Institutions	Strengthened water governance, institutions and financing mechanism in support of climate-resilient water management	1.1	Relevant national and local policies and strategies aligned with sustainable and climate resilient water management		X	X	X	X	X	X	X	X	X	X									X		
			1.2	Institutional & community level capacity for climate-smart water and watershed management strengthened			X	X	X	X																
			1.3	Innovative financing mechanisms for both watershed management and water infrastructure introduced						X	X				X	X	X	X	X							
2	Nature-based solutions for sustainable & climate-resilient watersheds, and livelihood	Vulnerable natural water catchments in the target river basin (Punatsangchu River Basin) restored, sustainably managed, protected and	2.1	Nature based solutions for watershed restorations implemented aimed at yielding stable spring/stream flows.		X	X	X	X	X	X	X	X	X		X		X			X				X	

C. No.	Component	Outcome	O. No.	Output	Y1 Q1	Y1 Q2	Y1 Q3	Y2 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4	Y3 Q1	Y3 Q2	Y3 Q3	Y3 Q4	Y4 Q1	Y4 Q2	Y4 Q3	Y4 Q4	Y5 Q1	Y5 Q2	Y5 Q3	Y5 Q4
	enhancement	their ecosystem conditions improved																						
			2.2	Forest/Ground cover in catchment watersheds managed and maintained through the engagement of local communities and private/corporate sector			X	X	X	X	X	X	X	X	X	X				X	X			
3	Efficient, adequate and sustainable supply, distribution and utilization of water	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				X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
			3.2	Efficient drought-resilient water management technology tested and upscaled through private sector (youth-						X		X		X		X								

C. No.	Component	Outcome	O. No.	Output	Y1 Q1	Y1 Q2	Y1 Q3	Y2 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4	Y3 Q1	Y3 Q2	Y3 Q3	Y3 Q4	Y4 Q1	Y4 Q2	Y4 Q3	Y4 Q4	Y5 Q1	Y5 Q2	Y5 Q3	Y5 Q4
				based start-up enterprises)																				
4	Knowledge Management		4.1	Communication strategy developed and implemented on water conservation and sustainable management developed and implemented		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
			4.2	Publication of a State of the Basin Report (SOBR) for the Punatsangchu River Basin institutionalized									X	X	X	X			X				X	

Annex 5 Monitoring Plan [here](#)

Annex 6 UNDP Social and Environmental Screening [here](#)

Annex 7: UNDP Risk Register and SESP Risks

Description	Type	Impact & Probability	Mitigation measures	Risk owner
Risk 1: Climate induced hazards may damage water infrastructure or obstruct and delay work	Environmental	P-3 I-3 Moderate	1. Infrastructure constructed as part of the project will be designed in accordance with updated projections of potential climate change induced hazards. Infrastructure will additionally be protected through slope stabilisation and support structure and water conservation measures. 2. In order to minimise impacts of inclement weather on project deliverables, all activities will be planned keeping in mind the likely seasonal weather disruptions. Movement of materials and all infrastructural interventions will be made during the dry season and based on local forecasts.	MoIT
Risk 2: Underdeveloped private sector and weak value and supply chains may hinder adoption and success of private sector engagements	Organizational	P-3 I-3 Moderate	The project will involve the private sector to ensure sustainability of the project. The project will further engage with the private sector in a number of income generation and livelihood diversification activities and by also tying up with ongoing initiative through cross learning and knowledge sharing	MoIT
Risk 3: IoT devices equipment may fail to perform due to poor power supply, network connectivity issues and breakdown	Operational	P- 2 I-2	Equipment's will be procured through established vendors and companies and will comply with the necessary ruggedness standards expected. Finally, all equipment will be purchased under warranties and regular monitoring and maintenance will be carried out with back up plans	MoIT
Risk 4: Beneficiaries' unwillingness to pay for the improved water facilities and supplies may not generate enough funds to sustain delivery of water utility services	Financial	P- 1 I- 3 Low	Water user associations will be required to ensure their members are involved in decisions pertaining to tariff, fee or other kind of in-kind payments.. Multiple forms of payments will be explored, including provision of labour or time for O&M and monitoring works by the WUA. Multiple sources of income for the WUAs will be explored so that fee collection is not the sole means of financially sustaining the project activities.	MoIT

<p>Risk 5: Emergent risks due to the COVID-19 pandemic</p>	<p>Implementation</p>	<p>P- 2 I- 4 Moderate</p>	<p>Standard health and safety precautions required for protection against COVID-19 will be implemented, including, but not limited to: (i) wearing a face mask, (ii) handwashing regularly, (iii) social distancing, and (iv) enabling as possible for local communities, project staff, government staff and other stakeholders to voluntarily get vaccinated.</p> <p>During lockdown the project will introduce innovative implementation, monitoring and oversight arrangements</p>	<p>MoIT/MoF</p>
<p>Risk 6: Changes in government may lead to changing priorities causing conflict with the project objectives, such as lesser priority on the water flagship</p>	<p>Political</p>	<p>P-2 I-3 Moderate</p>	<p>1. Water is a priority sector and a strong feature of the political manifestoes. The Water Flagship programme of the 12th Plan faced implementation challenges due to the pandemic. The programme must continue in the 13th Plan gaining more momentum and the project will advocate climate rationale.</p> <p>2.The project's communication and knowledge management components will ensure adequate advocacy on water.</p>	<p>MoIT/MoF</p>
<p>Risk 7: Slow economic recovery may reduce government and partners capacity to co-finance the project</p>	<p>Financial</p>	<p>P-2 I-3 Moderate</p>	<p>Co-financing agreements is secured and contributions will be periodically monitored with partners and discussed in the PSC.</p>	<p>MoIT/MoF</p>
<p>Risk 8 Institutional reorganisation and capacity gaps among IP/RPs may project implementation</p>	<p>Organizational</p>	<p>P-2 I-3 Moderate</p>	<p>Clear and regular coordination mechanisms established IP /RP</p> <p>The coordination mechanism will be reviewed both during project inception and through regular meetings of the Steering Committee/Board, to accommodate any changes.</p> <p>During the PPG capacity gap assessments has been conducted in the project areas with the concerned stakeholders. This has informed on inclusion of relevant capacity development activities in the project</p>	<p>MoIT/MoF</p>
<p>Risk 9 Poor connectivity over rugged terrain combined with inclement weather conditions may hinder supply of critical inputs during project implementation.</p>	<p>Operational 1</p>	<p>Moderate P = 2 I = 3</p>	<p>This risk will largely be addressed by the presence of Dzongkhag level coordination units for the project which will adequately procure and stock relevant materials in advance of the monsoon season and winters. The high level of mobile connectivity across Bhutan further ensures communications between field teams and administrative offices at different levels. Finally, the project strategy will rely primarily on local supply chains and markets for essential commodities and services.</p>	<p>PMU, Dzongkhag Unit</p>

<p>Risk 10</p> <p>Vulnerable groups^[1] (Members of ethnic socio-cultural groups and women-headed households) may be excluded from fully participating in project activities, particularly, from membership and leadership roles in the various community-based institutions such as natural resource management and water users association Committees. This may result in these groups not benefiting equitably from project activities, and/or preventing them from participating in the decision making and design roles that these CBOs are expected to perform.</p>	<p>Social</p>	<p>Moderate</p> <p>I = 4</p> <p>L = 2</p>	<p>Communities will be engaged in the design, implementation and monitoring of project activities. During the PPG, local government representatives, village elders as well as women and members of socio-cultural groups living in the areas were invited to participate in the consultative meetings. Free Prior and Informed Consent (FPIC) protocols followed during the PPG process will be adhered to during project implementation to ensure communities, including women and vulnerable groups, participate in the project by their own free will. Furthermore, the project will ensure timely dissemination, and information sharing for informed decision making on matters related to risks and grievances.</p> <p>The Stakeholder Engagement Plan (SEP) and the Gender Analysis and Action Plan (GAP) developed as part of the Environmental and Social Management Framework (ESMF) during the PPG provides a framework for proactive facilitation and inclusive participation of the community, particularly women, vulnerable groups and members of socio-cultural groups on decisions related to all project activities</p> <p>A framework for the project Grievance Redressal Mechanism (GRM) has been developed that will provide a mechanism to raise and manage programmatic and systematic concerns related to the project, which are to be resolved in a timely, fair and transparent manner. A robust GRM at all levels will be developed and updated periodically to ensure that the grievances and risks are addressed in a timely manner. All complaints and grievances received will be closely recorded and managed by maintaining a risk register with clear accountability</p>	<p>MOIT</p>
<p>Risk 11: Watershed restoration and conservation activities may result in temporary denial of communities or groups to traditional or customary use of forests. However, there are no communities in the project areas that depend largely on forestry resources from the forest areas identified for catchment watershed restoration, management or protection activities. Minor restrictions to stray grazing of local cattle may occur as result of strengthening existing community-based mechanisms to protect critical water catchment areas which is not foreseen to cause any economic</p>	<p>Social and Environment</p>	<p>Moderate</p> <p>I = 3</p> <p>L = 3</p>	<p>The project has been designed in accordance with FPIC principles, as outlined in the UNDP SES policy which have been adopted to undertake comprehensive consultation with communities while surveying and selection of sites for different interventions and decisions on the design and operation of water infrastructure. Further, the ESMF prepared for the project also includes provisions for FPIC which will be continued during the inception phase of the project and will also be guided by the SEP to ensure in-depth engagement with stakeholders and joint planning and design of the interventions. The latter will include site or activity-specific targeted assessments, which will</p>	<p>MOIT/ Dzongkha g units</p>

<p>displacement as productive cattle are usually not let out for stray grazing</p>			<p>be prepared during the early phase of the project (i.e. prior to commencing required site activities) and regularly monitored during project progress.</p> <p>Only those activities will be implemented which have the full support of the communities and target groups reinforced through a participatory approach of proper consultations and consent. Grazing areas and biomass collection areas of communities will be avoided but where this is impossible, alternate viable land in adjacent areas will be identified and provided for community use after consultation with the community for activities related to restoration or reforestation.</p> <p>The GRM developed for the project additionally provides a formal avenue for individuals or groups to raise complaints which are not resolved at their own level to escalate the grievance for resolution at the community/gewog, at the Dzongkhag/PMU and finally at the central level</p>	
<p>Risk 12: During project implementation, some sections of the pipeline will be routed through some of the private registered land, potentially causing disruption on use of land which is being used for agriculture purpose.</p>	<p>Social</p>	<p>Moderate I = 2 L= 4</p>	<p>Project activities do not envisage the acquisition of private land. A detailed survey has been conducted during the PPG. Private land will be avoided during the installation of pipes as far as possible by routing them along the plot boundaries and burying them at least 1 meter into the ground to enable continued use of the land by the owner. Consultations with affected landowners have been carried out, information conveyed of possible temporary impacts and agreement of measures to be implemented has been secured from affected persons during the PPG phase.</p> <p>The water will be conveyed using pressurized pipe which will be buried underground, thus ensuring minimal damage to private land. The project shall ensure coordinated efforts for the construction work along the private land is carried out during the non- agriculture season to avoid disruption of agricultural practices for private landowners. These measures will be included in the terms and conditions of the Contractual Agreements of the Contractors</p> <p>The water will be conveyed using pressurized pipe which will be buried underground, thus ensuring minimal damage to private land. The project shall</p>	<p>MOIT/Dzongkhag unit</p>

			ensure coordinated efforts for the construction work along the private land is carried out during the non- agriculture season to avoid disruption of agricultural practices for private landowners. These measures will be included in the terms and conditions of the Contractual Agreements of the Contractors.	
Risk 13: Plantations to restore degraded lands may follow environmentally inappropriate methods leading to monocultures or promoting the spread of invasive species that threaten local biodiversity.	Environment	Moderate I = 4 L = 2	Forest personnel and local staff are well trained in plantation techniques and norms. They will implement plantation activities with Forestry User Group Committee members who will guide communities on appropriate plantation techniques while jointly implementing plantation activities. Forestry regulations and forest management plans require site managers to plant locally viable species. A newly prepared Code of Best Management Practices in forestry defines forest management regimes and standards including prescriptions for plantations. In areas where natural regeneration is promising, local rules encourage natural regeneration. The National Biodiversity Centre has documented a comprehensive list of invasive species in the country including measures to prevent pathways and control them. All site-based plantations will strictly follow the National Plantation Strategy, 2020; and local forest management plans. Measures will also be put in place by local forest offices to monitor plantation establishment as well as their successes to avoid monocultures and prevent pathways for invasive species.	MOIT
Risk 14: The construction of infrastructure such as intake works, alignment of water pipes, reservoirs, BPTs etc. may cause temporary impacts to habitats. The sub-projects will be developed within or adjacent to protected areas potentially impacting biodiversity resources including endangered species, due to project activities.	Environment	Moderate I=3 L=3	Forest/ Environment clearance has been secured for the surveys conducted in the project landscape.. Based on the Forestry/ Environmental Clearance and the ESMF prepared during the PPG, site or activity-specific targeted assessment will be prepared during the early implementation phase of the project and ESMPs will be prepared, implemented and monitored. The site or activity specific targeted assessments will incorporate measures to address such risks which may emerge from the construction process. Mitigation measures such as manual excavation or minimal use of machinery for trenching to embed drinking and irrigation water pipes will be adopted. Laying of water conveyance pipes underground will further ensure pipes are not exposed and subsequent restoration of excavated soil and regeneration of vegetative material in forested tracts	MOIT

<p>Risk 15: In the two Payment for Ecosystem Services (PES) schemes planned under the project (at Khuchi, Tsirang and Okolumchu, Punakha) to secure the management of watersheds' natural resources namely forests, water sources and streams among others, the ecosystem providers (landowners) may face insecure tenure rights and restrictions in access to areas for food, fuel and products.</p>	<p>Social & Environment</p>	<p>Moderate I=2 L=3</p>	<p>Communities will be closely involved in the design of the PES and several consultative meetings will be conducted with the providers of ecosystem services and users so that there is adequate information provided and constructive discussion and agreement on the payments for services.</p> <p>The project will facilitate consultative processes between ecosystem providers and users so that they can share information, discuss, enter into written agreements specifying roles and responsibilities and payment for services besides establishing provider and user committees, bylaws etc.</p>	<p>MOIT/ Dzongkha g units</p>
<p>Risk 16: Infrastructure developed under the project as well as nature-based solutions provided by the project can be damaged or destroyed by natural calamities</p>	<p>Environment</p>	<p>Moderate I=3 L=3</p>	<p>The project will manage risks related to climate change and natural disasters mainly by incorporating climate-resilient design of infrastructure combining concrete infrastructure along with bio-engineering measures. The pipelines will be installed in trenches and buried to prevent pipes from being obstacles, to prevent damage and to ensure leakages do not erode slopes</p> <p>Designs of structures will incorporate scenarios based on climate projections.</p> <p>Other nature-based solutions such as sustainable land management techniques, spring revival activities, reforestation degraded areas are expected to enhance the capacity of the watershed to withstand effects of climate change</p>	<p>MOIT/ Dzongkha g units</p>
<p>Risk 17: Recruited workers may spread communicable diseases. Workers also may experience occupational health and safety issues at work because of contractors not providing them safe working conditions. Moreover, contractors may employ children and women at site and women may be paid less than their male counterparts</p>	<p>Social</p>	<p>Moderate I=3 L=3</p>	<p>Necessary medical examination for the recruitment and engagement of expatriate labourers at construction sites will be strictly implemented by the Project and adhered to by Contractors. Should a new pandemic emerge, to prevent its spread, standard guidance and operating procedures developed by the government will be followed.</p> <p>The project with the assistance of local health personnel (from hospitals and BHUs) will sensitize workers on STDs and HIV/AIDS. These measures will minimise spreading of diseases to communities resident proximate to labour camps.</p> <p>The Contractor will be informed of the provisions in the Labour & Employment Act as well as the Occupational Health & Safety Regulations on the minimum working conditions to create at site, working hours and occupational safety, prohibition of child labour and parity in</p>	<p>MOIT</p>

			<p>wages for men and women workers at the work sites which will also be made explicit in the contract clauses including periodic monitoring for compliance.</p> <p>Proper and well stocked medical first aid kits at site and a SOP to follow in the event of accidents and injury to workers will be prepared and implemented for first aid and where required quick and safe evacuation of injured workers to a medical facility</p>	
<p>Risk 18: The construction activities will entail excavation (though mostly as linear trenches) across terrain for laying pipes as well as during the construction of storage tanks, treatment plants, break pressure tanks etc. as well. As such, there may be a risk of chance finds during the construction period</p>	Social	<p>Low</p> <p>I=2</p> <p>L=1</p>	<p>During the implementation phase, in an unlikely event of chance finds, where artifacts are unearthed, procedures for chance find will be followed by informing the relevant authority</p>	MOIT/Dzongkhag units
<p>Risk 19</p> <p>The irrigation provided by the project will increase irrigated farming which in turn may encourage the use of inorganic fertilizers, pesticides, weedicides etc. polluting water sources and courses downstream</p>	Environment	<p>Low</p> <p>I=2</p> <p>L=2</p>	<p>The project will advocate use of integrated pest management practices for preventing and managing pests. Bio-pesticides is to be explored under the project for managing pests in paddy and vegetables as bio-pesticides are benign to human health and to the environment. Nutrient leaching will be addressed by the agriculture extension service recommendations and project activities such as mulching and application of compost in fields</p>	MOIT/Dzongkhag units
<p>Risk 20:</p> <p>Construction activities during project implementation may generate harmful waste and pollutants.</p>	Environment	<p>Moderate</p> <p>I=3</p> <p>L=3</p>	<p>Excavated materials will be safely disposed in designated sites and water sprinkled near residential areas for dust control. Waste generated from the project sites will be managed in accordance with the Waste Prevention and Management Regulations of 2016. A project site specific waste management plan will be developed before implementation</p> <p>Excavated material from trenches will be retained carefully to prevent spilling down the slopes and polluting water bodies and later re-filled in the trenches after laying the pipes. The management of soil will be closely monitored during the construction phase. The project will also implement nature based solutions including bio-engineering works to stabilize slopes where required</p>	MoIT/Dzongkhag units

¹⁴Vulnerable group is a term which describes both the condition and the processes that prevent individuals or groups from reaching sustainable development goals, or fully participating in social, economic and political life. In this document “vulnerable communities/groups” describes individuals or groups of people that face higher exposure to climate change, disaster risk and poverty, including but not limited to women, youth, children, elderly, differently-able people, indigenous peoples, disadvantaged families and

those living in high risk areas and danger zones. 'Vulnerable' does not mean that the group is vulnerable per se, but that this vulnerability is the result of social, economic and political processes),

Annex 8: Overview of Project Staff and Technical Consultancies

Consultant	Time Input	Tasks, Inputs and Outputs
<i>For Project Management</i>		
Local / National contracting		
<i>Project Director (RGOB financed)</i>	<i>240 weeks/ over 5 years</i>	<p>The Director of Department of Infrastructure (DoI), MoIT will assume the role of the Project Director. The PD will have the responsibility for operational direction, supervision and management of the project.</p> <p><u>Duties and Responsibilities</u></p> <ul style="list-style-type: none"> • Supervise and guide the Project Manager and other project staff; • Ensure that inputs from the RGoB, GEF, UNDP and other donors to the project are forthcoming in a timely and effective manner; • Endorse annual work plans and budgets for review and approval by the Project Board; • Ensure the project is implemented in a coordinated manner and as per approved project design, work plans and budgets; • Oversee timely submission of technical and financial progress reports in accordance with the requirements specified in the Project Document; • Oversee the recruitment of project consultants, ensuring consultants recruited are technically competent for the tasks in question and the quality of consulting inputs is of the desired quality and in accordance with the approved ToRs; • Represent the project as the national focal point.
<i>Project Manager (RGOB financed)</i>	<i>240 weeks/ over 5 years</i>	<p>A senior officer of the DoI will assume the role of the Project Manager. Under the overall supervision and guidance of the PD, the PM will have overall responsibility for the day-to-day management of the project, reporting to PD and the Project PSC.</p> <p><u>Duties and Responsibilities</u></p> <ul style="list-style-type: none"> • Manage and coordinate the implementation of the project activities in accordance with the approved Project Document, annual work plans and budgets; • Examine and verify annual work plans and budgets for onward submission to the PSC for perusal and approval; • Monitor project progress and oversee the preparation of technical and financial progress reports in accordance with the requirements of the Project Document and update Project Steering Committee accordingly; • Organise PSC meetings, TAG meetings, annual project review and planning meetings including the preparation and notification of agenda and circulation of documents necessary for these meetings at least two weeks in advance; • Ensure that the minutes of PSC meetings are produced and circulated within a week after such meetings are held; • Mobilisation of all project inputs, supervision over project staff, consultants and sub-contractors. • Network with other relevant agencies and projects and establish linkages for learning and sharing experiences and developing synergies; • Keep track of and report on co-finance commitments and progress during the PSC, PIRs, review meeting and evaluations • Facilitate mid-term and terminal evaluations of the project; • Liaise with UNDP on project management matters;

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • Conduct annual monitoring of project sites to appraise project implementation and related issues in interaction with local project stakeholders. • Commission joint monitoring as and when required. • Provide support for completion of assessments required by UNDP, spot checks and audits. • Manage requests for the provision of UNDP financial resources through funding advances, direct payments or reimbursement using the FACE form. • Monitor financial resources and accounting to ensure the accuracy and reliability of financial reports. • Monitor progress, watch for plan deviations and make course corrections when needed within project board-agreed tolerances to achieve results. • Ensure that changes are controlled and problems addressed. • Prepare and submit financial reports to UNDP on a quarterly basis. • Manage and monitor the project risks – including social and environmental risks - initially identified and submit new risks to the Project Board for consideration and decision on possible actions if required; update the status of these risks by maintaining the project risks log; • Capture lessons learned during project implementation. • Prepare revisions to the multi-year workplan, as needed, as well as annual and quarterly plans if required. • Prepare the inception report no later than one month after the inception workshop. • Ensure that the indicators included in the project results framework are monitored annually in advance of the GEF PIR submission deadline so that progress can be reported in the GEF PIR. • Prepare the GEF PIR; • Assess major and minor amendments to the project within the parameters set by UNDP-GEF; • Monitor implementation plans including the gender action plan, stakeholder engagement plan, and any environmental and social management plans; • Monitor and track progress against the GEF Core indicators.
<p><i>Monitoring and Evaluation & Communications Officer</i></p> <p><i>Rate: \$312.5/week</i></p>	<p><i>240 weeks/over 5 years</i></p>	<p>Under the overall supervision and guidance of the Project Manager, the M&E Officer will have the responsibility for monitoring and evaluation of project activities.</p> <p><u><i>M&E Duties and Responsibilities</i></u></p> <ul style="list-style-type: none"> • Develop annual M&E plan for the project and project-specific M&E tools as necessary; • Monitor project progress and participate in the production of progress reports ensuring that they meet the necessary Government, the UNDP Country Office and UNDP-GEF reporting requirements and standards; • Align the project’s M&E requirements with those of RGoB, and ensure that both RGoB and UNDP M&E requirements are effectively coordinated and addressed; • Oversee and ensure the implementation of the project’s M&E plan, including periodic appraisal of the Project’s Theory of Change and Results Framework with reference to actual and potential project progress and results; • Oversee/develop/coordinate the implementation of the stakeholder engagement plan; • Oversee and guide the design of surveys/ assessments commissioned for monitoring and evaluating project results;

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • Coordinate with consultants and closely observe the impact assessment works to ensure quality of findings. • Oversee and guide the design of surveys/ assessments commissioned for monitoring and evaluating project results; • Facilitate annual reviews of the project and produce analytical reports from these annual reviews, including learning and other knowledge management products; • Facilitate mid-term and terminal evaluations of the project including management responses; • Liaise with stakeholders through project focal points, UNDP CO and responsible parties for implementation of project activities in matters related to M&E and knowledge resources management; • Visit project sites as and when required to appraise project progress on the ground and validate written progress reports; • Support project site M&E and learning missions; <p><u>Knowledge management and Communications Duties and Responsibilities</u></p> <ul style="list-style-type: none"> • Develop a project communications strategy/plan and update it annually in consultation with project stakeholders and coordinate its implementation; • Facilitate knowledge generation by supporting the documentation of emerging good and best practices and lessons learnt. • Coordinate the implementation of knowledge management outputs in Component 4 of the project; • Coordinate and oversee the implementation of public awareness activities across all project components; • Facilitate learning and sharing of knowledge and experiences relevant to the project; • Develop communication materials (brochures, press releases, slideshows and other audiovisuals, leaflets) to disseminate project activities and highlight project achievements to a wider audience; • Develop media and narrative content for the overall product • Liaise with broadcast and print media to disseminate project events and activities of interest.
<p><i>Project Officer/Technical Expert</i></p> <p><i>Rate: \$312.5/week</i></p>	<p><i>240 weeks/ over 5 years</i></p>	<p>Under the guidance and supervision of the Project Manager, the Project Office/Technical Expert will carry out the following tasks:</p> <p><u>Duties and Responsibilities as Project Officer</u></p> <ul style="list-style-type: none"> • <i>Assist the Project Manager in day-to-day management and oversight of project activities;</i> • <i>Assist the M&E officer in matters related to M&E and knowledge resources management;</i> • <i>Assist in the preparation of progress reports;</i> • <i>Ensure all project documentation (progress reports, consulting and other technical reports, minutes of meetings, etc.) are properly maintained in hard and electronic copies in an efficient and readily accessible filing system, for when required by PSC, TAC, UNDP, project consultants and other PMU staff;</i> • <i>Provide PMU-related administrative and logistical assistance.</i> • Prepare and support coordination of PSC, TAG meetings, quarterly and annual planning and review meetings • Provide support in preparing annual work plans and budget in consultation with Responsible Parties and other implementing units • Prepare annual PIRs, quarterly progress reports and field monitoring reports • Oversee and guide surveys and assessments in coordination with Responsible Parties and relevant stakeholders • Provide management and administrative support to the Project Manager

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • Keep track of and maintain a record of progress on co-financing expenditure in consultation with the co-financing entities • Support Mid Term and Terminal Evaluation exercises together with the M&E and Communication Officer • Support the Gender and Safeguards experts to manage, monitor and report on environmental and gender risks • Capture lessons learnt during project implementation and support the Communication Expert in preparing and knowledge products and sharing <p><u>Duties and Responsibilities as Technical Expert</u></p> <ul style="list-style-type: none"> • Provide overall technical backstopping and management support to the Project Manager • Oversee, review and guide designs, drawings, estimates and specifications for project activities • Prepare tender documents for contract packages • Draft ToRs for consultancy assignments
<p><i>Project Accountant/ Finance officer (RGOB financed)</i></p>	<p>240 weeks/ over 5 years</p>	<p>An accountant from the MoIT Administration & Financial Services will assume the role of the Project Accountant. Under the guidance and supervision of the Project Manager, the Project Accounts/Finance Officer will have the following specific responsibilities:</p> <p><u>Duties and Responsibilities</u></p> <ul style="list-style-type: none"> • Keep records of project funds and expenditures, and ensure all project-related financial documentation are well maintained and readily available; • Review project expenditures and ensure that project funds are used in compliance with the Project Document and RGoB financial rules and procedures; • Validate and certify FACE forms before submission to UNDP; • Provide necessary financial information as and when required for project management decisions; • Provide necessary financial information during project audit(s); • Review annual budgets and project expenditure reports, and notify the Project Manager if there are any discrepancies or issues; • Consolidate financial progress reports submitted by the responsible parties for implementation of project activities; • Liaise and follow up with the responsible parties for implementation of project activities in matters related to project funds and financial progress reports.
For Technical Assistance		
Local / National contracting		
<p><i>Local consultant – Gender expert Rate: \$1000/week</i></p>	<p>24 weeks/ over 5 years</p>	<p><u>Duties and Responsibilities</u></p> <ul style="list-style-type: none"> • Monitor progress in implementation of the project Gender Action Plan ensuring that targets are fully met and the reporting requirements are fulfilled; • Oversee/develop/coordinate implementation of all gender-related work; • Review the Gender Action Plan annually, and update and revise corresponding management plans as necessary; • Work with the M&E officer and Safeguards Officer to ensure reporting, monitoring and evaluation fully address the gender issues of the project; • Train key staff of PMU, MoIT, Dzongkhags, project gewogs, WUAs, WUGs and private sector and other stakeholders on gender equality and intergradation of gender into project implementation plans including protocols to enable equal participation

Consultant	Time Input	Tasks, Inputs and Outputs
		<p>(especially women and youth) in water governance and management activities and to collect gender-specific information. This will be done at the beginning of the project period.</p> <ul style="list-style-type: none"> Review implementation review of Gender Action Plan during the Mid Term review of the project and provide recommendations.
Local consultant – Social and Environmental Safeguards Expert		<p><u>Duties and Responsibilities</u></p> <ul style="list-style-type: none"> Monitor progress in development/implementation of the project SESP/ESMF and SEP ensuring that UNDPs SES policy is fully met and the reporting requirements are fulfilled; Oversee/develop/coordinate implementation of all safeguard related plans; Ensure social and environmental grievances are managed effectively and transparently; Review the SESP/ESMF/ESMP and SEP annually, and update and revise corresponding risk log; mitigation/management plans as necessary; Prepare site or activity specific ESIA based on identified sites or activities and establish baseline data Recommend mitigation measures summarised into a separate Environmental and Social Management Plan. The ESMP will include a set of avoidance, mitigation, monitoring, and institutional measures – as well as actions needed to implement these measures – to achieve the desired social and environmental sustainability outcomes. Complementing what has already been identified in the ProDoc, the ESMP will further identify project activities that cannot take place until the relevant mitigation measures are approved and put in place. The measures will be adopted and integrated into the project activities, monitoring and reporting framework and budget, and captured in a revised SESP for each project. Ensure full disclosure with concerned stakeholders; Ensure environmental and social risks are identified, avoided, mitigated and managed throughout project implementation; Work with the M&E officer to ensure reporting, monitoring and evaluation fully address the safeguard issues of the project
Local Consultant – per capita drinking water assessment Rate: \$2857/week (including travels)	4.2 weeks / over 6 months in year 2	<p>The local consultant - per capita drinking water assessment- will be responsible for supporting the Ministry of Infrastructure and Transport Works and Human Settlement in assessing the per capita drinking water situation in Bhutan. Under output 1.1 and specifically as part of project activity 1.1.1, the consultant will be responsible for assisting the MoIT in;</p> <ul style="list-style-type: none"> Designing and facilitating stakeholder workshops to assess per capita drinking water consumption Providing technical inputs to the assessment Study daily per capita drinking water consumption that provides baseline for Bhutanese water consumption Finalise and submit the final report on per capita drinking water assessment
Local Consultant – digitization of water distribution network and & Non-Revenue Water Rate: \$2801.5/week (including travels)	12.85 weeks/over 9 months in year 4	<p>The local consultant - digitisation of water distribution network and & Non Revenue Water -- will be responsible for supporting the Ministry of Infrastructure and Transport in digitising the water distribution system in Punakha and Gasa. Under output 1.1 and specifically as part of project activity 1.1.1, the consultant will be responsible for assisting the MoIT in;</p> <ul style="list-style-type: none"> Designing and facilitating stakeholder sensitisation to carry out digitisation of water destination system. Design the methodology for data collection, compilation and digitization Submit final report with digital database, maps and assessment of non-revenue water for Punakha and Gasa
National Consultant - Review and establish	8.6 weeks/over 9 months in	<p>The local consultant - Review and establish national water tariff guideline - will be responsible for supporting the Ministry of Infrastructure and Transport in assessment of introducing water tariff in urban areas of Gasa town and Lobeysa townships . Under</p>

Consultant	Time Input	Tasks, Inputs and Outputs
<p><i>national water tariff guideline</i></p> <p>Rate: \$2791/week (including travels)</p>	Year 3 & 4	<p>output 1.3 and specifically as part of project activity 1.3.1, the consultant will be responsible for assisting the MoIT in;</p> <ul style="list-style-type: none"> • <i>Designing and facilitating stakeholder sensitisation to carry out assessment of introducing water tariff in urban areas of Lobeysa and Gasa.</i> • <i>Design the methodology for assessment including impacts on poor, vulnerable groups, gender issues</i> • <i>Submit final report of the study with recommendations on tariff structure for the two townships which will inform introduction of such tariff in other urban areas in Bhutan.</i>
<p><i>National Consultant - Study feasibility of introducing water tariff in rural and peri-urban area and update draft guidelines of MoENR</i></p> <p>Rate: 4922/week (including travels)</p>	6.4 weeks/over 6 months in year 2	<p>The local consultant - <i>Study feasibility of introducing water tariff in rural and peri-urban area</i> - will be responsible for supporting the MoENR in assessment of introducing water tariff in rural and per-urban areas . Under output 1.3 and specifically as part of project activity 1.3.1, the consultant will be responsible for assisting the MoENR in;</p> <ul style="list-style-type: none"> • <i>Review the draft guidelines for introduction of water tariff in rural and per-urban areas</i> • <i>Designing and facilitating stakeholder sensitisation to carry out assessment of introducing water tariff in rural and peri-urban areas.</i> • <i>Design the methodology for assessment including impacts on poor, vulnerable groups, gender issues in rural and per-urban areas</i> • <i>Submit final report of the study with recommendations on possible water tariff structure for the rural and peri-urban areas with elucidation of impacts on poor, vulnerable groups, gender issues in rural and per-urban areas based on which the draft guidelines of MoENR can be updated.</i>
<p><i>Local Consultancy- PPP model assessment and training</i></p> <p>Rate: \$2791/week (including travels)</p>	8.6 weeks/over 12 months in Year 3 & 4	<p>The local consultant – piloting PPP Model- will be responsible for supporting the MoENR in piloting a PPD model in delivery of water utility services through engagement of private entities. Under output 1.3 and specifically as part of project activity 1.3.2 the consultant will be responsible for assisting the MoENR in;</p> <ul style="list-style-type: none"> • <i>Designing and facilitating stakeholder workshops to assess engaging private sector entities in provision of water utility services</i> • <i>Providing technical inputs to the modality of PPP arrangement based on experiences elsewhere</i> • <i>Assess feasibility of PPP based enterprise and areas of O&M that can be maintained by private enterprises</i> • <i>Submit one Study report on feasibility of PPP arrangement and a proposal on modality of setting up one pilot PPD arrangement</i> • <i>Identifying and training such private entities in their initial set up for one pilot</i> • <i>Document lessons learnt from the pilot study for sharing and to generate discussions within government authorities at the Dzongkhag and national level and within the private sector for possible upscaling</i>
<p><i>Local consultant - MTR</i></p> <p>Rate: \$\$2800/week (including travels)</p>	5 weeks/over 3 months in year 3	<p>Under close supervision of the UNDP CO and in coordination with the Project Manager (PM) and the Team Leader of MTR, the Local consultant, MTR will be responsible to;</p> <ul style="list-style-type: none"> • <i>Support the Team Leader in review Project Concept Note, Project Document, SESP, SEP, GAP, Project Inception Report, PIRs, Project Steering Commute meeting minutes, baseline survey report</i> • <i>Participate in MTR inception workshop</i> • <i>Assist the Team Leader in finalising the methodology of the MTR</i> • <i>Conduct site visits in project areas and conduct local interviews in the field and hold meetings with project stakeholders, executing agencies, academia, local government and CSOs, etc.</i> • <i>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\</i> • <i>Assist in finalising and in producing the MTR report</i>

Consultant	Time Input	Tasks, Inputs and Outputs
Local consultant – TE Rate: \$2807/week (including travels)	5.7 weeks/over 3 months in year 5	Under close supervision of the UNDP CO and in coordination with the Project Manager (PM) and the Team Leader, for MTR, the Local consultant, TE will be responsible to; <ul style="list-style-type: none"> Support the Team Leader in review of Project Concept Note, Project Document, SESP, SEP, GAP, Project Inception Report, PIRs, Project Steering Commute meeting minutes, baseline survey report and MTR report Participate in TE inception workshop Assist the Team Leader in finalising the methodology of the TE with support from the local consultant for TE Conduct site visits in project areas and conduct local interviews in the field and hold meetings with project stakeholders, executing agencies, academia, local government and CSOs, etc. Review of GEF-financed and co-financed activities in line with UNDP/GEF requirements Assist in finalising and in producing the TE report.
International / Regional and global contracting		
International consultant– Framing guiding tool for Development of Water master plan Rate: \$7143/week (including travels)	4.2 weeks / over 6 months in year 1	The International consultant will be responsible for supporting the MoENR in framing guiding tool for Development of Water master plans which will guide the national and Dzongkhag level waster master plans. Under output 1.1 and specifically as part of project activity 1.1.1, the consultant will be responsible for assisting the MoENR in; <ul style="list-style-type: none"> Conducting a review of policy and planning process relevant to water sector Providing technical inputs to policy recommendations for strengthening the national and local water sector planning process Designing and facilitating stakeholder workshops on process and protocols relevant for national and local water master plan development Designing and formulation of guiding tool for development of national and Dzongkhag level water master plans Develop awareness materials for application of the guiding tools in preparing water master plans
International consultant, MTR Rate: \$7143/week (including travels)	4.2 weeks / over 3 months in year 3	Under close supervision of the UNDP CO and in coordination with the Project Manager (PM) and the Local Consultant and as Team leader for MTR, the International consultant, MTR will be responsible to; <ul style="list-style-type: none"> Review Project Concept Note, Project Document, SESP, SEP, GAP, Project Inception Report, PIRs, Project Steering Commute meeting minutes, baseline survey report Participate in MTR inception workshop Finalise the methodology of the MTR with support from the local consultant for MTR Conduct site visits in project areas and conduct local interviews in the field and hold meetings with project stakeholders, executing agencies, academia, local government and CSOs, etc. 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 Finalise and in produce he MTR report.
International consultant, TE Rate: \$7143/week (including travels)	4.2 weeks / over 3 months in year 5	Under close supervision of the UNDP CO and in coordination with the Project Manager (PM) and the Local Consultant and as Team leader for MTR, the International consultant, TE will be responsible to; <ul style="list-style-type: none"> Review Project Concept Note, Project Document, SESP, SEP, GAP, Project Inception Report, PIRs, Project Steering Commute meeting minutes, baseline survey report and MTR report Participate in TE inception workshop

Consultant	Time Input	Tasks, Inputs and Outputs
		<ul style="list-style-type: none"> • Finalise the methodology of the TE with support from the local consultant for TE • Conduct site visits in project areas and conduct local interviews in the field and hold meetings with project stakeholders, executing agencies, academia, local government and CSOs, etc. • Review of GEF-financed and co-financed activities in line with UNDP/GEF requirements • Finalise and in produce he TE report.
<p><i>International consultant, Safeguards Expert</i> Rate: \$4922/week</p>	<p>6.4 weeks/over 4 years (Year 1,2,3&4)</p>	<p>Under close supervision of the Project Manager (PM) and in coordination the National Safeguards Expert, <i>International Safeguards Expert will be responsible to guide the National Safeguards Expert to ;</i></p> <ul style="list-style-type: none"> • Monitor and support to ensure that project activities are carried out in line with the GEF and UNDP safeguards including the SESP, ESMF, ESMPs, SEP and GRM for the project during implementation of the project activities • Conduct and facilitate outreach programs to educate affected persons on the social benefits of the project • Oversee community engagement in the project and collect data of any social and environmental impacts • Draft reports on safeguards in line with project reporting requirements • Oversee/develop/coordinate revision of and implementation of all safeguard related plans; • Ensure social and environmental grievances are managed effectively and transparently; • Review the ESMF/SESP annually, and update and revise corresponding risk log; mitigation/management plans as necessary; • Prepare site or activity specific ESIA based on identified sites or activities and establish baseline data • Recommend mitigation measures summarised into a separate ESMPs. The ESMP will include a set of avoidance, mitigation, monitoring, and institutional measures – as well as actions needed to implement these measures – to achieve the desired social and environmental sustainability outcomes. Complementing what has already been identified in the ProDoc, the ESMP will further identify project activities that cannot take place until the relevant mitigation measures are approved and put in place. • Ensure full disclosure with concerned stakeholders; • Ensure environmental and social risks are identified, avoided, mitigated and managed throughout project implementation;
<p><i>International Consultant – Training of trainers on engineering curriculum</i> \$7143/week (including travels)</p>	<p>6.4 weeks/over 6 Months in Year 2 & 3</p>	<ul style="list-style-type: none"> •

Annex 9: [Stakeholder Engagement Plan](#)

Annex 10: [ESMF](#)

Annex 11: [Gender Analysis and Gender Action Plan](#)

Annex 12: [Procurement Plan final\(Year 1\)](#)

Annex 13: GEF focal area specific annexes , as listed below ([link](#))

- Annex 13a. Climate Analysis
- Annex 13b. Watershed Assessment
- Annex 13c. Economic Analysis
- Annex 13d. National Strategies and plans relevant to Bhutan
- Annex 13e. Description of project activities
- Annex 13f. Covid-19 Responses
- Annex 13g: Partnerships

Annex 14: [GEF Core Indicator](#)

Annex 15: [GEF-7 Taxonomy](#)

Annex 16 : HACT and PCAT (*UNDP Internal | available upon request*)

ANNEX 17. [GEF Audit Checklist](#)

Annex 18 : On-Granting Provisions Applicable to the Implementing Partner

On-granting clauses for non-UNDP Implementing Partners can be found [here](#). This applies in cases where on-granting is built into the design and to the extent that it complies with the [UNDP Policy on Low Value Grants \(LVGs\)](#).

Annex 19: TOR of Project Board and Project team

The standard Project Board TOR can be found [here](#)

TOR of the Project Board:

- Consensus decision making:
 - The project board provides overall overall guidance and direction to the project, ensuring it remains within any specified constraints, and providing overall oversight of the project implementation.
 - Review project performance based on monitoring, evaluation and reporting, including progress reports, risk logs and the combined delivery report;
 - The project board is responsible for making management decisions by consensus.
 - In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.
 - In case consensus cannot be reached within the Board, the UNDP representative on the board will mediate to find consensus and, if this cannot be found, will take the final decision to ensure project implementation is not unduly delayed.
- Oversee project execution:
 - Agree on project manager's tolerances as required, within the parameters outlined in the project document, and provide direction and advice for exceptional situations when the project manager's tolerances are exceeded.
 - Appraise annual work plans prepared by the Implementing Partner for the Project; review combined delivery reports prior to certification by the implementing partner.
 - Address any high-level project issues as raised by the project manager and project assurance;

- Advise on major and minor amendments to the project within the parameters set by UNDP and the donor and refer such proposed major and minor amendments to the UNDP BPPS Nature, Climate and Energy Executive Coordinator (and the GEF, as required by GEF policies);
- Provide high-level direction and recommendations to the project management unit to ensure that the agreed deliverables are produced satisfactorily and according to plans.
- Track and monitor co-financed activities and realisation of co-financing amounts of this project.
- Approve the Inception Report, GEF annual project implementation reports, mid-term review and terminal evaluation reports.
- Ensure commitment of human resources to support project implementation, arbitrating any issues within the project.
- Risk Management:
 - Provide guidance on evolving or materialized project risks and agree on possible mitigation and management actions to address specific risks.
 - Review and update the project risk register and associated management plans based on the information prepared by the Implementing Partner. This includes risks related that can be directly managed by this project, as well as contextual risks that may affect project delivery or continued UNDP compliance and reputation but are outside of the control of the project. For example, social and environmental risks associated with co-financed activities or activities taking place in the project's area of influence that have implications for the project.
 - Address project-level grievances.
- Coordination:
 - Ensure coordination between various donor and government-funded projects and programmes.
 - Ensure coordination with various government agencies and their participation in project activities

TOR of M&E / Communications Officer

M&E Duties and Responsibilities

- Develop annual M&E plan for the project and project-specific M&E tools as necessary;
- Monitor project progress and participate in the production of progress reports ensuring that they meet the necessary Government, the UNDP Country Office and UNDP-GEF reporting requirements and standards;
- Align the project's M&E requirements with those of RGoB, and ensure that both RGoB and UNDP M&E requirements are effectively coordinated and addressed;
- Oversee and ensure the implementation of the project's M&E plan, including periodic appraisal of the Project's Theory of Change and Results Framework with reference to actual and potential project progress and results;
- Oversee/develop/coordinate the implementation of the stakeholder engagement plan;
- Oversee and guide the design of surveys/ assessments commissioned for monitoring and evaluating project results;
- Coordinate with consultants and closely observe the impact assessment works to ensure quality of findings.
- Oversee and guide the design of surveys/ assessments commissioned for monitoring and evaluating project results;
- Facilitate annual reviews of the project and produce analytical reports from these annual reviews, including learning and other knowledge management products;
- Facilitate mid-term and terminal evaluations of the project including management responses;
- Liaise with stakeholders through project focal points, UNDP CO and responsible parties for implementation of project activities in matters related to M&E and knowledge resources management;
- Visit project sites as and when required to appraise project progress on the ground and validate written progress reports;
- Support project site M&E and learning missions;

Knowledge management and Communications Duties and Responsibilities

- Develop a project communications strategy/plan and update it annually in consultation with project stakeholders and coordinate its implementation;
- Facilitate knowledge generation by supporting the documentation of emerging good and best practices and lessons learnt.
- Coordinate the implementation of knowledge management outputs in Component 4 of the project;
- Coordinate and oversee the implementation of public awareness activities across all project components;
- Facilitate learning and sharing of knowledge and experiences relevant to the project;
- Develop communication materials (brochures, press releases, slideshows and other audiovisuals, leaflets) to disseminate project activities and highlight project achievements to a wider audience;
- Develop media and narrative content for the overall product

Liaise with broadcast and print media to disseminate project events and activities of interest.

TOR of Project Technical Specialist

Duties and Responsibilities as Project Officer

- Assist the Project Manager in day-to-day management and oversight of project activities;
- Assist the M&E officer in matters related to M&E and knowledge resources management;
- Assist in the preparation of progress reports;
- Ensure all project documentation (progress reports, consulting and other technical reports, minutes of meetings, etc.) are properly maintained in hard and electronic copies in an efficient and readily accessible filing system, for when required by PSC, TAC, UNDP, project consultants and other PMU staff;
- Provide PMU-related administrative and logistical assistance.
- Prepare and support coordination of PSC, TAG meetings, quarterly and annual planning and review meetings
- Provide support in preparing annual work plans and budget in consultation with Responsible Parties and other implementing units
- Prepare annual PIRs, quarterly progress reports and field monitoring reports
- Oversee and guide surveys and assessments in coordination with Responsible Parties and relevant stakeholders
- Provide management and administrative support to the Project Manager
- Keep track of and maintain a record of progress on co-financing expenditure in consultation with the co-financing entities
- Support Mid Term and Terminal Evaluation exercises together with the M&E and Communication Officer
- Support the Gender and Safeguards experts to manage, monitor and report on environmental and gender risks
- Capture lessons learnt during project implementation and support the Communication Expert in preparing and knowledge products and sharing

Duties and Responsibilities as Technical Expert

- Provide overall technical backstopping and management support to the Project Manager
- Oversee, review and guide designs, drawings, estimates and specifications for project activities
- Prepare tender documents for contract packages

Draft ToRs for consultancy assignments

Annex 20: GEF CEO Endorsement/ approval

M.Sc. Carlos Manuel Rodríguez
CEO and Chairperson

April 10, 2023

Mr. Pradeep Kurukulasuriya
GEF Executive Coordinator
United Nations Development Programme (UNDP)
New York City, USA

Dear Mr. Kurukulasuriya,

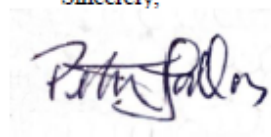
I am pleased to inform you that I have endorsed the full-sized project detailed below:

Decision Sought:	CEO Endorsement of Full-sized Project
GEFSEC ID	10779
Agency:	UNDP
Agency ID	6647
Focal Area:	Climate Change
Project Type:	Full-sized Project
Country:	Bhutan
Name of Project:	Advancing Climate Resilience of Water Sector in Bhutan (ACREWAS)
GEF Project Financing:	\$8,932,420
Agency Fee:	\$848,580
Funding Source:	Least Developed Countries Fund

Agency Fee Commitment:					
Agency	Trust Fund	20% committed at Council Approval (US\$)	50% to be committed at 1 st Disbursement (US\$)	30% to be committed at Mid-Term Review (US\$)	Total (US\$)
UNDP	LDCF	169,716	424,290	254,574	848,580

This endorsement is based on the understanding that the project is in conformity with the GEF focal areas strategies and in line with GEF policies and procedures.

Sincerely,



Peter Lallas
Acting Chief Executive Officer and Chairperson

Copy to: Country Operational Focal Points, GEF Agencies, Trustee

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