

# CLIMATE INVESTMENT FUNDS

PPCR/SC.7/7  
October 26, 2010

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Meeting of the PPCR Sub-Committee  
Washington, D.C.  
November 10, 2010

STRATEGIC PROGRAM FOR CLIMATE RESILIENCE  
TAJIKISTAN

**Proposed Decision by PPCR Sub-Committee**

The PPCR Sub-Committee reviewed document PPCR/SC.7/7, *Strategic Program for Climate Resilience: Tajikistan*, endorses and agrees to the further development of activities foreseen in it. The Trust Fund Committee agrees to an envelope of up to \$50million in grant resources to finance the Program.

**PILOT PROGRAM FOR CLIMATE RESILIENCE**  
**Summary – Strategic Program on Climate Resilience**

1. Country/Region:	<b>Tajikistan</b>	
2. SPCR Funding Request:	<b>US\$50 Million</b> <b>(\$47.75 M Grant to Government;</b> <b>\$2.25Million fees to MDBs)</b>	<b>Concessional Loan:</b>
3. National Focal Point:	Mr Kurbonbekov Jumabek - Deputy Head, Department for Environment Protection and Emergency Situations, Executive Office of the President, Address:80 Rudaki Ave, 734023, Dushanbe Tajikistan Tel: +992 372 216676 Fax: +992 372 276181 e-mail: jkurbonbekov@gmail.com	
4. National Implementing Agency (SPCR coordination)	Government Lead – Murodali Alimardon, Deputy Prime Minister Implementation support from State Organization for Hydrometeorology, (Committee for Environment Protection); Ministry of Energy and Industry; Ministry of Agriculture; Ministry of Land Reclamation and Water Resources; State Forestry Organisation; others	
5. Multilateral Development Banks/focal points:	<b><i>MDB HQ focal point:</i></b>  <b>World Bank:</b> Ron Hoffer, Environment and Water Adviser, Europe and Central Asia Region (overall MDB coordinator)  <b>Asian Development Bank:</b> Peter Hayes, Senior Climate Change Specialist, Country Coordination and Regional Cooperation Division, CWRD  <b>European Bank of Reconstruction and Development:</b> Craig Davies, Principal Environmental Adviser, Environment and Sustainability Department	<b><i>MDB country focal point:</i></b>  <b>Ms. Chiara Bronchi</b> Permanent Representative World Bank Country Office Dushanbe, Republic of Tajikistan  <b>Mr. Joji Tokeshi</b> Permanent Representative Asian Development Bank Mission Republic of Tajikistan  <b>Mr. Ulf Hindstrom</b> Head, Dushanbe Resident Office European Bank for Reconstruction and Development Republic of Tajikistan

**PILOT PROGRAM FOR CLIMATE RESILIENCE**  
**Summary – Strategic Program on Climate Resilience**

6. SPCR Description:

(i) **Key development challenges** (vulnerability) related to climate change/variability:

- Tajikistan is the most vulnerable country in Central Asia to the projected impacts of climate change. Projected higher temperatures, reduced rainfall, melting glaciers, and increased frequency of extreme events such as floods, droughts and storms, are likely to adversely affect vulnerable communities and livelihoods, placing critical ecosystems and infrastructure at risk and contributing to increased poverty. Recent floods, droughts and weather extremes have highlighted the high vulnerability of groups such as women, children and rural communities, and pointed out inadequacies in the climate resilience of key economic sectors;
- The country has limited institutional and human capacity to mainstream climate change adaptation in development plans, programs and policies. Understanding of the risks that climate change poses to vulnerable groups and key sectors are hindered by the inadequate capacity to produce and absorb weather and climate information. As a result, the ability of policy and decision makers to make decisions under uncertain climate change is extremely limited;
- Energy security is critical for Tajikistan's development and poverty reduction, both for domestic needs and potential exports to neighbouring countries. Yet hydropower, which provides 98% of Tajikistan's electricity, is extremely sensitive to climate variability and climate change;
- Threats to agricultural production and rural livelihoods (from degradation of arable land, forests, pastures and rangeland) will increase with projected higher temperatures, reduced rainfall, melting glaciers, and increased frequency of extreme events such as floods, droughts and storms;
- Critical ecosystems, communities and infrastructure in major glacier-dependent river basins containing a large proportion of agricultural land, such as the Pyanj River basin, are already highly vulnerable to the adverse effects of climate change.

(ii) **Areas of intervention** – sectors and themes

Building on the Phase 1 activities, the SPCR outlines six potential investment and capacity-building activities (totally \$50 million in grant financing plus additional co-financing) that will be carried out under Phase 2 of the PPCR:

- **Building capacity for climate resilience** aimed at building stronger institutional capacity and awareness of climate change amongst a variety of stakeholders groups, including civil society, the media and highly vulnerable groups such as women and children. This component also includes the establishment of a PPCR Secretariat and coordination mechanisms to ensure effective implementation of PPCR activities and maximize their development impact;
- **Improvement of Weather, Climate and Hydrological Service Delivery** aimed at improving the national hydro-meteorological monitoring system to provide timely warnings on dangerous events, support water management, and build the evidentiary basis for climate variability and change. It includes a major technical re-equipment of the observation networks and strengthening of the information base of the service. Service delivery will be improved through expanded provision of hydromet service products to consumers, and bolstering the national forecasting, warning, and response system. Institutional strengthening of the hydromet services, to improve its personnel and financial sustainability is another major component.

**PILOT PROGRAM FOR CLIMATE RESILIENCE**  
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- **Climate Science and Modelling Program** aimed at enhancing Tajikistan’s capacity to conduct climate science and glaciology research, develop climate change models and interpret the outputs from those models to provide policymakers and sector specialists with the data they need to plan for climate change. This component includes also training of local experts to ensure the sustainability of this work beyond the PPCR; and coordination and dissemination of information;
- **Enhancing the Climate Resilience of the Energy Sector** aimed at piloting the integration of climate change analysis and climate resilience measures into the planning and implementation of hydropower investments using the rehabilitation of Kairakkum hydropower plant (HPP) as a pilot. This activity will also help to build the capacity of the Tajik authorities to conduct climate change analysis as part of investment planning in the hydropower sector;
- **Agriculture and Sustainable Land Management** aimed at replicating and scaling up effective, existing land management practices to ensure that climate resilience becomes an integral part of land management and agricultural production. The exact detail of initiatives will be determined through a country-wide analysis and consultation process, funded through PPCR Phase 1;
- **Building Climate Resilience in the Pyanj River Basin** aimed at increasing climate resilience in critical ecosystems, communities and infrastructure that are based in major glacier-dependent river basins and containing a large proportion of agricultural land, such as the Pyanj River basin. Measures aimed at integrating sector-based climate-proofing measures in vulnerable eco-systems and critical infrastructure will be piloted in the Khatlon target area and Pyanj tributaries.

An important priority for the PPCR that emerged during consultations was to ensure that the needs and participation of vulnerable groups, including women, will be addressed in the design of investments.

**(iii) Expected Outcomes from SPCR**

The long-term expected outcomes of the PPCR in Tajikistan are:

- Improved capacity of Tajikistan’s government and practitioners to integrate climate resilience into development plans, programmes and policies;
- Increased capacity of Government of Tajikistan to move from a reactive, donor-led approach to a proactive country-led approach and create the conditions for ownership of adaptation to climate change within Tajikistan;
- Enhanced information base on climate change risks and improved understanding of climate change amongst a variety of stakeholders
- Improved coordination of climate change activity by Government of Tajikistan, international organisations, MDBs and NGOs within Tajikistan;
- Improved ability of Tajikistan’s stakeholders to scale up and replicate climate resilient approaches by building on the PPCR practical experience of integrating climate resilience into development planning.

**(iv) Key SPCR Results and Indicators of Success** (consistent with PPCR Results Framework):

<b>1. Building capacity for climate resilience</b>	Includes effective inter-institutional coordination and information exchange; Government better able to mainstream climate change in national and sub-national development plans; Knowledge products developed and disseminated, etc.
<b>2. Improvement of Weather, Climate and Hydrological Service Delivery</b>	Numerical targets included for accuracy of forecasts, modernization of basic hydromet stations, agricultural area covered by targeted forecasts; areas covered by improved snow surveys, etc.

**PILOT PROGRAM FOR CLIMATE RESILIENCE**  
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3. <b>Climate Science and Modelling Programme</b>	Targets include improved ability of Tajikistan institutions and HydroMet to carry out climate science and glaciology research; improved climate scenarios that allow better understanding of impacts on communities, ecosystems and infrastructure, etc.						
4. <b>Enhancing the Climate Resilience of the Energy Sector</b>	Indicators include identification of practical and achievable climate resilience features that form an integral part of the detailed technical design of the rehabilitation of Kairakkum HPP; better capacity to conduct climate change risk analysis and integrate climate resilience measures as part of investment planning in the hydropower sector, etc.						
5. <b>Agriculture and Sustainable Land Management</b>	Will be developed following Phase 1 analyses						
6. <b>Building Climate Resilience in the Pyanj River Basin</b>	Basin-specific Indicators include ecosystem and engineered reductions in risk, strengthening of early warning systems, development of climate vulnerability and risk maps, etc.						
7. Project concepts proposed under the SPCR :							
Project Concept Title	MDB	Requested PPCR Amount (\$)	Financing Modality	Expected Co-Financing (\$)	Source(s) of co-financing (indicative)	MDB Fee (\$)	Total (\$)
Building Capacity for Climate Resilience	ADB	\$3 M	Grant	TBD	TBD	\$400K	\$3.4 M
Improvement of Weather, Climate and Hydrological Service Delivery	WB	\$7 M	Grant	\$6M + \$1M	WB-IDA Government	\$400K	\$7.4 M
Climate Science and Modeling Programme	ADB	\$3 M	Grant	TBD	TBD	\$300K	\$3.3 M
Enhancing the Climate Resilience of the Energy Sector	EBRD	\$10 M	Grant	EBRD EIB EC	\$30 million loan, \$15 million loan, €15 million grant.	\$350K	\$10.35 M
Agriculture and Sustainable Land Management	WB	\$9.45 M	Grant	TBD	TBD	\$400K	\$9.85 M
Building Climate Resilience in the Pyanj River Basin	ADB	\$15.3M	Grant	TBD	TBD	\$400K	\$15.7 M
<b>\$47.75 M</b>						<b>\$2.25 M</b>	<b>\$50 M</b>

**PILOT PROGRAM FOR CLIMATE RESILIENCE**  
**Summary – Strategic Program on Climate Resilience**

8. Timeframe (tentative) – Approval<sup>1</sup> milestones

**Project 1: Building capacity for climate resilience;** Advance initiation by January 2011 through ADB additional funding; Feasibility Study disbursement: 3<sup>rd</sup> Q 2011 (concurrently with completion of Phase 1 capacity building work); Full Project Documentation (Investment Board Approval): 4<sup>th</sup> Q 2011 (continuity with Phase 1); First SPCR Investment disbursement: 4<sup>th</sup> Q 2011 (continuity with Phase 1).

**Project 2: Improvement of Weather, Climate and Hydrological Service Delivery** Full project documentation by January 2011; World Bank Board March 2011; Grant agreement signed Spring 2011.

**Project 3: Climate Science and Modelling Programme;** Concept Note prepared in mid 2011; to be informed by Phase 1 findings; Feasibility Study disbursement: 3<sup>rd</sup> Q 2011; Full Project Documentation (Investment Board Approval): 3<sup>rd</sup> Q 2011; First SPCR Investment disbursement: 4<sup>th</sup> Q 2011.

**Project 4: Enhancing the Climate Resilience of the Energy Sector;** Project preparation expected to start in January 2011; Grant agreement for project preparation(feasibility study and ESIA) in January 2011; Negotiation of loan agreement spring-summer 2011; EBRD Board decision autumn 2011; Grant agreement for project implementation in 4<sup>th</sup> Q 2011.

**Project 5: Agriculture and Sustainable Land Management;** Concept Note prepared in mid-2011; to be informed by Phase 1 findings.

**Project 6: Building Climate Resilience in the Pyanj River Basin;** Feasibility Study disbursement: Jan 2011; Full Project Documentation (Investment Board Approval): 3<sup>rd</sup> Q 2011; First SPCR Investment disbursement: 4<sup>th</sup> Q 2011.

9. Other Partners involved in SPCR<sup>2</sup>:

Government ministries, agencies and committees coordinated through the Executive Office of the President; international and local technical experts and consulting support provided by international consulting firm AEA, with funding from the United Kingdom's Department for International Development

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<sup>1</sup> Expected Date of Signature of Loan/Grant Agreement between country government and MDB

<sup>2</sup> Other national and international partners involved in design and implementation of SPCR

**PILOT PROGRAM FOR CLIMATE RESILIENCE**  
**Summary – Strategic Program on Climate Resilience**

10. Key national stakeholder Groups involved in SPCR design:

In preparation of Tajikistan's SPCR there has been considerable consultation, both formal and informal. These have comprised three Joint Missions of the MDBs, advance visits by consultants, and numerous informal consultations.

Key groups of stakeholders include:

- **Executive administration of the President of Tajikistan;**
- **Government Ministries and Committees** (e.g.: Ministry of Agriculture, Energy and Industry, Economy, Finance, Water and Melioration, Transport and Health. Agency of Geology, Committee on Environmental Protection, Committee, Committee for Emergency Situation, State organization for Hydrometeorology, Academy of Science, State National, Agricultural and Technical University, Tajik Medical University);
- **MDBs** (WB, EBRD, ADB and IFC);
- **Bi-lateral donors** (The Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Swiss Development Corporation (SDS), Swedish International Development Agency (SIDA), UK Department for International Development (DfID), Japan International Co-operation Agency (JICA), European Commission);
- **International organizations** (United Nations Development Program (UNDP), United Nations Environment Program (UNEP), Food and Agriculture Organization (FAO), World Health Organization (WHO), Organisation for Security and Co-operation in Europe (OSCE));
- **International NGOs** (Christian Aid, Oxfam, Focus, International Alert, Agence d'Aide à la Coopération Technique Et au Développement (ACTED));
- **Civil Society and local NGOs** (e.g.: Tajik Climate Network, Network for sustainable development of Central Asia, NGO 'Little Earth', NGO "Noosphere", NGO "Tarakkiet" and Tajik Socio-Ecological Union).



October 2010

# Tajikistan: Strategic Programme for Climate Resilience

Prepared under the Pilot Program for Climate Resilience





## Tajikistan - Strategic Programme for Climate Resilience Pilot Programme for Climate Resilience

### List of acronyms

<b>ADB</b>	Asian Development Bank
<b>CACILM</b>	Central Asian Countries Initiative for Land Management
<b>CAREC</b>	Central Asia Regional Economic Cooperation
<b>DFID</b>	Department for International Development of the United Kingdom
<b>DRM</b>	Disaster Risk Management
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>FAO</b>	Food and Agriculture Organisation
<b>GLOF</b>	Glacial Lake Outburst Flood
<b>GoT</b>	Government of Tajikistan
<b>IFC</b>	International Finance Corporation
<b>IFIs</b>	International Financial Institutions
<b>IMAC</b>	Information Management and Analytical Centre
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>JM</b>	Joint Mission
<b>NGOs</b>	Non Governmental Organisations
<b>PPCR</b>	Pilot Programme for Climate Resilience
<b>PRS-3</b>	Third Poverty Reduction Strategy of the Republic of Tajikistan
<b>REACT</b>	Rapid emergency assessment and coordination
<b>SPCR</b>	Strategic Programme for Climate Resilience
<b>TLSS</b>	Tajikistan Living Standards Survey
<b>UNDP</b>	United Nations Development Programme
<b>WB</b>	World Bank
<b>WHO</b>	World Health Organisations



# Tajikistan - Strategic Programme for Climate Resilience

## Pilot Programme for Climate Resilience

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## Executive Summary

Tajikistan is a beautiful land-locked mountainous country in Central Asia. It is rich in history and culture, and is home to thousands of glaciers and glacial lakes, small and large rivers that provide water also to neighbouring Uzbekistan and Afghanistan, fertile valleys and some of the highest mountains in the world.

Tajikistan is also one of the most vulnerable countries to climate change in Central Asia. The environmental legacy of the Soviet central planning, combined with a multitude of current problems such as crumbling infrastructure, increasing feminisation of poverty and limited institutional capacity, threaten the sustainability of Tajikistan's economic, social and human development. Climate change will exacerbate existing problems and pose additional risks to the achievement of national development priorities.

The Government of Tajikistan recognises that 'development as usual' will not sufficiently address these emerging risks.

We believe that the Pilot Programme for Climate Resilience (PPCR) offers a unique opportunity to shift from business as usual to a climate resilient development path by piloting approaches to integrate climate risks in development planning.

The PPCR in Tajikistan is composed of two Phases. In Phase 1, six technical assistance activities are currently being funded to strengthen Tajikistan's capacity and analytical evidence base and help define an investment plan. Phase 2 is concerned with implementing the investment plan. This document, the Strategic Programme for Climate Resilience (SPCR) summarizes the country driven strategic approach to climate resilience, and defines the underlying investment program proposed for PPCR support.

Building on the Phase 1 activities, the SPCR outlines six potential investment and capacity-building activities (totally \$50 million plus additional co-financing) that will be carried out under Phase 2 of the PPCR. The SPCR reflects: (i) outcomes from previous Joint Missions, (ii) progress on Phase 1 technical assistance efforts approved in June 2010, (iii) discussions at the technical/sectoral level that have taken place over the last few months by MDB teams with their Government counterparts, and (iv) consultations with stakeholders, including international organizations, donors and civil society. The six components are:

- **Building capacity for climate resilience** aimed at building stronger institutional capacity and awareness of climate change amongst a variety of stakeholders groups, including civil society, the media and highly vulnerable groups such as women and children. This component also includes the establishment of a PPCR Secretariat and coordination mechanisms to ensure effective implementation of PPCR activities and maximise their development impact.
- **Improvement of Weather, Climate and Hydrological Service Delivery;** aimed at improving the national hydro-meteorological monitoring system to provide timely warnings on dangerous events, support water management, and build the evidentiary basis for climate variability and change. It includes a major technical re-equipment of the observation networks and strengthening of the information base of the service. Service delivery will be improved through expanded provision of hydromet products to consumers, and bolstering the national forecasting, warning, and response system.



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Institutional strengthening of the hydromet services to improve its personnel and financial sustainability is another major component.

- **Climate Science and Modelling Programme** aimed at enhancing Tajikistan's capacity to conduct climate science and glaciology research, develop climate change models and interpret the outputs from those models to provide policymakers and sector specialists with the data they need to plan for climate change. This component also includes training of local experts to ensure the sustainability of this work beyond the PPCR.
- **Enhancing the Climate Resilience of the Energy Sector**; aimed at piloting the integration of climate change analysis and climate resilience measures into investments in hydropower facilities using the rehabilitation of Kairakkum hydropower plant (HPP) as a pilot. This activity will also help to build the capacity of the Tajik authorities to conduct climate change analysis as part of investment planning in the hydropower sector.
- **Agriculture and Sustainable Land Management**; aimed at replicating and scaling up effective, existing land management practices to ensure that climate resilience becomes an integral part of land management and agricultural production. The exact detail of initiatives will be determined through a country-wide analysis and consultation process, funded through PPCR Phase 1.
- **Building Climate Resilience in the Pyanj River Basin**, aimed at increasing climate resilience in critical ecosystems, communities and infrastructure that are based in major glacier-dependent river basins and containing a large proportion of agricultural land, such as the Pyanj River basin. Measures aimed at integrating sector-based climate-proofing measures in vulnerable eco-systems and critical infrastructure will be piloted in the Khatlon target area and Pyanj tributaries.

Phase 2 investments will pilot climate resilience approaches in the energy, water, agriculture, natural resources management and other sectors, through targeted analyses, infrastructure improvements, policy reforms, networking and capacity building. Institutional structures in government will be established and strengthened so that the lessons emerging from PPCR support will be sustained when the program closes. Phase 2 activities will commence at the end of 2010, and extend for three to five years thereafter. The results from Phase 1 technical assistance activities (approved in June 2010 and extending through 2011) and further consultation with stakeholders will inform the precise nature of the Phase 2 investments in detail.



## 1. Introduction

Tajikistan was nominated to participate in the Pilot Program for Climate Resilience (PPCR) by the PPCR Expert Group in January 2009, and based on this invitation the Government of the Republic of Tajikistan (GoT) confirmed its interest and willingness to participate in the PPCR in May 2009<sup>1</sup>.

In expressing interest and willingness to participate in the PPCR, the Government has identified a number of crucial sectors considered particularly vulnerable to climate change: agriculture, water resources and energy, ecology and disaster risk management. It was felt these key areas offered the best opportunities for scaled-up action and transformational change in integrating consideration of climate resilience in national development planning consistent with poverty reduction and sustainable development goals.

In line with the seriousness of potential climate change impacts on Tajikistan, the Government's response has been coordinated by the Executive Office of the Deputy Prime Minister (Mr Alimardon) with an appointed Focal Point from the Ecology and Emergency Situation Department within the Executive Office of the President.

The first Joint Mission was undertaken in October 2009 to investigate the range of climate change related activities in Tajikistan and reach agreement with the multi-lateral development banks (MDBs) on the process and broad scope of PPCR activities.<sup>2</sup> The JM participants included the World Bank (WB), the European Bank for Reconstruction and Development (EBRD) and the Asian Development Bank (ADB) and sought consultation with a wide range of stakeholders including government ministries, other international development and financial institutions, bilateral donors and civil society.

The JM confirmed that Tajikistan is highly vulnerable to current climate variability and that climate change is likely to exacerbate existing development challenges, such as low household incomes, high levels of poverty (especially in rural areas), and the impact of adverse climate conditions (such as low rainfall, drought and flooding) on livelihoods, ecosystems, infrastructure, energy security and agriculture. An equally important challenge was identified as a lack of institutional capacity and co-ordination to effectively address the challenge of mainstreaming climate change considerations into development planning, and the need to apply existing capacity and resources on other urgent priorities (e.g. poverty reduction) and emergency situations.

In line with the requirements of the PPCR, the SPCR is consistent with the National Development and Poverty Reduction Strategy and has been developed as a broad-based strategy for achieving climate resilience in the medium and long-term. Given issues of institutional and organisational capacity, the SPCR has been developed as a phased, programmatic approach i.e. some of the investments will be fully developed when the SPCR is initially submitted whilst others will be informed by the relevant Phase 1 activities (see annex 4). The latter have been designed to provide a solid platform for a more comprehensive, integrated and ambitious approach to climate resilience in Phase 2 of the PPCR.

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<sup>1</sup> See **Acceptance of Offer to Participate in the Pilot Program for Climate Resilience (English)**: [http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TajikistanAcceptanceTemplate\\_Eng.pdf](http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TajikistanAcceptanceTemplate_Eng.pdf); **(Russian)**: [http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TajikistanAcceptanceTemplate\\_Rus.pdf](http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TajikistanAcceptanceTemplate_Rus.pdf)

<sup>2</sup> For Joint Mission report: [http://www.climateinvestmentfunds.org/cif/Joint\\_Missions](http://www.climateinvestmentfunds.org/cif/Joint_Missions) .



## **Tajikistan - Strategic Programme for Climate Resilience**

### **Pilot Programme for Climate Resilience**

This SPCR has been developed by the Government of Tajikistan in partnership with the World Bank, the Asian Development Bank and the European Bank for Reconstruction and Development, and has been supported by technical assistance provided by an international consulting firm AEA and funded by the UK Department for International Development (DFID).

The document is divided into three parts:

- Part 1 includes an executive summary and an introduction to the PPCR in Tajikistan;
- Part 2 provides the national context and the rationale for PPCR support;
- Part 3 outlines the Government's vision and agreed approach towards building climate resilient development and outlines a proposed programme for investments to be funded under Phase 2 of PPCR;



## **2. BACKGROUND and RATIONALE**

### **2.1. Country circumstances**

Tajikistan is a land-locked country located in south-east Central Asia. Mountains occupy about 93% of the terrain and glaciers make up 6% of the total country area. The rivers of Tajikistan are the main sources of water replenishing the Aral Sea and provide neighbouring areas with water for irrigation and power generation. With a population of over 7 million and a gross domestic product of around \$751 per capita<sup>3</sup>, Tajikistan has amongst the lowest GDP per capita of the countries in the Central Asia.

The general economic contraction and the loss of social services after the collapse of the Soviet Union in 1991 were exacerbated by the civil war (1992 to 1997) and caused a drastic deterioration in overall living conditions. Poor land management practices and the environmental legacy of the Soviet central planning, combined with a multitude of current problems such as crumbling infrastructure and inadequate levels of investment, onerous external debt, increasing feminisation of poverty and limited institutional capacity, threaten the sustainability of Tajikistan's economic, social and human development. The impacts of climate change are expected to add to these existing problems and pose additional risks to the achievement of national development priorities.<sup>4</sup> From the evidence we have on climate change impacts in Tajikistan it is clear that 'development as usual' will not sufficiently address these emerging risks.

### **2.2. Development context and climate risks**

Climate change is likely to pose additional and significant risks to economic activity, human welfare and the environment in Tajikistan. Recent droughts and weather extremes have illustrated existing inadequacies in the climate resilience of major sectors, for example the inability of hydropower facilities to cope with the extreme winter of 2008. Understanding current vulnerability to extreme events provides a starting point for assessing the impact of increasing climatic variability and future climate change for Tajikistan. For example, figure 1 illustrates areas currently at risk from glacial flooding and landslides. Not only may such existing and known risks increase, but new areas may also be put at risk.

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<sup>3</sup> Tajikistan's GDP per capita (current US\$) is \$751 (2008 estimate), GDP per capita PPP (current international \$) is \$PPP 1,870 (2008 estimate). Source: World Development Indicators (WDI), July 2010.

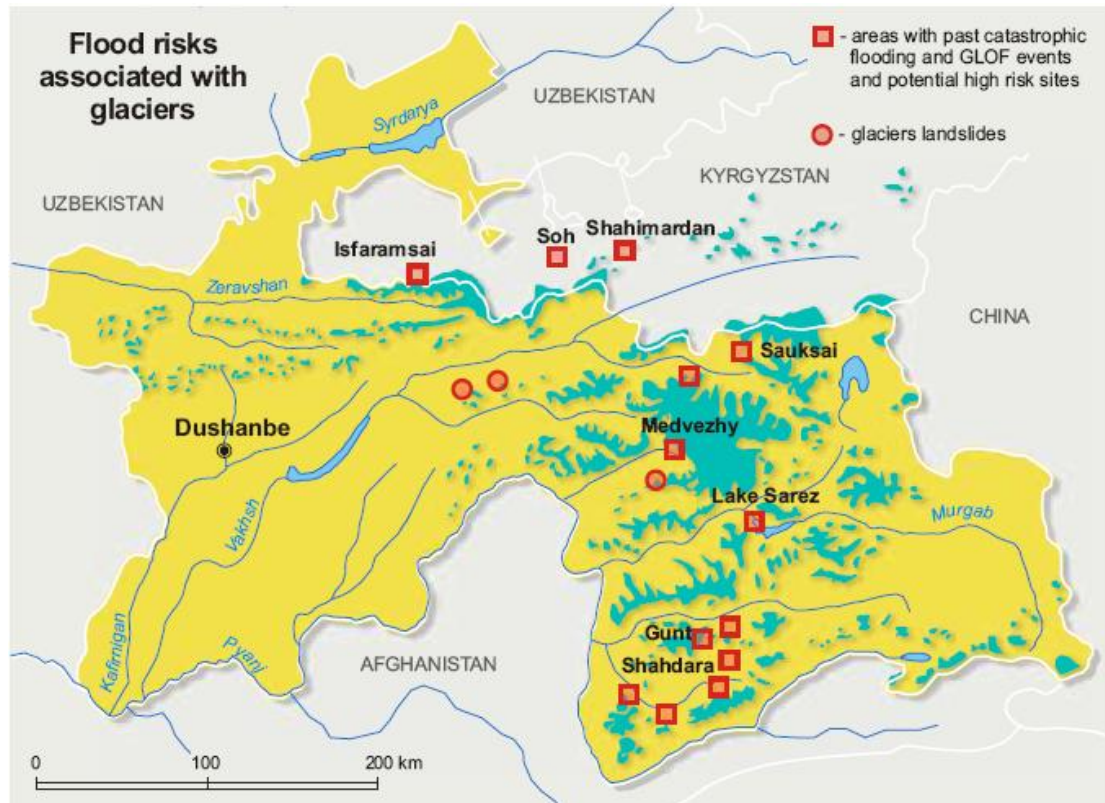
<sup>4</sup> National Development Strategy (2007 for the period to 2015)





## Tajikistan - Strategic Programme for Climate Resilience Pilot Programme for Climate Resilience

**Figure 1.** Flood risk associated with glaciers in Tajikistan (Source: State Administration for Hydrometeorology from Second National Communication).<sup>5</sup>



Climate projections suggest Tajikistan will experience higher temperatures, reduced rainfall and higher evapotranspiration with an increased frequency of extreme events such as floods, droughts and storms. These changes will lead to impacts, such as fluctuations in the hydrological cycle - especially from glacial retreat and flash floods – with downstream consequences for ecosystems and water resources for livelihoods, water resources for hydro power, potable water, irrigation and food security.<sup>6</sup> These impacts pose direct threats to agricultural production and rural livelihoods, for example from degradation of arable land, forests, pastures and rangeland.

The adverse effects of climate change will be felt most acutely by those parts of the population that are already vulnerable owing to gender, age and disability. The poor are particularly vulnerable to the effects of climate change in Tajikistan. Using the absolute poverty line derived from the TLSS 2007, 53% of the population was poor and 17% was extremely poor (that is living below the food poverty line). 75% of the poor live in rural areas<sup>7</sup>, suggesting that climatic shocks have the potential to tip a large percentage of population into extreme poverty. Climate change is likely to compound existing food security issues and impact heavily upon those dependent on the agricultural economy. The distributional effects are more likely to fall upon those involved in rainfed subsistence agriculture or pastoralism. Women and children, who constitute the majority of the country's poor, are vulnerable to the effects of climate change in Tajikistan. They are often charged with the responsibility to secure water,

<sup>5</sup> Kayumov et al (2008). Tajikistan. The second national communication of the Republic of Tajikistan under the United Nations Framework Convention on Climate Change Available from: [http://unfccc.int/essential\\_background/library/items/3599.php?such=j&symbol=TJK/COM/4%20E#beg](http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=TJK/COM/4%20E#beg)

<sup>6</sup> See for example IPCC WGII 4<sup>th</sup> Assessment Report Chapter 10

<sup>7</sup> World Bank 2009 – Republic of Tajikistan Poverty Assessment.



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food and fuel for cooking and heating in Tajikistan's rural areas and are dependent for their livelihood on natural resources that are threatened by climate change. Unreliable access to electricity for household heating and cooking – often heavily influenced by climate factors – means that women are exposed to higher levels of indoor air pollution, with harmful impacts on respiratory health, due to their need to use often low-quality solid fuels. Despite women's responsibilities in households and communities and their expertise, positioning them well to contribute to livelihood strategies adapted to changing climatic conditions, they face social, economic and political barriers that limit their coping capacity.

### **Text box 1: Gender, poverty and climate change in Tajikistan**

The promotion of gender equality is an important priority in Tajikistan's National Development Strategy. The strategy acknowledges that gender issues have not been adequately addressed in principal government strategies. Women tend to have unequal access to resources and control over resources particularly in rural areas. This makes women more vulnerable to poverty. Climate change will exacerbate these existing problems.

An important priority for the PPCR that emerged during consultations was to ensure that the needs and participation of vulnerable groups, including women, were addressed. This will be achieved through the coordination role played by the PPCR Secretariat whose terms of reference include the responsibility for liaison between stakeholders to ensure participation and inclusiveness. Gender concerns will be central to the design of investments in sustainable land management and river-basin initiatives; monitoring and evaluation data will be disaggregated by gender (see annex for detailed investment descriptions).

It is expected that Tajikistan's farming lands, which are essentially in arid and semi-arid areas, will be exposed to increasingly low and erratic rainfalls coupled with the drying up of water resources through increased regional temperatures, higher evapotranspiration and reduced snow accumulation in mountain glaciers. This increased variability will place greater strain on already stressed environments and increase desertification. Rainfed agriculture is particularly vulnerable to climate change, but irrigated agriculture (over 80% of cultivated land in Tajikistan is irrigated<sup>8</sup>) will suffer the compounded effects of climate change on dilapidated infrastructure and low capacity to collect adequate resources for operation and maintenance. Crop yields in some regions are projected to decrease by up to 30% by the end of this century, threatening local food security<sup>9</sup>. Among the Central Asian countries, Tajikistan's incidence of under nourishment at 34% is already one of the highest<sup>10</sup>. A key focus of the Government of Tajikistan in the long run will need to be on addressing climate associated risks in water resources and agricultural production which are tightly linked in the production landscapes and economy of Tajikistan. For example, the Water Sector Development Strategy identifies irrigation as one of its main strategic objectives.

Tajikistan's poor are also vulnerable from threats to energy security, as demonstrated during the severe winter of 2008 when many households, especially in rural areas on the peripheries of the grid had no access to energy for heating and cooking. Urban households were also badly affected as they did not have alternative coping strategies (such as the use of firewood) that rural communities could fall back on. The recurrent winter electricity deficits caused by the inability of energy infrastructure

<sup>8</sup> FAO Aquastat ([http://www.fao.org/nr/water/aquastat/data/factsheets/aquastat\\_fact\\_sheet\\_tjk\\_en.pdf](http://www.fao.org/nr/water/aquastat/data/factsheets/aquastat_fact_sheet_tjk_en.pdf))

<sup>9</sup> From IPCC WGII 4th Assessment Report Chapter 10 (p.479).

<sup>10</sup> From FAO.(Food Security Statistics): <http://www.fao.org/economic/ess/food-security-statistics/en/>



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to meet winter energy demands, means that these problems are persistent and worsening. Annex 1 summarises key expected changes in climate and subsequent impacts, sectoral vulnerabilities and the capacity to adapt in Tajikistan. There are still considerable gaps in the understanding of how, when and where climate change impacts will occur, the nature and location of vulnerable sectors, populations and ecosystems and the economic, social and ecological implications of climate change impacts. Government's understanding of the relationship between climate 'events', 'impacts' and 'consequences' in Tajikistan is still incomplete. While experience and evidence of recent climatic variability provides a useful introduction to the longer term complexities of future climate change, to plan effectively it will also be necessary to address the current gaps in our knowledge.

Climate change is an additional burden on the challenges of attaining stable and long-term economic growth and poverty reduction in Tajikistan. To put climate change in context, the National Development Strategy<sup>11</sup> outlines some of the key broader issues facing Tajikistan and the Government. These include:

- **Ineffective public administration;**
- **Weak investment climate** caused by excessive administrative barriers, unfavourable economic conditions and geographical location;
- **Inadequate competition** with most enterprises operating, in essence, as monopolies;
- **Limits on growth caused by** problems with public (e.g. transportation, power, telecommunications) and private infrastructure (e.g. banking and insurance);
- **Sharp decline in human capital** caused by delays in legislating minimum state social standards and the slow pace of reform in social sectors;
- **Inadequate implementation of reforms at the local level.**

These factors suggest that Tajikistan has very limited 'adaptive capacity' to adjust to climate change or to cope with its consequences. This increases the vulnerability of the country to projected climate change impacts.

PPCR activities are expected to reinvigorate the process of building understanding and capacity on climate change issues and in addition generate an institutional framework to manage, oversee and influence climate change activities in the longer term. A key focus of the DFID-funded technical assistance has been to explore and propose options for the institutional 'home' and organisational arrangements for both the PPCR Phase 1 analytical activities<sup>12</sup> and the Phase 2 investments; this will enable mechanisms to be developed over time that will ensure that the GoT is able to provide effective oversight and co-ordination (see section 3.9).

### 2.3. Existing development plans and programs

In terms of national policies, plans and programmes, the appointment of a Committee with specific responsibility for environmental protection in April 2008 has contributed to raising the profile of environmental issues in the GoT's political agenda. The GoT has adopted more than 30 laws and bylaws in the area of nature protection, and developed a number of national environmental programmes and national action

<sup>11</sup> National Development Strategy of the Republic of Tajikistan for the period to 2015 (2<sup>nd</sup> Draft) 2007. Available from: [http://www.untj.org/files/reports/NDS\\_\(English\).pdf](http://www.untj.org/files/reports/NDS_(English).pdf)

<sup>12</sup> See Phase 1 grant proposal: <http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Tajikistan%20Proposal.pdf>



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plans. However, to date, only limited account has been taken of climate change in most of Tajikistan's national development policies, plans and programmes. For example there is no reference to climate change in the National Development Strategy (NDS) for 2006 to 2015. The National Disaster Risk Management Strategy and Action Plan makes reference to the fact that climate change is likely to increase the intensity and frequency of certain risks but consultation suggests there has been little concrete action in this area. A positive example of where climate change concerns are mentioned in relation to development planning is the Third Poverty Reduction Strategy (PRS-3: May 2010 to 2012) that includes adaptation to climate change as a key cross-cutting activity at a sectoral level. However this strategy falls considerably short of adequately addressing the challenges of climate change on development priorities and is compounded by a lack of action on the ground.

Consultations with stakeholders (GoT Ministries, MDBs, bilateral donors, NGOs) indicated that national and sectoral plans do not provide a strategy for dealing with existing climate change stresses, nor do they address increased severity and frequency of climatic extreme events. It is thus unlikely that existing programmes are sufficient in scope and scale to meet the development challenges posed by climate change i.e. they are not sufficiently climate resilient.

Climate change adaptation is a relatively new and unfamiliar issue at a government and institutional level in Tajikistan. While the GoT has demonstrated both interest and commitment to moving forward on adaptation, it is also recognized that climate change is still a fairly under-developed policy discourse in the country. Most line ministries understand that climate change is a threat and recognise the need to enhance their knowledge of the impacts of climate change on their particular policy area. But the lack of technical and human capacity of national institutions to mainstream climate change into policy and programmes has not yet been addressed.

The approved Phase 1 activities provide a necessary starting point for analytical work in these priority areas and will assist in starting to mainstream climate change into development planning by raising awareness, building and improving the evidence base and enhancing knowledge and capacity within key vulnerable sectors. Phase 2 investments outlined in this SPCR, will build on the challenges identified through a targeted program of investment.

### **2.4. Rationale for PPCR support**

Climate change in Tajikistan will pose an additional burden on the ability of the GoT to ensure food, water and energy security, manage disaster risk and achieve the ambitions of the National strategies for economic, social and institutional development. PPCR support provides an opportunity, through focused financing, to address the climate resilience of key sectors and build capacity in the longer term to enable the GoT to mainstream climate resilience across the spectrum of development activities in Tajikistan.

The added value of the PPCR is demonstrated by, at least, the following elements:

- Providing the opportunity to move further away from a reactive type of assistance to a more proactive approach by expanding the time horizon taken into account in the planning of government-financed and donor-supported investments;



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- Being a catalyst for coordination amongst relevant ministries and policy departments in the GoT, and with multilateral and bilateral donors operating in-country and in the region;
- Contributing to the development of institutional mechanisms that ensure a focus on climate impacts and adaptation, and the building of institutional and human capacity in areas relevant to climate resilience;
- Supporting transformational investments that pilot innovative approaches to improving climate resilience in vulnerable sectors, providing demonstrable results that can be scaled up in Tajikistan and beyond, and facilitating transition towards a sustainable and climate-resilient economy;
- Supporting the creation of a solid evidence-base to support integrating adaptation into decision-making.

The overall goal of the PPCR is to mainstream climate resilience into development planning in ways that reduce the population's vulnerability to climate risks and hazards, with special consideration for the needs of vulnerable groups, and to strengthen national capacity to address the challenges of climate change. The SPCR will promote sustainable and resilient growth ensuring more sustainable livelihood development, water and energy security, health, and social equity in the long-term. This is where the PPCR can add real value – by ensuring that, in the shorter term, investments in critical sectors become resilient to climate change and enhanced capacity, awareness, evidence and institutional frameworks are built for a longer term climate resilient development pathway within Tajikistan, thus providing a catalyst for further investment.

### 2.5. Institutional Analysis

The country has limited institutional and human capacity to mainstream climate change adaptation in development plans, programs and policies. In terms of institutional arrangements, responsibilities related to climate change are spread over a number of government agencies and departments. The SPCR therefore supports the mainstreaming of inputs for climate adaptation – towards greater climate resilience – into sector strategies. A schematic in Annex 2 shows the interdependencies of different government entities with responsibility for climate change. The Committee of Environment Protection is the state planning and regulatory entity for natural resources management and environmental protection. The State Organisation for Hydrometeorology Institute under the Committee for Environment Protection is a coordinating state entity for weather and climate, as well as the implementing authority of the UN Framework Convention on Climate Change (UNFCCC). A Government Focal Point was tasked with coordinating the engagement in the PPCR process<sup>13</sup> but the lack of technical and human capacity of national institutions to mainstream climate change into policy and programmes has not yet been addressed in earnest. For example, while the Committee on Emergency Situations and Civil Defence (CoES) manages an Information Management and Analytical Centre (IMAC), there is limited capacity for linking existing risks with climate change.

A number of additional gaps in the basic institutional framework have been identified, including:

- Severe weakness in national systems for acquiring and managing basic data on meteorology and hydrology, with severe implications for assessing near

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<sup>13</sup> The office of the Deputy Prime Minister



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and longer term climate trends, and limited access to climate change information;

- Key gaps in the science base, especially on the implications of changes in hydrology, glacial melt and climate impacts in mountainous terrain;
- Low awareness of government officials, business circles, and the public on the adverse risks and impacts of climate change;
- Lack of personnel in government, academia and education system who are trained in climate science and related disciplines;
- Low understanding of the key socio-economic vulnerabilities, the consequences of climate variability and change to the key sectors of the economy and scope for potential adaptation measures;
- Lack of integration of climate change impact assessments and risk management in national development strategies and sectoral investment plans.

To this list addressing what could be termed institutional-technical deficiencies, we could also add a further list of institutional-managerial issues relating to the Government's capacity and competence to take over the management of the PPCR in the short to medium term, and to organise a sustainable and continuing follow-on programme in the longer-term.

This all points to the need to establish some form of structure within Government to manage the program as it moves through Phase 1 and Phase 2. Typically such a structure would have oversight arrangements provided by a high level Inter-Ministerial 'Steering' Committee with technical and other advice being available on demand from working groups, and with the day-to-day management arrangements of the programme being taken care of by a Secretariat.

There is broad agreement across stakeholders for this structure as well as Government commitment to developing leadership and ownership of the process. Agreed arrangements are set out at Section 3.9 of this document.

### **2.6. Participation process**

In the preparation of Tajikistan's SPCR there has been considerable formal and informal consultation. These have comprised three Joint Missions of the MDBs and numerous informal consultations conducted by the consultancy support team. Some of the key milestones in the consultation that facilitated and contributed to the development of the SPCR include:

- Pre-Joint Mission meetings and consultations with GoT, multi-laterals, bi-laterals, international organizations and NGOs. Work began with a preliminary consultation with a wide range of stakeholders in September 2009, with the aim to prepare the ground for the first Joint Programming Mission in October 2009;
- The First Programming Joint Mission took place in October 2009. The mission held a wide stakeholder consultation and met with communities on the ground to identify climate vulnerabilities and priorities areas for the PPCR;
- Informal consultation and meetings with the relevant MDB country missions, government and non-government stakeholders were held in the following months (November and December, 2009 and January 2010). Line ministries were consulted and contributed directly to the development of the activities to be proposed for grant assistance;



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- Informal follow up meetings were held with a wide range of government and non-government stakeholders in February 2010. This consultation clarified further the expectations of the stakeholders and guided the design of the PPCR Phase 1 Technical Assistance;
- A mid-term Joint Mission was held from March 4<sup>th</sup> to 11<sup>th</sup> 2010. In order to create consensus on the activities proposed for grant assistance, the Mission held a workshop with government and non-government experts, as well as meetings with international organisations, bilateral donors and civil society;
- A number of informal consultations were conducted between August 25<sup>th</sup> and September 5<sup>th</sup> 2010 to provide an update on the work to date on Phase 1 activities, inform stakeholders on the next steps in the process and prepare for a institutional and organisational development workshop and the 2<sup>nd</sup> JM;
- On September 29<sup>th</sup> and 30<sup>th</sup>, a facilitated self-assessment workshop was held to consider Government capacities for efficient and effective management, logistics and coordination of the PPCR programme in Tajikistan;
- A Second Joint Mission was conducted from the 4<sup>th</sup> to the 11<sup>th</sup> October and a stakeholder workshop was held to discuss the proposed SPCR.

The result of these consultations allowed a balance to be made between the aspiration for immediate action on the ground and the need for strategic planning to ensure long-term sustainable impact. The result of this substantive schedule of consultations has been high awareness of the PPCR and engagement at the level of the Deputy Prime Minister down to locally-based NGOs. As far as possible the SPCR reflects and will continue to build on local experiences and reflect the views and needs of a range of stakeholders, including specifically vulnerable groups and sectors. The ambition is that future developments will also engage more closely with the growing private sector in Tajikistan (see text box 1). A full list of stakeholder organisations consulted can be found in Annex 3.

### **Text box 2: The Private Sector in Tajikistan**

The private sector's share of GDP in Tajikistan stands around 50% and is growing, but still remains low by international and regional standards. The current economic structure is dominated by large state-owned companies and there are a number of barriers to greater growth and dynamism amongst small and medium-sized enterprises, including: failures in the provision of electricity, an undeveloped financial system and limited physical access to export markets. So there are good reasons why the private sector does not play a more prominent role in the SPCR to date

Improving the business climate in Tajikistan is an important focus of the WB, ADB and EBRD's country strategies.

Source: ADB Country Partnership Strategy 2010 - 2014



### **3. PROPOSED INVESTMENTS PROGRAMME COMPONENTS FOR PPCR FINANCE**

#### **3.1 Tajikistan's Strategic Programme for Climate Resilience**

The activities funded under the Phase 1 Technical Assistance grant will provide further insights and models for addressing both the nature of the risks posed by climate change and the institutional capacity needed in the longer term. Through Phase 1 and Phase 2 institutional analysis and capacity-building, donor-funded investments in key sectors that align with National Development priorities will be linked to PPCR investment enabling transformative shifts towards greater climate resilient development. There is an opportunity to make real and demonstrable progress in developing Tajikistan's climate resilience in key areas whilst the necessary technical and institutional capacity building and evidence gathering progresses through Phase 1.

The Government of Tajikistan and its PPCR development partners (WB, EBRD, and ADB) therefore present a Strategic Program for Climate Resilience that takes account of the pressing need for building climate resilient development whilst also acknowledging the need to build institutional and technical capacity.

A full funding envelope is presented for approval; as the results of Phase 1 activities become available the exact nature of the investment required will be refined through further consultation.

#### **3.2 Process of prioritisation**

The prioritisation of components for the SPCR was developed through a process of consultation across Government and other stakeholders (see section 2.6).

Initial priorities for the PPCR were identified by GoT in their offer of acceptance to participate in the PPCR.<sup>14</sup> Main areas of focus were expected to be on agriculture, water resources and energy, ecology and disaster risk management since these are critical sectors for the country. These areas are consistent with the priorities identified in the National Development Strategy, Joint Country Partnership Strategy (JCPS)<sup>15</sup>, and are consolidated in the third Poverty Reduction Strategy (PRS-3). Further, they are consistent with the findings of a vulnerability assessment conducted for the Second National Communication to the UNFCCC.<sup>16</sup>

Table 1 provides an overview of how the PPCR priority thematic areas align with Government Development priorities and form the basis for SPCR investments.

During the preliminary scoping mission in April 2009 and the Joint Mission in October 2009, an initial stock-take of donor activity in Tajikistan identified a number of projects and programmes that are relevant in the context of climate change adaptation in the country. IFIs and consulted stakeholders agreed that a valuable contribution from the PPCR would be to scale-up the most relevant existing initiatives that provided an opportunity for transformational change within the priority areas identified.

<sup>14</sup> See: [http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TajikistanAcceptanceTemplate\\_Eng.pdf](http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TajikistanAcceptanceTemplate_Eng.pdf)

<sup>15</sup> See: [http://www.untj.org/icps/documents/Relevant\\_documents/JCPS\\_November\\_2009\\_signed\\_eng.pdf](http://www.untj.org/icps/documents/Relevant_documents/JCPS_November_2009_signed_eng.pdf)

<sup>16</sup> The Second National Communication of the Republic of Tajikistan Under the United Nations Framework Convention on Climate Change (2008). See: <http://unfccc.int/resource/docs/natc/tainc2.pdf>





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**Table 1.** Consistency between GoT priorities and PPCR thematic areas

Government Priorities (NDS)	Promotion of sustainable economic growth			Improvement of public administration	Development of human resources		
<b>PPCR priorities (national)</b>	Building stronger linkages between overarching goals of <b>poverty reduction and human development</b> through technical interventions that respond to climate change threats.			Enhancing <b>institutional structure</b> and improving <b>ability of line ministries</b> to engage in inter-sectoral dialogue on climate risk management policies and measures		Strengthening the <b>capacity of the country</b> to produce and utilise better climate data and climate science;	
<b>PPCR priorities</b>	Sector				Project		Community
	Reducing the vulnerability of the <b>energy</b> sector	Building resilience of the <b>agricultural and land management</b> sector	Building resilience of the <b>river-basin (water) sector</b> and enhancing the ability to build climate resilience into priority investments	Advancing <b>climate risk screening of projects</b> and support longer-term sustainability of existing and future investment	Improving <b>country capacity to deal with climate-related disasters,</b>	Empowering <b>vulnerable groups,</b> through a <b>participatory framework.</b>	Ensuring consideration of the <b>needs and participation of vulnerable groups,</b>



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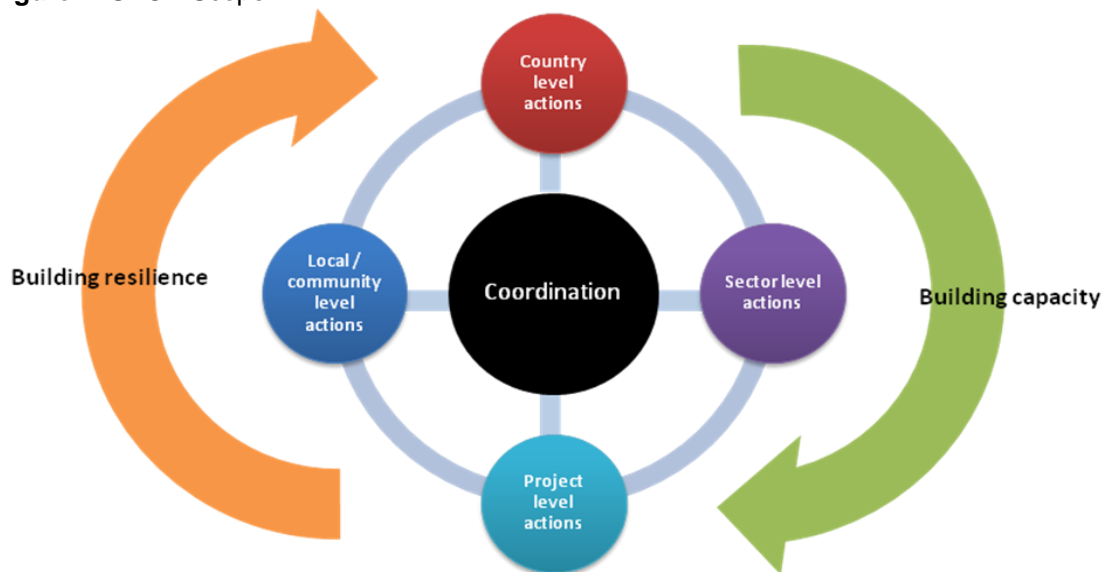
Phase 1 activities were then identified through consultation with Government and other stakeholders with the aim of building capacity, awareness and institutional arrangements whilst also further assessing the climate vulnerability of priority areas.

Through extensive consultation before and during the Second Joint Mission the importance of the main thematic areas was confirmed. Further and more detailed consultation with stakeholders will follow on the detail of investments once the SPCR is approved. This process will be co-ordinated by the Secretariat with continued support during the short-term from the DfID-funded Technical Assistance.

### 3.3 Scope

Whilst it is clear that the PPCR will not be able to meet all the needs of Tajikistan, the SPCR will provide a framework and mechanism for coordinating activities across different levels of governance that seek to strengthen capacity and demonstrate approaches to integrate climate resilience into development policies and planning. As a result of the consultations and process of prioritisation described in section 3.2, the SPCR seeks to address two key needs of **building capacity** and **building resilience** across different scales of governance and activity (see figure 2).

Figure 2. SPCR Scope



It is clear that these two processes are both necessary and must operate in tandem across the whole scale of activities for the realisation of climate resilient development in Tajikistan. Coordination mechanisms are discussed further in section 3.9.

Phase 1 activities are underway and are vital for improving our understanding of the institutional and technical arrangements required to integrate climate change into policies and programmes and will provide an enhanced evidence base on climate vulnerabilities in priority sectors. The results will help understand more clearly the potential for transformative investments for specific activities in water, energy, land and other sectors in Phase 2 of the PPCR.

The ambition of the SPCR is to apply for the full funding envelope of \$50 million available for the PPCR in Tajikistan. The envelope comprises \$47.75 million in requests for grants to the



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Government, and a separate \$2.25 million to cover MDB costs for preparation and supervision.

### 3.4 Investment Proposals

A description of each proposed Phase 2 investment project is provided in this section, followed by a summary in Table 2. Further details on each proposal are provided in Annex 5.

#### Building Capacity for Climate Resilience

The Government recognizes that there is a need to strengthen both technical capacity for climate resilience, and the institutional and organizational capacities that are necessary for effective oversight, coordination and the management and monitoring of the PPCR. Both should aim to facilitate transformational change in the longer term.

Phase 2 funding will be used to build stronger institutional capacity and enhance awareness of climate change amongst a variety of stakeholder groups, including policy and decision makers, highly vulnerable groups such as women and children, educational institutions, media and civil society. Phase 2 investments aimed at building capacity for climate resilience in Tajikistan will build on the outcomes of Phase 1 activity A1 and A3 (supported by the World Bank in partnership with UNDP). The framework of capacity building activities in Phase 2 will be fully scoped and programmed by Government in collaboration with the MDBs after approval of Phase 2 funding.

All stakeholders agree that the most important requirement to ensure successful PPCR coordination is for Government to establish institutional governance mechanisms at the heart of Government. Therefore Phase 2 funding will also be used to support the operation of a PPCR Secretariat, which will facilitate the effective implementation of the PPCR activities and maximize their development impact. Recognizing the urgent need to establish such a coordination mechanism, the Asian Development Bank will provide financial support during Phase 1 to fast start the PPCR Secretariat.

At a capacity self-assessment workshop conducted in October 2010, participants included a broad spectrum of stakeholders. These stakeholders identified multiple areas for improvement (AFIs) for institutional strengthening. It is envisaged that the Secretariat, building on this and other awareness raising and institutional assessment work during Phase 1, will programme further Technical Assistance and capacity development inputs to address these AFIs during Phase 2. Government will ensure that these capacity development inputs are aligned with inputs being provided through the MDBs' technical work-streams, and that any capacity developments do not duplicate any provision through other Government or bilateral programmes. It is also envisaged that the PPCR Secretariat could become a hub for climate change information and communication in the long term. Availability of potential additional resources will be explored over the course of the PPCR to ensure the continuity of Secretariat's operations beyond the PPCR itself.

**Responsible MDB:** ADB

**Government Implementing Agencies:** Office of the Deputy Prime Minister

**Total project cost estimate:** \$3 million+ for the whole Phase 2 capacity building component. In addition, initial TA funding will be provided by ADB to fast track the establishment of the Secretariat for Phase 1 activities.

**PPCR request:** \$3 million

**Co-financing:** None in Phase 2

**Administrative costs for MDB:** \$400,000



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### Improvement of Weather, Climate and Hydrological Service Delivery

Improving weather, climate and water services in Tajikistan is essential for stable social and economic development. The country is the most vulnerable in Central Asia to a wide range of weather-related disasters, including floods and mudflows, droughts, frosts, avalanches, hails, and strong winds. Climate variability and projections of future climate indicate a situation which will become even direr in the coming decades. Data suggests that these events constitute a major part of all economic losses attached to natural hazards; on average around or exceeding 1.0% of GDP per annum. There is a critical need for better quality weather, water and climate information particularly for early warning, support of disaster reduction strategies and improvement of operations in such sectors as agriculture, transport, water resources management, hydropower generation and public health.

The project includes three components. Of crucial importance is the first element of improving the national hydro-meteorological monitoring system to provide timely warnings on dangerous events, support water management, and build the evidentiary basis for climate variability and change. This component includes a major technical re-equipment of the observation networks and strengthening of the information-technology base of the service. The second element focuses on strengthening the system of service delivery through expanded provision of hydromet service products to consumers and bolstering the forecasting, warning, and response system of the Committee for Emergency Situations. The third component is institutional strengthening of the hydromet services, to improve its personnel and financial sustainability.

**Responsible MDB:** World Bank

**Government Implementing Agencies:** State Agency for Hydrometeorology

**Total project cost estimate:** \$14 million

**PPCR request:** \$7 million

**Co-financing:** \$6 million (IDA) for Tajikistan (part of Regional IDA totalling \$15 million); \$1million Government.

**Administrative costs for MDB:** \$400,000

### Climate Science and Modelling Programme

The aim of Phase 2 investment on climate science and modelling is to build in-country capacity to conduct climate science and glaciology research, develop climate change models and interpret the outputs to provide policymakers and sector specialists with the information they need to plan for climate change. Current global circulation models have several limitations for application to Tajikistan and uncertainty still remains on the rate and extent of glacial melt and climate impacts in Tajikistan, as well as in Central Asia more widely. The Tajik Hydromet and other scientific institutions in the country has very limited capacity for climate change science and impact projections. Advancement in the national capacity to formulate and interpret climate science and to downscale global climate projections will facilitate the prediction of downstream impacts in Tajikistan and inform development policy, plans and sector-based program investments.

Phase 2 investments in national climate science and modelling will establish dynamic downscaled modeling capacity within Hydromet to ensure the development of high resolution climate projections and impact scenarios to mainstream vulnerability and adaptation measures in national and sub-national development plans and projects. In addition, scientific and technical capacity for climate science and glaciology research in Tajikistan will be

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strengthened to enhance the understanding of glacial melt and downstream impacts on water resources, and glacier-dependent infrastructure. This work will build upon Phase 1 recommendations and will be done in collaboration with relevant institutions in the country, such as the Hydromet, the National University of Tajikistan, as well as climate and glaciology centres in the region and reputed European centres of excellence on glacial melt.

**Responsible MDB:** Asian Development Bank  
**Government Implementing Agencies:** State Organization on Hydrometeorology  
**Total project cost estimate:** \$3 million  
**PPCR request:** \$3 million  
**Co-financing:** none  
**Administrative cost for MDB:** \$300,000

### Enhancing the Climate Resilience of the Energy Sector

The proposed intervention is to pilot the incorporation of climate change analysis and climate resilience measures into the rehabilitation of hydropower facilities using the rehabilitation of Kairakkum hydropower plant (HPP) as a pilot. The PPCR grant would provide a means of developing ways of incorporating climate change analysis and climate resilience measures into the design and implementation of HPP rehabilitation. This will strengthen the climate resilience of Tajikistan's energy sector and help to build the capacity of the Tajik authorities (e.g. Barki Tojik, Hydromet etc.) to conduct climate change analysis and mainstream it into investment planning and future investment projects in the hydropower sector. The rehabilitation of HPPs is a priority for the Government of Tajikistan, recognising the enormous significance for the country's energy security, economic development and long-term poverty reduction. Although the precise nature of measures undertaken will depend upon the outcomes of PPCR Phase 1 activity A4 (to be completed by May 2011), the subsequent feasibility work and Environmental and Social Impact Assessment to be carried out during project preparation, it is envisaged that they could include the following:

- Modification of installed capacity in the light of projected changes to river inflows and other climatic variables over the lifespan of the facility;
- Modifications to spillway capacity to ensure the safe operation of the facility and the safety of downstream communities, including a consideration of extreme climatic events such as floods and mudslides;
- Measures to address sedimentation in the light of altered hydrology due to climate change;
- Measures to address changing risks of extreme events such as floods and mudslides that may impact on HPP operations and dam safety;
- Institutional strengthening to improve the management of HPPs to anticipate and manage climate change risks to HPP operations.

This pilot project will provide important lessons on how climate change impacts can be addressed in the planning of investments in the hydropower sector, which will be extremely useful for future investments in the sector such as the rehabilitation of Nurek HPP and the possible construction of Rogun HPP. Project preparation (i.e. feasibility work, ESIA including stakeholder engagement, and negotiation of the loan agreement) is expected to commence at the beginning of 2011 and will take approximately 8 months. An EBRD Board decision is anticipated for Q3 2011 and project implementation is expected to commence by the end of the year.

**Responsible MDB:** EBRD

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**Government Implementing Agencies:** Barki Tojik (Ministry of Energy and Industry).

**Proposed PPCR contribution:** it is proposed that a USD 10 million grant from the PPCR be used to co-finance additional, transformative climate resilience features of this investment which will have a total investment size of USD 75 million.

**Co-financing (tentative):** The overall investment, with a total expected investment size of USD 75 million, will be financed through a combination of loans and grants. The PPCR grant will have a transformative effect by mainstreaming climate resilience into HPP rehabilitation and turning the whole USD 75 million investment into a climate resilient project. Furthermore, it will have a multiplying effect by leveraging much larger volumes of investment. This fulfils one of the key objectives of the PPCR – leveraging additional finance for climate resilience. The other proposed sources of finance for this investment are:

- EBRD loan (USD 30 million)
- EIB loan (USD 15 million)
- EU grant (EUR 15 million – \$20 million equivalent)

**Administrative costs for MDB:** \$350,000

### Agriculture and Sustainable Land Management

Climate change, in the form of reduced water availability and increased temperatures, is expected to put increased stress on Tajikistan's land resources. Water use in Tajikistan is dominated by agriculture. Out of Tajikistan's 4.6 million ha of agricultural land, about 780,000 ha are irrigated. Of the remainder, a large proportion is in semi arid and fragile mountain ecosystems, used as pasture and forest, with much of the land already degraded.

The impacts for the country's uplands and rainfed farming areas are likely to include reduced water inflows and crop and rangeland productivity, changes in crop and forage quality, and the ranges of pests and vectors, plus associated shifts in land-use systems livelihoods. Irrigated agriculture will also experience additional water stress, with the need for enhancements in water storage capacity and management. These changes will put additional pressure on a sector which already faces numerous technical and financial challenges. Water infrastructure is often in a poor state of repair and water availability unreliable.

Despite the increasing pressure, there are potential changes to the way both irrigated and rainfed land is managed that can provide positive impacts on production and increase the resilience to adverse effects of climate change. PPCR will provide additional financing that support pilots that with a focus on agricultural livelihoods and rangeland management. The investments will help farmers and communities to address these issues by enabling them to adapt, as well as become more resilient, to climate change by improving local livelihoods, reducing hunger, and restoring productive natural resources.

Additional financing available through PPCR will be used to support replicating and scaling up effective, existing land management practices to ensure that climate resilience becomes an integral part of land management and agricultural production.

The exact detail of initiatives will be determined through a country-wide analysis and consultation process, funded through PPCR Phase 1. Implementation during Phase 2 will likely be through existing donor-supported Government programmes that are already addressing the sustainable land management, rural livelihoods and irrigation. Modalities could include providing additional financing for clear climate resilience needs as part of the Second Upland Agricultural Livelihoods and Land Management Project (under preparation) and the Fergana Valley Water Resources Management project.



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**Responsible MDB:** World Bank

**Government Implementing Agencies:** likely to be Ministry of Agriculture and/or Ministry of Land Reclamation and Water Resources; others possible

**Total project cost estimate:** TBD based on results from Phase 1

**PPCR request:** \$9.9 million

**Co-financing:** TBD

**Administrative costs for MDB:** \$400,000

### Building Climate Resilience in the Pyanj River Basin

PPCR Phase 2 investments on Tajikistan's river basins aim to build climate resilience in critical ecosystems, communities and infrastructure that are particularly vulnerable to climate change risks. Climate change in Tajikistan is mainly about water. Major glacier-dependent river basins, containing a large proportion of agricultural land, such as the Pyanj River basin, are increasingly vulnerable to glacial melt and extreme events, whether caused by climate or other factors. Increasingly unstable hydrological resources can threaten upstream ecosystems and downstream infrastructure and services, such as irrigation, hydropower, and potable water, as well as vulnerable communities and infrastructures. Climate change in Tajikistan has therefore the potential to weaken household livelihoods and lead to trans-border effects on neighbouring countries.

This Phase 2 investment will build on the findings of the Phase 1 activity A6 'Analysis of River Basin Approach to Climate Resilience'. The Phase 1 activity will develop a methodology to integrate climate risk in river basin investments and identify sector-based national and sub-regional investment priorities. Under ADB leadership, Phase 2 investments will be directed to increase the climate resilience of river basins in Tajikistan. ADB will work in partnership with the government of Tajikistan, the Ministry of Water resources, the Tajik Hydromet and other national and international experts to identify and implement measures aimed at building climate resilience and reducing the vulnerability of communities, ecosystems and infrastructure in the Khatlon target area of the Pyanj river basin, and Pyanj tributaries. Lead time for preparation is approx 10 months (2 months from approval of SPCR to fund commitment, and 8 months for feasibility study and ADB's internal project approval).

**Responsible MDB:** Asian Development Bank

**Government Implementing Agencies:** Ministry of Melioration and Water Resources / Committee of Environment protection

**Total project cost estimate:** \$15.3 million

**PPCR request:** \$15.3 million

**Co-financing:** None

**Administrative cost for MDB:** \$400,000



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**Table 2:** Tajikistan SPCR Financial Proposal

Proposed investment program component	GoT Technical Lead	MDB Lead (TTL)	Component costs	MDB costs from PPCR (prepare and supervise)	Tentative co-financing (amount/source)	Key dates
<b>Building Capacity for Climate Resilience</b>	Executive Office of the President	ADB (P. Hayes; C. Losenno)	\$3 M	\$400K	None	Advance initiation by January 2011 through ADB additional funding; full project documentation in 4 <sup>th</sup> Q 2011
<b>Improvement of Weather, Climate and Hydrological Service Delivery</b>	Tajik Hydromet	WB (Tsirkunov)	\$7 M	\$400K	\$6M + (WB-IDA) \$1M (Government)	Full project documentation by January 2011; World Bank Board March 2011; effective Spring 2011
<b>Climate Science and Modeling Programme</b>	Tajik Hydromet	ADB (Hayes)	\$3 M	\$300K	TBD	Concept Note prepared in mid 2011; to be informed by Phase 1 findings; Full project documentation 3 <sup>rd</sup> Q 2011
<b>Enhancing the Climate Resilience of the Energy Sector</b>	Barki Tojik (and ME&I)	EBRD (Davies/Chabrier)	\$10 M	\$350K	EBRD (\$30 million loan) EIB (\$15 million loan) EC (€15 million grant – approx \$20 million equivalent)	Project preparation expected to start in January 2011; Grant agreement for project preparation(feasibility study and ESIA) in January 2011; Negotiation of loan agreement spring-summer 2011; EBRD Board decision autumn 2011; Grant agreement for project implementation in 4th Q 2011.
<b>Agriculture and Sustainable Land Management</b>	MoA and/or MoW	WB (Croxtan; others)	\$9.45 M	\$400K	TBD	Concept Note prepared in mid-2011; to be informed by Phase 1 findings
<b>Building Climate Resilience in the Pyanj River Basin</b>	MoW / CEP	ADB (Ryutaro)	\$15.3M	\$400K	None	Full project documentation 3 <sup>rd</sup> Q 2011
<b>Subtotal</b>			<b>\$47.75M</b>	<b>\$2.25M</b>		
<b>Total request</b>				<b>\$50M</b>		

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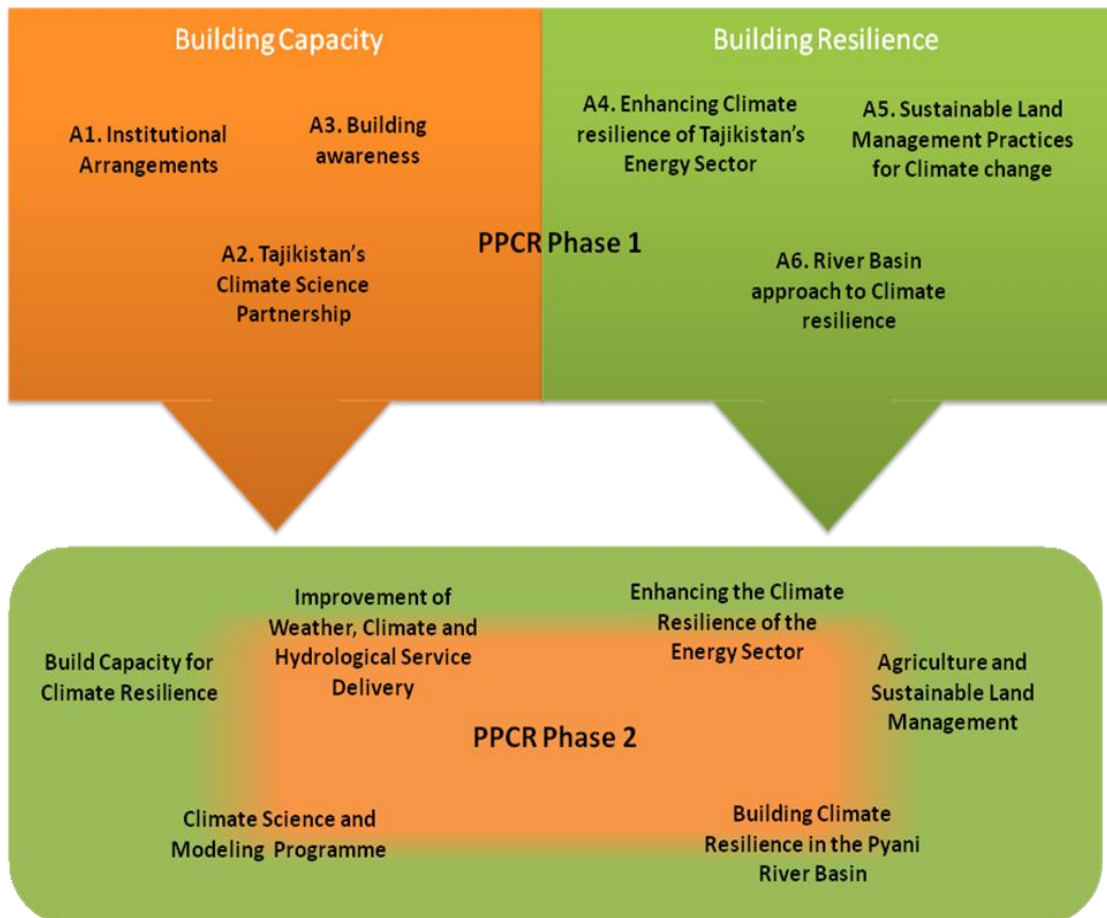




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Figure 3 illustrates the relationship between Phase 1 and Phase 2.

**Figure 3.** Tajikistan's SPCR: Phase 1 activity and Phase 2 Investments



The long-term expected outcomes of the PPCR in Tajikistan are:

- Improved capacity of Tajikistan's government and practitioners to integrate climate resilience into development plans, programmes and policies;
- Increased capacity of Government of Tajikistan to move from a reactive, donor-led approach to a proactive country-led approach and create the conditions for ownership of adaptation to climate change within Tajikistan;
- Enhanced information base on climate change risks and improved understanding of climate change amongst a variety of stakeholders
- Improved coordination of climate change activity by Government of Tajikistan, international organisations, MDBs and NGOs within Tajikistan;
- Improved ability of Tajikistan's stakeholders to scale up and replicate climate resilient approaches by building on the PPCR practical experience of integrating climate resilience into development planning.



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### 3.5 Coordination across components

Each component is closely coordinated with other PPCR components to prevent overlap and take advantage of synergies. For example, the component to improve 'Weather, Climate and Hydrological service delivery' targets the basic acquisition and use of hydromet data nationally. The proposed 'Climate Science and Modelling Programme' aims at improving and sharing the scientific bases; for example in glaciology and climate modelling. Nevertheless, as Tajikhydromet will have an important role in both projects, data outputs and capacity building will be harmonized. Similarly the component dealing with 'Building Climate Resilient in the Pyanj River Basins' may require additional water monitoring stations over and above the national system (and other pilot area) to more fully characterize basin hydrology. Project implementers will ensure there are close links in terms of instrumentation, telemetry, data analysis and other aspects to ensure complimentary results and avoid duplication. The component dealing with 'Enhancing the Climate Resilience of the Energy Sector' also outlines a need for Tajikhydromet to be included in the planning of hydropower investments given the importance of reliable hydromet data. Clearly the PPCR Secretariat will play an important role in coordinating actions and communicating results.

### 3.6 Timing

Tajikistan's PPCR include two phases that are expected to overlap. The six activities under Phase 1 technical assistance work will occur over the following timeframes:

Phase 1 Activity	Timing
Review of Tajikistan's climate change institutional arrangements and capacity needs (WB lead under Grant arrangement with UNDP)	October 2010 to October 2011(12 months)
Tajikistan's Climate Science and Impact Modelling Partnership (ADB lead)	October 2010 to July 2011 (9 months)
Raising awareness of climate change in Tajikistan (WB lead under Grant arrangement with UNDP)	October 2010 to December 2011 (14 months)
Identifying options for enhancing the climate resilience of Tajikistan's energy sector (EBRD lead)	September 2010 to May 2011 (9 months)
Analysis of sustainable land management approaches for changing climatic conditions in Tajikistan (WB lead)	December 2010 to July 2011 (7 months)
Analysis of river basin approaches to climate resilience (ADB lead)	October 2010 to July 2011 (9 months)

Phase 2 will start immediately on approval of the SPCR by the PPCR Subcommittee. More detailed concept notes (pre-appraisal) will be developed as soon as the results of Phase 1 activities are available. Details on the timings for Phase 2 are outlined in the full investment proposals below.

This SPCR is submitted by Government for consideration by the PPCR Subcommittee at its mid-November 2010 meeting. Assuming the \$50 million 'envelope'

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is approved at the meeting, with allocations in each of the six components, the MDBs will formalize their administrative arrangements with the CIF Administrative Unit and Trustee to allow the release of administrative fees for project preparation. Government institutions will work with the relevant MDB to further the preparation of each component over the following months. It is our understanding that the authorization for further release of funds can only take place once project documentation is received and considered adequate by the PPCR sub-committee.

“Key dates” for project implementation are noted in the project templates in Annex 5. The first of the six components to be fully prepared (including co-financing) is expected to be the ‘Improvement of Weather, Climate and Hydrologic Services Delivery’ project. The current schedule assumes full documentation and PPCR project-specific authorization of funds in December 2010, as project negotiation with Government would follow thereafter in February 2011. The project is scheduled to be considered by the World Bank Board of Directors at the end of March 2011, with signing of the grant agreement and effectiveness following closely. The other five components are estimated to have documentation ready for release of further project funds during the course of 2011. Actual dates will depend on availability of co-financing, progress in preparatory analyses, and other technical and administrative factors. As noted in project templates in the Annex, specific project activities of some components cannot be shaped before the outcomes of Phase 1 technical assistance work. The PPCR Secretariat will ensure all parties are informed of any major changes in project timelines.

### **3.7 Administrative Costs for MDBs**

The MDBs requests to cover administrative costs on the incremental costs of PPCR investments are shown in project templates and the summary table. These costs are estimated to range from \$300K to \$400K, and cover supervision over the 3 to 5 year life of the activity. These costs are well within established MDB guidelines.

### **3.8 Environmental and social risks**

Each project will be covered by the implementing MDBs applicable safeguard policies on environmental assessment, involuntary resettlement, and other risks. Policies and procedures mitigation of risks and engagement of stakeholders (including access to information) are also applicable. The relevant risk rating is noted in each project template in Annex 5.

### **3.9 Institutional arrangements**

With full endorsement of the Government and MDBs, agreement has been reached on the establishment of a co-ordination structure for the PPCR and how it will work, including broad indicative suggestions concerning functions/roles, reporting lines, funding lines/mechanisms, and how to build capacity. Potentially, this could become a permanent structure of the GoT with its own strategic vision, and the authority and responsibility for a much broader climate adaptation agenda, both nationally and internationally.

The Government recognizes that there is a need to strengthen both technical capacity for climate resilience, and the institutional and organizational capacities that

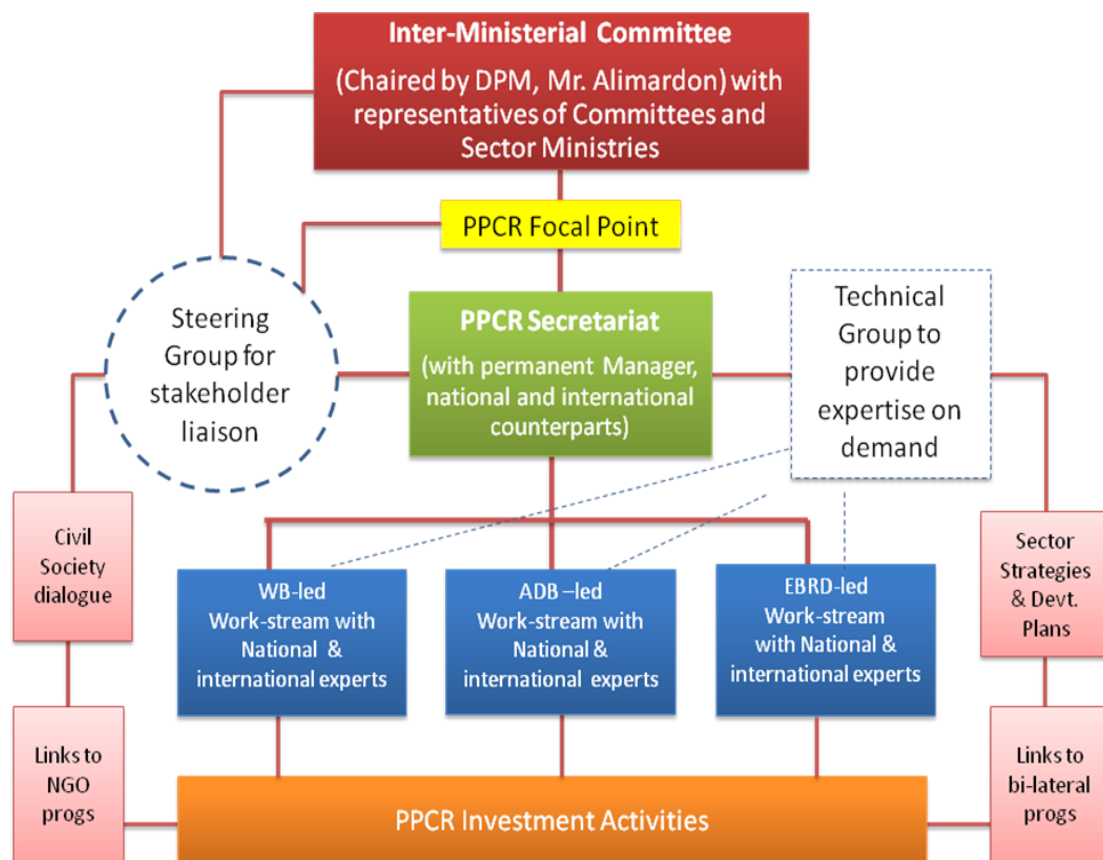


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are necessary for effective oversight, coordination and the management and monitoring of the PPCR. All stakeholders agree that the most important requirement to ensure successful PPCR coordination is for institutional governance mechanisms to be established at the heart of Government (with possibility Executive Office of the President). Oversight should be provided by an Inter-Ministerial Committee, and coordination and management provided through a full-time Secretariat. ADB has agreed to provide interim funding for the initial establishment of key posts required for the Secretariat, and the Deputy Prime Minister has agreed that the Secretariat should be located in his Office. Over the longer term, capacity-building and the Secretariat itself will be financed via Phase 2 SPCR investments.

Figure 4 shows the agreed management structure schematically:

**Figure 4.** PPCR Management structure in Tajikistan



A capacity self-assessment workshop was conducted in October 2010 with Government. Representatives from Government agreed the overall management structure required and then identified multiple areas for improvement for institutional strengthening. Ten vital priorities were selected for which there was consensus. It is envisaged that the Secretariat, building on this workshop and Phase 1 activities A1 and A3 will programme further Technical Assistance for capacity development and institutional strengthening to be developed into a longer term investment for Phase 2. Government / Secretariat will ensure that these capacity development inputs are aligned with inputs being provided through the MDBs' technical work-streams, and that any capacity developments do not duplicate any provision through other Government or bi-lateral programmes.



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The essential responsibilities of this Secretariat will be as follows:

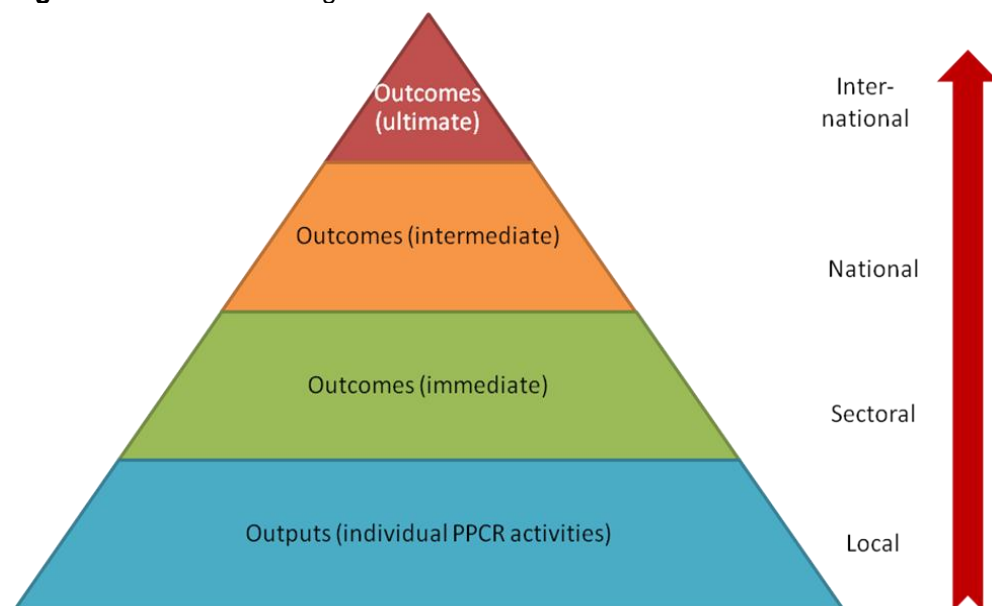
- Ownership and Leadership of PPCR will rest with the GoT through the Focal Point and Secretariat;
- Central co-ordination for PPCR – Create a platform for broad stakeholder dialogue (e.g. including NGOs, civil society, private sector and academia);
- Co-ordinate Phase 1 activities – Help MDBs identify critical dependencies between activities. What outputs are needed from one activity to be used in another for joint Outcomes?
- Monitor and report progress across the PPCR;
- Influence the separate work-streams to fulfil the spirit of the SPCR in Phase 2 – consulting widely and broadly with bilateral donors, international organisations and civil society;
- Provide a central channel (through the Focal Point) for consultations on Phase 2 investments. Build on the planned national conference and Phase 1 activities A1 and A3 (being implemented by UNDP) as awareness grows.

### 3.10 Monitoring and Evaluation

Developing a comprehensive monitoring and evaluation framework (MEF) will be a key activity for the secretariat (section 3.9). Drawing on the PPCR results framework,<sup>17</sup> Tajikistan's SPCR will be monitored and evaluated at a number of different levels – from the outputs and outcomes of individual activities at a local, project or sectoral level to National outcomes in the longer term. See figure 5.

In particular, the MEF will ensure that the outputs and outcomes for individual activities implemented by relevant MDBs are consistent with the overall objectives of the PPCR in Tajikistan and the long-term expected outcomes (section 3.3). The initial iteration of the Logical Framework for assessing the Tajikistan's SPCR can be found in Annex 6.

**Figure 5.** PPCR Monitoring and Evaluation framework



<sup>17</sup> See: <http://siteresources.worldbank.org/INTCC/Resources/PPCRResultsFrameworkApril24.pdf>



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Learning is a vital component of the PPCR. Tajikistan has demonstrated a considerable progress on the learning curve as the process has developed. At the outset there were no established structures to deal with climate change adaptation within Government and limited experience of participatory consultative processes. The PPCR has been developed through an improving program of consultation and this process will need to continue as the PPCR Secretariat is established and also as the projects are developed further in greater detail.



## **4. Annexes**

- Annex 1** Tajikistan's climate change impacts and vulnerabilities  
**Annex 2** Government Departments responsible for Climate Change  
**Annex 3** Details of stakeholder organisations consulted during PPCR process  
**Annex 4** Technical Assistance under Phase 1 grant  
**Annex 5** Investments
- Building capacity for climate resilience
  - Improvement of Weather, Climate and Hydrological Service Delivery
  - Climate Science and Modelling Programme
  - Enhancing the Climate Resilience of the Energy Sector
  - Agriculture and Sustainable Land Management
  - Building Climate Resilience in the Pyanj River Basin
- Annex 6** Logical Framework for Monitoring and Evaluation



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### Annex 1 – Tajikistan’s climate change impacts and vulnerabilities

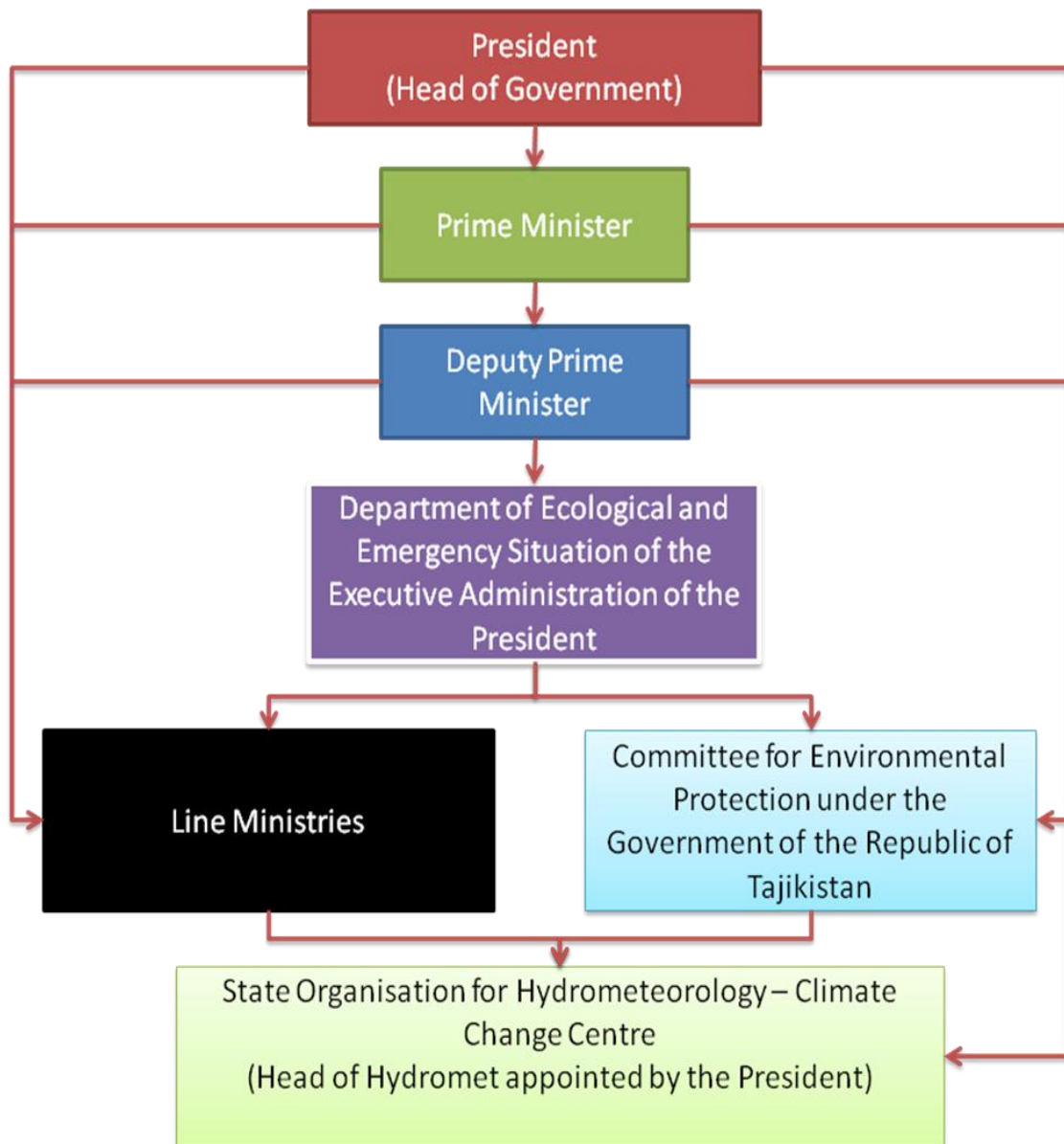
Climatic change	Impact	Sectoral vulnerabilities	Adaptive capacity
Warming above the global mean in central Asia	Increase in average plain region temperatures of 0.5 to 0.8 C and mountain region temperatures of 0.3 to 0.5 C in 60 year period.	<ul style="list-style-type: none"> <li>• Glacier stock changing with increased warming, especially in high-altitude areas such as Pamir, Zeravshan and Pamir- Alai.</li> <li>• Extinction of natural ecosystem and species such as the Marmota menzbieri previously found in Northern Tajikistan.</li> <li>• Increased vulnerability of human health to malaria, infectious and non-infectious diseases with increased warming, especially in high altitude areas such as Pamir, Zeravshan and Pamir- Alai.</li> </ul>	<p>Very limited understanding of how these particular changes in climate will impact people, lives and livelihoods in Tajikistan. Poor understanding coupled with issues of limited resources has resulted in weak adaptive capacity to climate change. The challenges are compounded by the fact that in almost all areas the scientific evidence and data is very poor, making adequate adaptive responses next to impossible</p> <p>Gaps in the basic institutional framework, include:</p> <ul style="list-style-type: none"> <li>• Lack of integration of climate change risk in national development strategies and sectoral investment plans.</li> <li>• Weakness in national systems for acquiring and managing meteorology and hydrology data, with severe implications for assessing near and longer term climate trends, and limited access to climate change information;</li> <li>• Low awareness of government officials, academia, business circles, and the public on the adverse risks and impacts of climate change, and limited technical skill pool</li> </ul>
Decrease in precipitation in the summer	The number of days with precipitation has decreased in the country.	Variable water flow of Varzob River – most significant source of water supply for Dushanbe – closely linked with precipitation patterns, especially in the mountains. Less reliable access to water and greater competition.	
Increase in evapotranspiration	Expert assessments of expected climatic changes suggest increased evaporation by 5-14 percent as well as vapor transpiration by 10-20 percent.	Inadequate water availability for crop production	
Reduction in snow and ice	Continuous periods, such as from 1970-1984 with low amounts of rainfall	Direct impact on river water availability, size of snowmelt flood and level of moisture in soil, leading to less water available for other energy and agriculture	
Increasing frequency and intensity of extreme events particularly, intense rainfall events causing landslides and severe floods	Heavy rains, high waters caused by mudflow, high air temperature accompanied by droughts, strong winds and dust storms, frosts and extreme cold temperature cause most damage to agriculture.	<ul style="list-style-type: none"> <li>• Agricultural challenges such as irreparable damage to cotton crop especially in Spring</li> <li>• Increased flooding causes sedimentation of irrigation infrastructure</li> <li>• Hail damages plants, breaking stems and reducing the quality and yield of crops.</li> </ul>	





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### Annex 2 – Government Departments responsible for Climate Change





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**Annex 3** - Details of stakeholder organisations consulted during PPCR process (summary)

Stakeholder	Phase 1 grant proposal and informal		
	First JM (12 <sup>th</sup> to 22 <sup>nd</sup> October 2009)	Consultations (October 2009 to September 2010)	Second JM (4 <sup>th</sup> to 11 <sup>th</sup> October 2010)
<b>Ministries and Departments</b>			
Agency of Geology	✓		
Committee on Environmental Protection	✓	✓	✓
Executive Office of the President (Focal Point)	✓	✓	✓
State organization for Hydrometeorology	✓	✓	✓
Deputy Prime Minister	✓	✓	✓
Ministry of Water and Melioration	✓	✓	✓
State Committee of Investments	✓	✓	
Ministry of Agriculture	✓	✓	✓
Ministry of Energy and Industry	✓	✓	✓
Committee for Emergency Situation	✓	✓	✓
Ministry of Economy	✓	✓	✓
Tajik Branch of Executive office of Aral Fund	✓		
Ministry of Transport	✓	✓	
Ministry of Finance	✓	✓	
Academy of Science	✓	✓	✓
University of Bern / Tajikistan Academy of Agricultural Science	✓		✓
Ministry of Health	✓	✓	✓
State National University		✓	
State Agricultural University		✓	
State Technical University		✓	



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Tajik Medical University	✓		
<b>Donor organisations</b>			
World Bank (WB)	✓	✓	✓
Asian Development Bank (ADB)	✓	✓	✓
European Bank of Reconstruction and Development (EBRD)	✓	✓	✓
International Finance Corporation (IFC)		✓	✓
UK Department for International Development (DFID)	✓	✓	✓
Gesellschaft für Technische Zusammenarbeit (GTZ)	✓	✓	✓
Swiss Development Corporation (SDC)	✓	✓	✓
Swedish International Development Agency (SIDA)	✓	✓	✓
JICA (Japan International Co-operation Agency)	✓		✓
European Commission	✓		✓
<b>International Organisations</b>			
UNDP / UNEP	✓	✓	✓
Centre of Competence for Disaster Reduction	✓		✓
Food and Agriculture Organisation (FAO)	✓	✓	✓
World Health Organisation (WHO)		✓	✓
The Organization for Security and Co-operation in Europe (OSCE)	✓	✓	✓
<b>Civil Society</b>			
Focus Humanitarian Assistance		✓	✓
International Alert		✓	
ACTED		✓	✓
OXFAM		✓	✓
Christian Aid		✓	✓
Tajik Climate Network	✓	✓	✓
Network for sustainable development of Central Asia		✓	✓



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NGO 'Little Earth'	✓	✓	✓
NGO "Noosphere"	✓	✓	✓
NGO "Tarakkiet"	✓	✓	✓
Tajik Socio-Ecological Union	✓	✓	✓



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**Annex 4** Technical Assistance under Phase 1 grant

Activity		Expected outputs	Expected outcomes
A1	Review of Tajikistan's climate change institutional arrangements and capacity needs	Assessment of Tajikistan's institutional, technical and human capacity at the national and local levels to mainstream climate change considerations in key policy areas, with particular focus on the requirements for taking forward the SPRC	Improved understanding of current arrangements to develop adaptation responses and take forward the activities that will emerge from the SPCR, as well as a road map for strengthening the ability of GoT to include the likely impacts of climate change into future national policies and programmes
A2	Tajikistan's Climate Science and Impact Modeling Partnership	Assessment of Tajikistan's capabilities for projecting future climate scenarios and consequent impacts on various sectors and resources, and roadmap for further development and use of climate change information	Enhanced scientific evidence and skill base for national policy making
A3	Raising awareness of climate change in Tajikistan	Initial awareness raising events on climate change impacts, vulnerabilities and adaptation for policy makers and other stakeholders and training of trainers for future awareness raising activities	Enhanced understanding of Tajikistan's vulnerabilities and increased sustainability of national and local development plans and PPCR activities. Enhanced ability to exercise influence internationally and leverage funds
A4	Identifying options for enhancing the climate resilience of Tajikistan's energy sector	Assessment of the climate vulnerability of the hydropower sector and roadmap to increase sector's resilience and Tajikistan's energy security	Enhanced knowledge base to inform national energy plans and potential actions on the energy sector in the PPCR Phase 2
A5	Analysis of sustainable land management approaches for changing climatic conditions in Tajikistan	An inventory and analysis of sustainable land management activities and associated land policy issues to identify investment projects and policy support programme for PPCR Phase 2	Improved access to information on sustainable land management and climate change and enhanced understanding of the opportunities and constraints of land and other policy reform processes. Identification of opportunities for Phase 2 investment
A6	Analysis of river basin approaches to climate resilience	Development of a replicable methodology to identify and enhance climate resilience on priority investments, at the river basin level, in vulnerable areas of Tajikistan	Enhanced ability to climate proof investments at the river basin level



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**Annex 5 – Investments**



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<b>Title</b>	<b>Building capacity for climate resilience</b>
<b>Government Contact</b>	Government of Republic of Tajikistan
<b>MDB contact</b>	Asian Development Bank Peter Hayes, Senior Climate Change Specialist, CWRD
<b>Objective of the proposed activity</b>	To strengthen the government of Tajikistan's capacity for mainstreaming climate change risks into national policy and development plans, increasing the country's resilience through ( <i>inter alia</i> ) effective management of the PPCR.
<b>Key dates</b>	January 2011: Work begins through quick start ADB TA (for activities in 2011); October 2011: Full project documentation for FY2012 and beyond prepared and informed by Phase 1 analyses FY 2012: Phase 2 implementation commences
<b>Expected duration</b>	5 years
<b>Environmental and social risks</b>	Category C
<b>Estimated Level of Funding</b>	\$ 3,000,000
<b>Administrative costs for PPCR support</b>	\$400,000

**Section One: Background**

Climate change is an additional burden on the challenge of attaining stable and long-term economic growth and poverty reduction efforts in Tajikistan. To put climate change in context, the National Development Strategy<sup>18</sup> outlines some of the broader issues facing Tajikistan and the Government including ineffective public administration and the sharp decline in human capital. Delays in legislating minimum state social standards, the slow pace of reform in social sectors and the low rate of return on funds that are spent mean that people are being denied access to education and medical and social services and the quality of these services is poor.

A number of additional gaps in the basic institutional framework for climate change include:

- Low awareness of government officials, business circles, and the public on the adverse risks and impacts of climate change;
- Lack of qualified personnel on climate science and impacts in government, academia and education system;
- Low understanding of the key socio-economic vulnerabilities, the consequences of climate variability and change to key sectors of the economy and scope for potential adaptation measures;
- Lack of integration of climate change impact assessments and risk management in national development strategies and sectoral investment plans.

The Government recognizes that there is an urgent need to strengthen both technical capacities for climate resilience, and the institutional and organizational capacities that are

<sup>18</sup> National Development Strategy of the Republic of Tajikistan for the period to 2015 (2<sup>nd</sup> Draft) 2007. Available from: [http://www.untj.org/files/reports/NDS\\_\(English\).pdf](http://www.untj.org/files/reports/NDS_(English).pdf)



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necessary for the effective oversight, coordination, management and monitoring of the PPCR. Both should aim to facilitate transformational change in the longer term.

Phase 2 funding will be used to build stronger institutional capacity and enhance awareness of climate change amongst a variety of stakeholders groups, including highly vulnerable groups such as women and children. Phase 2 funding will be used also to support the operation of a PPCR Secretariat, which will facilitate the effective implementation of the PPCR activities and maximize their development impact. Recognizing the urgent need to establish such a coordination mechanism, the Asian Development Bank will provide financial support during Phase 1 to fast start the PPCR Secretariat

### **Section 2: Development and Specific Objectives**

Phase 2 interventions aimed at building capacity for climate resilience in Tajikistan will build on the outcomes of Phase 1 activity A1 and A3 (managed by the World Bank), and are likely to focus on institutional strengthening, training and awareness raising, as well as the establishment of a PPCR coordination mechanism. Capacity building activities in Phase 2 will be coordinated with the Climate Science and Modelling Programme and other Phase 2 investments to explore synergies and avoid duplication. It is anticipated that the PPCR Secretariat will play a key role in ensuring coordination across the PPCR Phase 2 investments.

Specific objectives include:

- Conduct training and facilitate engagement in national and international climate change events;
- Raise awareness targeting a number of specific audiences, including highly vulnerable groups, civil society, private sector, educational institutions, the media and the general public and;
- Strengthen institutional and technical capacity on climate change impacts and adaptation, and mainstream climate change adaptation into national and sub-national policies, poverty reduction strategies and development plans, such as the development of a National Climate Change Adaptation Strategy, key sector strategies and local authority's Action Plans;
- Support to implement the Secretariat work-plan<sup>19</sup>, including strengthening of coordination bodies and groups that will contribute to the effective implementation of the PPCR, coordination activities, monitoring, reporting and communication.

### **Section Three: Key indicators and baseline**

Indicators

- *Institutional capacity to mainstream climate risks in development plans and policies and devise adaptation responses strengthened;*
- *Ability of Tajikistan's government to exert influence in international fora, and to leverage additional finance enhanced;*
- *Improved institutional arrangements to develop adaptation responses at the national and sub-national level;*
- *Understanding of climate change and its implications for Tajikistan enhanced amongst a variety of audiences, including vulnerable groups such as women, children, the elderly and the sick;*
- *PPCR coordination mechanisms, including Secretariat, inter-ministerial committee and other coordination bodies, established and operational;*
- *PPCR Secretariat work-plan implemented;*
- *Knowledge products developed and disseminated;*
- *Profile of PPCR in Tajikistan raised in country and internationally;*
- *Effective communication among government, MDBs, international organisations, civil society, private sectors and other PPCR partners attained.*

<sup>19</sup> The PPCR Secretariat will develop and start implementing a workplan during the first year of operation.





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### *Baseline*

There is currently no coordination mechanism around climate change, and therefore no systematic measurement of any of PPCR related activities or indicators. The baseline is therefore that the introduction of the above indicators is recognised as necessary and now being planned.

### **Section Four: Anticipated components and activities (including learning and knowledge management activities)**

1. Support the establishment and operationalisation of the PPCR Secretariat
  - a. Coordination of the activities being managed by the MDBs under PPCR and other relevant activities being implemented in the country;
  - b. Provision of a single point of contact for the Programme between Government, MDBs, Civil Society, local government, academia and private sector;
  - c. Strategic and operational planning support to implement the secretariat work-plan, including strengthening of structures, coordination activities, monitoring, reporting and communications;
2. Conduct training, study tours and engagement in national and international climate change events;
3. Facilitate cross-sectoral and inter-ministerial round tables to ensure strong cooperation across government departments and integration of climate change risks in sector-based strategies;
4. Facilitate dialogues between key stakeholders groups, including national and sub-national decision makers, civil society and the media
5. Awareness raising activities targeting specific audiences
6. Develop knowledge products that are relevant to a variety of stakeholders and capture synergies between PPCR and other national, sub-national and community-based agencies operating in the country;
7. Activities aimed at mainstreaming climate change adaptation into national and sub-national policies and development plans, such as the development of a National Climate Change Adaptation Strategy, key sector strategies and local authority's Action Plans

### **Section Five: Risks**

<b>Risks</b>	<b>Mitigation Measures</b>
Adequately engaging and representing government and other stakeholders' views in the activities aimed at strengthening institutional capacity.	Working closely with the GoT and other stakeholders to design and implement relevant activities. Meaningful engagement of stakeholder groups through the work of the secretariat and building upon work being carried out by other agencies
The lack of information in local language and the cross-cutting nature of climate change may result in a low interest amongst stakeholders and a loss of support.	The project team conducting awareness raising activities will work closely with the key government departments and ministries to ensure that awareness raising activities are carefully tailored (e.g. in terms of audience need, format / delivery mechanism, language and content) and maintain government backing for these activities.
Identification and retention of suitably qualified staff for the Secretariat	Additional professional development incentives



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Secretariat and Executive Office of the President have limited expertise in Financial management and procurement and needs to meet PPCR administrative standards; concerns amongst stakeholders for transparency.	Close monitoring of disbursement of funds by ADB FM and procurement; international consultants provide technical and administrative oversight
Complexity of communications channel for coordination of activities under the PPCR	Establishment of formalised communication channels and forums for dialogue, such a steering group with representatives from stakeholders group  Development of implementation of the Secretariat's communication strategy including a variety of knowledge product
Changes in Government personnel (especially in key counterpart positions) could militate against progress and 'ownership' of the programme by GoT; Capacity gaps, competing Government priorities and the pace of capacity building, may result in slow disbursement of funds.	Sustained engagement of government contacts and decision makers

### **Section Six: Investment Costing (notional allocation – PPCR and cop-finance including counterpart finance)**

The estimates reported below are indicative. Detailed costing will be developed on the basis of the outcomes of phase 1 activities A1 and A3.

Component	PPCR support (US\$)/year	Other support (US\$)	Project total (US\$) over 5 years
Secretariat staffing and consulting support	150,000	0	750,000
Training, awareness raising and institutional strengthening	300,000	0	1,500,000
Knowledge management, events and travel	100,000	0	500,000
Equipment & office	50,000	0	250,000
<b>TOTAL</b>	<b>600,000</b>	<b>0</b>	<b>3,000,000</b>

**Bank administrative budget requirements:** Asian Development Bank administrative costs total \$400,000.

### **Section Seven: Results and Performance framework**

Outcome Indicators	Baseline (Pre-project)	Proposed Project Results
Functional Secretariat	Established and staffed	Secretariat work-plan developed and implemented Effective inter-institutional coordination and information exchange



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<b>Outcome Indicators</b>	<b>Baseline (Pre-project)</b>	<b>Proposed Project Results</b>
Institutional strengthening	Phase 1 A1 outcomes	Government better able to mainstream climate change in national and sub-national development plans
Training and awareness raising	Phase 1 A1 and A3 outcomes	Training conducted More informed stakeholders groups
Knowledge management	Communication strategy developed	Knowledge products developed and disseminated Annual reporting Tajikistan's experience and lessons shared with other PPCR pilots
Events	Ad-hoc attendance at international events	Attendance at international events planned and prioritized



**Tajikistan - Strategic Programme for Climate Resilience**  
**Pilot Programme for Climate Resilience**

<b>Title</b>	<b>Improvement of Weather, Climate and Hydrological Service Delivery</b>
<b>Government Contact</b>	Makhmad Safarov, Director, State Organization on Hydrometeorology
<b>MDB contact</b>	World Bank Vladimir Tsirkunov, ENVGC Salman Anees, ECSSD
<b>Objective of the proposed activity</b>	Increase resilience to climate change by strengthening national capacity to collect, analyze and present data and information on weather, climate and hydrology to the government and public
<b>Key Dates</b>	Project Appraisal Documents and release of PPCR funds – December 2010 Negotiations on full package – January 2011 World Bank Board – late March 2011 Effectiveness/implementation – Spring 2011
<b>Expected duration</b>	5 years (2011-2016)
<b>Estimated level of funding</b>	<b>\$ 7.0 million from PPCR</b> \$ 6.0 million from <i>International Development Association (IDA)</i> \$1.0 million from <i>Tajikistan (in-kind contribution)</i> Total Project Size: \$14 million
<b>Administrative costs for MDB preparation and supervision (PPCR portion)</b>	\$400,000

**Section One: Background**

Improving weather, climate and water services in Central Asia region is essential for stable social and economic development. Central Asian countries such as Tajikistan are vulnerable to a wide range of weather-related disasters, including floods and mudflows, droughts, frosts, avalanches, hails, and strong winds. Data suggests that these events constitute a major part of all economic losses attached to natural hazards. In Tajikistan, losses on average are around 1.0 percent of GDP per annum. Existing systems of collection and dissemination of weather, water and climate information managed by the Tajik Hydromet is inadequate to cope with even the basic needs of the economy and public. Obsolete and broken equipment, poor telecommunications, inadequate qualification of staff all contribute to this problem. The lack of access to timely and accurate weather, climate and water information impedes civil society and economic performance, increase losses from hazardous weather and climate events.

Strengthening the system of disaster risk management is listed as a priority in the World Bank's Country Partnership Strategy (CPS) for Tajikistan (50769-TJ). Tajikistan has allocated USD 2 million from its IDA country allocations for improving disaster preparedness by modernizing its hydromet services and by participating in a regional cooperation program with other Central Asian countries. By participating in a regional cooperation program, Tajikistan will gain access to additional funds (USD 4 million) from the Regional window of IDA. Therefore, Tajikistan has access to USD 6 million from IDA, all of which is in grant form. The



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Government of Tajikistan has also indicated USD 1 million of in-kind counterpart funding for the program. The Government has clearly expressed an interest in adding PCCR financing for this operation to further increase its scope and associated climate resilience focus and impacts. The overarching project (now under preparation) which the PPCR resources will leverage is the Central Asia Hydrometeorology Modernization Program (CAHMP; P120788) now in the final stages of preparation.

### **Section Two: Development and specific objectives**

The main objective of the overall project is to strengthen the hydromet service delivery in Tajikistan in support of economic development and disaster risk management and climate change

The **specific objective of PPCR support** is to strengthen Tajikhydromet's capacity to contribute to climate resilience through improved data collection, analysis, and information sharing with end-users.

The proposed PPCR support would be **transformational** at national, regional and local levels. There is a growing need for better quality of weather, water and climate information particularly for early warning, support of disaster reduction strategies and improvement of operations in such sectors as agriculture, transport, water resources management, hydropower generation and public health. The proposed TJHMP will focus on providing technical assistance and equipment to help build the capacity of Tajikhydromet to deliver basic weather, climate, and hydrological services to its end-users.

Support from TJHMP includes refurbishing and developing observation, communication, and forecasting systems, as well as improving the delivery of services. A critical investment is building the capacity and capabilities of the workforce of Tajikhydromet to produce and deliver the level of weather, climate and hydrological services expected by their users. In addition to national-level activities, the Tajikhydromet will be able to participate in regional cooperation activities with other Central Asian hydromet services to improve the effectiveness of its services. The country also will be able to comply with World Meteorological Organization (WMO) requirements for obtaining, processing and disseminating main types of hydrometeorological data and development of forecasts.

This component is closely coordinated with other PPCR components to prevent overlap and take advantage of synergies. The proposed Climate Science and Impact Modelling Partnership aims at improving and sharing the scientific bases and aspects of several technical climate fields, rather than improvement of basic weather and data acquisition with consequent service delivery as is the case with this component. Nevertheless, as Tajikhydromet will have an important role in both, data outputs and capacity building will be harmonized. Similarly the component dealing with Building Climate Resilience in the Pyanj River Basins may require additional water monitoring stations over and above the national system (and pilot areas noted in this template) to more fully characterize basin hydrology. Project implementers will ensure there are close links in terms of instrumentation, telemetry, data analysis and other aspects to ensure complimentary results and avoid duplication. The component dealing with Enhancing the Climate Resilience of the Energy Sector also outlines a need for Tajikhydromet to be included in the planning of hydropower investments given the importance of reliable hydromet data.

### **Section Three: Key indicators and baseline**

#### ***Indicators:***

- More reliable weather, hydrological and climate forecasts, directly contributing to Tajikistan's economic development, particularly in disaster reduction, agricultural, water resources management, energy/hydropower sectors and public health;
- More substantive hydrological and meteorological data for input to climate change studies;



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- Better quality and more variable information products presented in a user friendly, client-oriented format;
- Better client satisfaction (special matrix of outcomes/outputs will be delivered based on background surveys and/or assessments);
- Improvement of regional data and information exchange, particularly on hazards.

### **Baseline and Project Area:**

While main activities of the projects will be concentrated at the national level by strengthening TajikHydromet forecasting and data management centers, the outputs of the project will be disseminated to all country and will contribute to improvement of hydromet services at all levels. In the process of project preparation it is planned to select several pilot areas and/or river basins where improvement of weather, climate and hydrological services for main sectors (disaster reduction, agriculture, water resources management, hydro power) will be initially tested. Results will be disseminated to the whole country.

### **Section Four: Anticipated components and activities (including learning and knowledge management activities)**

#### **A. Institutional strengthening of the National Meteorological and Hydrological Service (NMHS or Tajikhydromet), improving personnel and financial sustainability of the NMHS**

- Technical design of the system of hydrometeorological monitoring
- Institutional strengthening
- Improving personnel and financial sustainability of the NMHS

#### **B. Improving the hydrometeorological monitoring system to provide timely warnings on dangerous hydrometeorological events and support water resource management**

- Re-equipment of the observation networks
- Strengthening of the information-technology base of the service

#### **C. Strengthening of the service delivery system**

- Improving the system of provision of hydro-meteorological services for consumers
- Improvement of the forecasting, warning, operational response and early warning system of the Committee for Emergency Situations

#### **D. Project Management**

- Technical, financial and administrative management

### **Section Five: Risks**

There are three main areas of risk, to program implementation sustainability, and coordination, summarized below:

Risks	Mitigation Measures
<b>A. Program Implementation</b>	
The ability of Tajikhydromet to exploit the new capabilities provided by the program is limited.	Implementing demonstration projects prior to full scale modernization to demonstrate the value of new services to Tajikhydromet will speed up acquisition of national capacity
The capacity of Tajikhydromet to absorb the national program is limited.	A key mitigation measure is intensive training of Tajikhydromet's staff, some of which will be done during project preparation; introduction of specialized technical support by hiring general consultant or integrator complemented by individual consultants.



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<b>B. Sustainability</b>	
The investments associated with this program will lead to higher operations and maintenance costs.	Those types of investments, for which incremental operating costs will not be available, may have to be postponed or replaced by lower cost alternatives, where feasible.
Beyond initial investments, commitment from the Government of Tajikistan (GoT) to increase operating costs for Tajikhydromet may be required. In some cases, GoT may be unwilling or unable to finance such increments to operating costs.	New business models will be developed, tested and implemented during the program implementation to assist Tajikhydromet recover costs for services delivered. Tajik MOF indicated that it will consider an increase of the Tajikhydromet operational budget
<b>C. Coordination</b>	
Coordination and different implementation schedules, which depend on IDA and PPCR funding, may result in poor integration of the national modernization program.	World Bank management of the different financial elements. Appropriate implementation support mechanisms will be developed as part of detailed project preparation.

### **Section Six: Investment Costing (PPCR; co-financing and counterpart finance**

Component	PPCR support (USD million)	IDA (USD million) <sup>20</sup>	Beneficiary Contribution (USD million)	Project total (USD million) <sup>21</sup>
A. Institutional Strengthening of Tajikhydromet	1.00	0.75	0.2	1.95
B. Hydrometeorological Monitoring	4.50	4.60	0.5	9.60
C. Service Delivery	0.90	0.35	0.2	1.45
D. Project Management	0.60	0.3	0.1	1.0
<b>Total</b>	7.00	6.00	1.0	14.0

**Bank administrative budget requirements:** World Bank administrative costs for the addition of PPCR financed support total \$400,000; including \$100,000 for project preparation and \$300,000 for project implementation support over the implementation period. These fees would be matched by Bank supplemental funding as determined by Country Unit annual allocations.

### **Section Seven: Results and Performance framework**

**PPCR objective:** To strengthen Tajikhydromet's capacity to contribute to climate resilience through improved data collection, analysis, and information sharing with end-users.

**Overall project development objective and global environmental objective:** The main objective of the TJHMP is to strengthen the hydromet service delivery in Tajikistan in support of economic development and disaster risk management.

<sup>20</sup> Proposed levels, subject to confirmation.

<sup>21</sup> Based on proposed levels of external financing.



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<b>Outcome Indicators</b>	<b>Baseline (Pre-project)</b>	<b>Incremental Results Associated with Additional PCCR Financing<sup>22</sup></b>	<b>Total Proposed Project with IDA and PCCR Financing</b>
1. Increase of accuracy and lead time of medium-range (3-7day) weather forecasts	Accuracy of medium-range range forecasts is 60%	TBCA	At least 80% accuracy for medium range forecasts
2. Increase of accuracy and lead time of long-term hydrological forecasts (for vegetation period)	Accuracy of long-term hydrological forecast is 62%	TBCA	At least 75% accuracy for long-term hydrological forecasts
3. The volume of data sent/received at TJ Hydromet from all sources rises	25 Mbytes/10 Mbytes sent/received daily	TBCA	500 Mbytes/50 Mbytes sent/received daily
4. Increase a number of hydrological stations used of operational needs	25% of total number of hydrological stations	TBCA	90% of total number of hydrological stations
5. Increase a number of hydrological stations measuring discharge	Less than 50%	TBCA	90% of total number of hydrological stations
6. Increase of agricultural area covered by agrometeorological observations	25,000 ha or 5% of total cultivated agricultural land	TBCA	150,000 ha or 30% of cultivated agricultural land
7. Increase of area covered by snow surveys	5,000 km <sup>2</sup> or 20% of necessary area	TBCA	18,000 km <sup>2</sup> or 70% of necessary area

<sup>22</sup> Targets levels will depend on amount of financing.





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<b>Intermediate Indicators</b>	<b>Incremental Results Associated with Additional PCCR Financing</b>	<b>Total Proposed Project with IDA and PCCR Financing</b>
Component A: Institutional Strengthening of Tajikhydromet.	TBCA	TBCA
Component B: Hydrometeorological Monitoring	TBCA	TBCA
Component C: Service Delivery	TBCA	TBCA



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<b>Title</b>	<b>Climate Science and Modelling Programme</b>
<b>Government Contact</b>	Makhmad Safarov, Director, State Organization on Hydrometeorology
<b>MDB contact</b>	Asian Development Bank Peter Hayes, Senior Climate Change Specialist, CWRD
<b>Objective of the proposed activity</b>	Increase resilience to climate change by strengthening national capacity of the Hydromet and PPCR stakeholders to produce, analyse and apply climate science and downscaled climate impact projections toward formulation of sector-based climate science for investment resilience.
<b>Key dates</b>	October 2011: Full project documentation prepared and informed by Phase 1 analyses FY 2012: Phase 2 Implementation commences
<b>Expected duration</b>	3 years (2011-2014)
<b>Environmental and social risks</b>	Given nature of work, negligible risk (Category C)
<b>Estimated Level of Funding</b>	<b>USD 3.0 million from PPCR</b>
<b>Administrative costs for MDB</b>	<b>\$300,000</b>

**Section One: Background**

Tajikistan’s scientific and hydromet institutions have very limited capacity to conduct basic climate projections and climate change impact assessments. Limited scientific knowledge and technical capacity in-country hinders the Government’s and civil society’s ability to adequately understand the expected risks that climate change poses to critical natural and engineered infrastructure and vulnerable populations, and to national poverty reduction objectives.

Current global circulation model impact projections have limited use value for Tajikistan because of coarse grid resolution. Key river basins, such as the Pyanj, Vakhsh, Amu Darya, or Sir Darya are vulnerable to glacial melt and extreme events. Snow pack and glaciers comprise the major source of water supply for all water-dependent sectors in Tajikistan. For example, over 90% of energy generation in Tajikistan is supplied by glacier-fed hydropower plants. Agricultural irrigation comprises the major consumptive use of water. Glacial melt is of critical importance to downstream riparian communities, and essential for the economies of neighbouring countries.

In this context, there are major gaps in monitoring snow pack and glacial retreat. There is also deficiency in understanding the geomorphic stability of local glacial lakes, and sub-regional glacial dynamics. The inability to produce national climate impact scenarios and risk assessments severely compromises Tajikistan’s capacity to adapt to and prepare for climate hazards.

The Phase I activity A2 ‘Climate Science and Impact Modelling Partnership’ will produce an assessment of Hydromet (and other associated institutions) capacity and identify opportunities for institutional strengthening and capacity building for climate science. It will help formulate appropriate medium-resolution downscaled impact scenarios (statistical downscaling). Phase I will see formulation of no-regrets, and impact model-based adaptation



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projections to inform PPCR investments at the national, sub-regional, project, and community level. Because Phase 2 dynamical downscaling will take some time to produce, Phase 1 statistical downscaling outputs will complement interim no regrets adaptation measures.

Phase 2 investment on climate science and modelling will build upon Phase 1's recommendations on how to address the Hydromet's overall capacity needs to produce dynamical downscaled climate and impact projections, and formulate, interpret, disseminate and promote climate science and applied risk management research for multiple sectors and sub-regions/eco-systems at risk in Tajikistan.

### **Section Two: Development and specific objectives**

The primary aim is to build in-country capacity to conduct climate science and glaciology research, develop climate change models and interpret the outputs from those models to provide policymakers and sector specialists with the data they need to plan for climate change. The government of Tajikistan has already developed a state programme aimed at monitoring glaciers in Tajikistan. Phase 2 will build upon this national programme. Furthermore, statistical downscaled modelling work during Phase 1 and dynamical downscaled modelling in Phase 2 will help to assess impact risks in all PPCR sectors/activities. For example, dynamical downscaling technology is useful for the land degradation component of PPCR, to quantify how land degradation will change the water balances and hydrologic extremes. In addition, modelling work will help to assess impact risks at the river basin level (i.e., Pyanj) to determine hydro-climatic data for downscaled modelling re flood forecasting and water resource planning and risk management. This will also help to assess irrigation infrastructure risk and resilience measures. The energy sector will particularly benefit from impact projections relating to upstream glacial melt and changes in downstream water coursing, and changes in river basin siltation and sedimentation behaviour.

Specific objectives include:

- Establish dynamic downscaled modelling capacity within Hydromet to ensure the development of high resolution climate projections and impact scenarios and practical scientific knowledge to mainstream vulnerability and adaptation measures in national and sub-national development plans and projects. This will include the establishment of a dedicated computer lab to run the models, which will continue to be used for climate modelling and as a training facility;
- Based on the findings of the Phase 1 assessment on climate science and modelling capacity, strengthen climate science and glaciology research in Tajikistan to enhance the understanding of glacial melt and downstream impacts on water resources, and glacier-dependent infrastructure. This will be done in collaboration with relevant institutions in the country, such as the National University of Tajikistan, as well as climate and glaciology centres in the region, including ICIMOD, reputed European centres of excellence on glacial melt, and the planned glaciology centre in Kazakhstan;
- Develop capacity to analyse and interpret output from climate models and science. This will include training of local experts (Hydromet, experts from academia, line ministries, NGOs, vulnerable communities) on climate impact modelling and applied risk management science, including study tours, field vulnerability assessment, exchange of scientists from international centres of excellence. It would also include building capacity in Tajik universities and other educational institutions to strengthen climate science, meteorology and glaciology education in the country;
- Mainstream climate modelling outputs in development planning and capital investment decisions. This would include working with line ministries, policy and decision makers at the national and sub-national level to enable the introduction of climate resilient strategies and measures in agriculture, transport, water resources management, hydropower generation and public health and in vulnerable communities.

### **Section Three: Key indicators and baseline**



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### Indicators:

1. Downscaled modeling facility established
2. Downscaled climate projections and impact scenarios developed
3. Training of local experts carried out
4. Successful mainstreaming of climate modeling analyses in government strategies, sector-based investments and development plans

### Baseline and Project Area:

The State Agency for Hydrometeorology has limited capacity to formulate downscaled climate and impact projections.

Currently, no government institutions are able to rely upon high resolution impact models to inform risk management practices. This includes the inability to assess the upstream glacial melt and downstream impacts on vulnerable communities, ecosystems and infrastructure.

### Section Four: Anticipated components and activities (including learning and knowledge management activities)

#### 1. Hydromet Downscaled Modelling Capacity, Interpretative Climate Science, and Adaptation Mainstreaming

- Establish the facility within Hydromet to ensure high resolution trend reliable impact projections, including installation of minimum 80 CPU capacity to conduct computer realisations;
- Phase I will inform the need to develop dynamical downscaling of 10 GCM climate change projections for the 2010 - 2100 period (this will correspond to 900 years of future projections and 90 years of historical control simulations). Modelling will utilize 3 different GCMs with 4 different scenarios (A1B, B1, A2 and A1FI) to cover the whole spectrum of emission scenarios and provide a comprehensive picture on the future behaviour of climate over the target-basin region, and other key regions/sectors;
- Downscaling of GCM/RCM projections to 9 km grid resolution to render realistic results. Climate inputs (precipitation, temperature, radiation and wind) will be used in the modelling of glacial and watershed hydrologic processes at finer resolution with a watershed hydrology model. This data will be layered with land use data, soil conditions data, evapotranspiration data, and social data on livelihoods, vulnerability and economic demographics, to generate a more integrated impact model;
- Based on the outcome of Phase 1 activity A2, implement measures to strengthen Tajikistan' capacity to carry out climate science and glaciology research, working in partnership with relevant institutions in the country, in the region and elsewhere;
- Digitization of hard copy historical hydro-meteorological data;
- Formulation of model-based climate impact science to inform sector-based policy-makers and practitioners about appropriate adaptation measures in investment plans and operations.

#### 2. National Training Programme on Downscaled Modelling and Climate Science for Local Experts & PPCR Stakeholders

- Local technical experts will be trained to run the installed local computing centre system. The "Capacity building" component of this project will have a number of Tajik technical experts (Hydromet, Line Ministries, Jamat officials, community leaders, and key NGOs) receive on-the-job training in climate science, glaciology, climate modelling and impact projections, and integration of climate risk management practices in investment activities;
- Modelling software will be installed within the local computing centre, and staff will be trained to run the installed system;



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- Multi-stakeholder training courses, domestic and international study tours, field vulnerability assessment, and exchange of scientists from international centres of excellence will be carried out;
- 3. Mainstreaming Impact Projections, Climate Science, and Adaptation Measures for Multiple End-Users**
- Introduction of climate resilient strategies and measures in agriculture, transport, water resources management, hydropower generation and public health and in vulnerable communities;
  - Development of knowledge management products, including summary of climate projections and impacts scenarios for policy makers, dissemination events on climate vulnerability of fragile mountainous ecosystems and contribution to Phase 2 awareness raising activities.

### **Section Five: Risks**

Risks	Mitigation Measures
Availability of relevant historical hydro-meteorological data	Acquisition and compilation of relevant hydromet data (combination of historical, satellite telemetry, GCMs/RCMs, met data )
Shortage of, and retention of trained experts	Additional professional development incentives
Limited ability of ministries policy makers and practitioners to mainstream climate projections in their policies and operations	Awareness raising through PPCR secretariat and dedicated PPCR awareness raising activities
Sustainability of investment	Leveraging cofinancing Sale of climate projections datasets and other risk management knowledge products

### **Section Six: Investment Costing (notional allocation – PPCR and cop-finance including counterpart finance)**

The estimates reported below are indicative. Detailed costing will be developed on the basis of the outcomes of Phase 1 activity A2

Component	PPCR support (USD million)	IDA (USD million)	Beneficiary Contribution (USD million)	Project total (USD million)
Hydromet Downscaled Modelling Capacity, Interpretative Climate Science, and Adaptation Mainstreaming	1,000,000	N/A	N/A	1,000,000
National Training Programme on Downscaled Modelling and Climate Impact Science for Local Experts and PPCR Stakeholders	1,000,000	N/A	N/A	1,000,000
Mainstreaming Impact	1,000,000	N/A	N/A	1,000,000

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Projections, Climate Science, and Adaptation Measures for multiple end-Users				
<b>Total</b>	3,000,000			3,000,000

**Section Seven: Results and Performance framework**

<b>Outcome Indicators</b>	<b>Baseline (Pre-project)</b>	<b>Proposed Project Results</b>
Climate science and research enhanced	Findings and recommendations of Phase 1 activity A2	Improved ability of Tajikistan’s educational institutions and Hydromet to carry out climate science and glaciology research
Functional Downscaled Modelling Facility	Findings and recommendations of Phase 1 activity A2	Established, equipped and staffed
Dynamical downscaled carried out	Phase 1 A2 outcomes	Improved evidence base on climate change in Tajikistan
Impacts scenarios developed for priority sectors and regions	Phase 1 A2 outcomes	Improved understanding of the impacts of climate change on communities, ecosystems and infrastructure
Climate projections and impacts scenarios mainstreamed in national, sub-national and sector-based policy and development plans	Phase 1 outcomes	<ul style="list-style-type: none"> <li>- Government better able to mainstream climate change in national and subnational development plans</li> <li>- Knowledge products developed and disseminated</li> <li>- Tajikistan’s experience and lessons shared with other mountainous developing countries</li> </ul>
Training	Phase 1 A1, A2 and A3 outcomes	Training conducted



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<b>Title</b>	<b>Enhancing the Climate Resilience of the Energy Sector</b>
<b>Government Contact</b>	Abdullo Yorov, Chairman, Barki Tojik (state power utility under the Ministry of Energy and Industry)
<b>MDB contact</b>	Craig Davies (EBRD)
<b>Objective of the proposed activity</b>	Piloting the integration of climate change analysis and climate resilience measures into hydropower investments
<b>Expected duration</b>	2011 - 2014
<b>Key dates (indicative)</b>	Launch of ESIA & Feasibility Study: January 2011 Negotiation of loan agreement: spring – summer 2011 Finalisation of project design: summer 2011 EBRD Board decision: autumn 2011 Implementation: end 2011 onwards
<b>Environmental and social risks</b>	Expected to be classified as Category A under EBRD's Environmental and Social Policy and therefore subject to a full Environmental and Social Impact Assessment (ESIA)
<b>Estimated Level of funding (tentative)</b>	<b>USD 10 million grant (PPCR)</b> <i>USD 30 million loan (EBRD)</i> <i>USD 15 million loan (EIB)</i> <i>EUR 15 million grant (EU Investment Fund for Central Asia)</i> <u>Total project size: USD 75 million</u>
<b>Administrative costs for PPCR support</b>	USD 350,000

**Section One: Background**

Energy security is critical for Tajikistan's development and poverty reduction. This is spelled out in detail in Tajikistan's Poverty Reduction Strategy, which stresses the importance of increasing the availability of affordable energy to Tajikistan's population, and using Tajikistan's impressive energy resources as a platform for economic growth and development. Tajikistan is endowed with abundant hydropower resources, which provides around 98% of the country's electricity. Despite its small territory, the country boasts the eighth largest hydropower potential in the world. Only a small fraction (4.08 GW) of the total hydropower potential of 40GW has been tapped. This potential is larger than that of any other country in Central Asia. Despite this, Tajikistan is a net importer of electricity as a consequence of years of underinvestment, both in new generation capacity and rehabilitation of existing capacity. Regional tensions over water and energy resources affect the certainty of energy imports from neighbouring countries and pose a serious threat to energy security. This situation, exacerbated by the climate vulnerability of the hydropower sector, has negative consequences for economic activity and for the wider Tajik population, especially the poor and vulnerable. There are particular energy security challenges faced by rural and remote communities, which are often not connected to the electricity grid. As pointed out in the PRSP, harnessing Tajikistan's huge energy potential, in a way that is sustainable, equitable and climate resilient, is essential for Tajikistan's long-term development and poverty alleviation. Progress is critically important for the development of Tajikistan's economy, the development of the private sector, job creation, foreign investment, the generation of tax revenues to support better public services, and ultimately leading Tajikistan away from aid dependence towards self-sufficient development.



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Hydropower in Tajikistan needs to be considered in the context of the overall energy sector, including non-hydropower energy sources (e.g. fossil fuels, solar, wind and biomass), demand-side issues, and power transmission and distribution networks. A complementary study by the World Bank, planned to commence in Q2 2011, will cover the climate vulnerability of the energy sector overall, and its findings will guide the development and implementation of the activities described in this proposal. In the meantime, there is an overwhelming case for moving ahead with efforts to improve the climate resilience of the hydropower sector. Hydropower provides nearly all of Tajikistan's electricity, with only 2% coming from non-hydropower sources. Also, hydropower facilities play a critical role in water management and irrigation, with some facilities such as Kairakkum on the Syrdarya River having been constructed for irrigation as well as power generation.

Hydropower is extremely sensitive to climate change. As made clear in Tajikistan's Second National Communication to the UNFCCC, Tajikistan's hydropower plants (HPPs) are highly vulnerable to the projected impacts of climate change as they depend upon river basins fed by glacial meltwater and snowmelt. Most climate models predict significant changes in the dynamics of Tajik glaciers, snowmelt and precipitation as the climate warms in the coming decades. Significant increases in the next few decades from enhanced glacial melting and melting of accumulated snow are expected to be followed by drastic reductions in supplies as the mass of glacial ice and accumulated snow shrinks. The International Commission on Large Dams (ICOLD) has already emphasised the urgent need to adapt older dams, especially their spillway capacities, to cope with the new climate conditions.

In order to safeguard Tajikistan's development, it is absolutely essential that Tajikistan's hydropower resources be developed in a way that is resilient to climate change. The vulnerability of hydropower to climate change is exacerbated by the fact that the physical infrastructure has been weakened by low maintenance and investment owing to the civil war, natural disasters, resource constraints and poor management. Power generation has declined in recent years due to operational difficulties in some critical large HPPs and a lack of resources for repairs and rehabilitation. As a result, there is a significant energy deficit (especially in winter) due to the unreliable electricity supply. In the winter of 2007/08, the Tajik hydropower system faced major shortfalls in winter generation due to insufficient water reserves in major HPPs, resulting in severe economic losses and extreme hardship for thousands of households. Furthermore, Tajikistan's HPPs were designed during the 1950s and 1960s, when anthropogenic climate change was not understood, and are consequently poorly placed to cope with its impacts. Since then, increases in mean and extreme temperatures have been observed and the waters stored in the glaciers of Central Asia are estimated to have shrunk by 25% - and they are projected to shrink by a further 25% over the next 20 years. HPPs were designed without consideration of these impacts and measures to cope with them were not built into their design. Furthermore, the ability of hydropower dams to cope with climate-related extreme events such as floods and mudslides has serious safety and environmental implications for downstream communities. Special consideration may be required to address the energy needs of remote and rural communities that are not connected to the main electricity grid. In these cases, small-scale HPPs may have a significant role to play in improving access to energy. However, the climate vulnerability of small-scale HPPs is poorly understood and there is very little hydrological data on small water courses where small-scale HPPs tend to be located. It is anticipated that the associated PPCR Phase 2 activities *Improvement of the Weather, Climate and Hydrological Service Delivery* led by the World Bank, and the *Climate Science and Modelling Programme* led by ADB may help to fill these data gaps in the longer-term.

Phase I of the PPCR is already improving understanding of the vulnerability of the hydropower sector to climate change through the EBRD-managed activity A4 *Identifying options for enhancing the climate resilience of Tajikistan's energy sector*. The objective of this activity is to analyse the climate vulnerability of Tajikistan's hydropower sector, and to provide recommendations on how this analysis can be used in investment planning (including the use of PPCR Phase 2 resources) to lead to a more climate-resilient hydropower sector. This activity commenced in September 2010, in cooperation with Barki Tojik (the state power





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utility) and Tajikhydromet, and its findings will be available in spring 2011. These will provide valuable input to the activities described in this proposal.

### **Section Two: Development and specific objectives**

In order to achieve a sustainable and climate-resilient hydropower sector, it is necessary to develop innovative approaches to integrating a thorough consideration of climate change impacts into hydropower investment planning. This proposal sets out how PPCR Phase 2 resources could be used to pilot the integration of climate analysis and climate resilience measures into HPP investments. This will build on the analysis being carried out under PPCR Phase I activity A4, and planned complementary work by the World Bank on the climate vulnerability of the energy sector overall.

This proposal has the following objectives:

- i) to demonstrate how climate analysis can inform project design and investment decisions in the hydropower sector to optimise climate resilience;
- ii) to provide concrete benefits in the form of a more reliable, sustainable and climate-resilient power supply that will improve energy security for Tajikistan as a whole and especially for the region, communities and industries that depend directly upon the pilot HPP for their energy supply, as well as improved safety for downstream communities;
- iii) to pilot a replicable approach that can provide valuable lessons for subsequent investments in HPP rehabilitation and construction that are expected to be financed in the coming years (and which may also provide useful lessons to other countries facing similar challenges);
- iv) to build the capacity of the Tajik authorities (specifically, Barki Tojik, Ministry of Energy & Industry, Tajikhydromet and others) to conduct climate change analysis as part of HPP investment planning and mainstream its findings into the design of projects in order to optimise the climate resilience of HPPs;
- v) to provide leverage on policy dialogue and reforms in areas that influence the climate resilience of the energy sector overall (e.g. transmission and distribution networks, electricity grid coverage, and the regulatory environment for investment in small-scale HPPs and other renewable energy sources);
- vi) to raise awareness of the need to consider climate change in investment planning in the hydropower sector, to demonstrate that action can be taken to understand and manage climate risks, and to generate demand for climate analysis from MDBs and other investors in future investments in the sector;
- vii) to provide important co-benefits in the form of improved water resource management systems (e.g. irrigation, regulation of rivers) that take into account climate projections, and capacity to withstand extreme climatic events (e.g. floods, mudslides etc.) that could threaten downstream communities – again providing lessons for future investments;
- viii) to launch a number of small-scale HPP pilot projects that incorporate climate analysis as part of their design.

This proposal is consistent with the scales of action identified in the main body of the SPCR: local, project-level, sector and national. The primary focus of this proposal (at project level) will be a pilot project to increase the climate resilience the Kairakkum HPP, which will undergo rehabilitation under EBRD financing. The secondary goal of the proposal (at sector level) is to provide a replicable 'best practice' model on incorporating adaptation concepts in the design and implementation of other investments in HPP rehabilitation in Tajikistan and elsewhere. In March 2010 the Government of Tajikistan formally requested EBRD to support the rehabilitation of Kairakkum HPP, and this investment is now being developed. The PPCR offers an excellent and timely opportunity to ensure that climate resilience is mainstreamed into this investment, building on the analytical work being carried out under PPCR Phase I. The allocation of a PPCR Phase 2 grant will enable climate analysis to be factored into project design, and additional climate-resilience features to be incorporated into HPP rehabilitation. It will achieve a key PPCR objective – leveraging additional investment – by facilitating much larger amounts of finance (estimated total \$75 million). Furthermore it will have a powerful demonstration impact and will provide a replicable 'best practice' model that will be particularly relevant to the other priority hydropower investments that MDBs and the



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Government of Tajikistan may consider in the coming years, including the rehabilitation of Nurek HPP, the construction of Rogun HPP and other rehabilitation investments in the Vakhsh cascade. All of these proposed investments, including Kairakkum, are in line with Tajikistan's PRSP, the Government's priority Public Investment Program and the Government Strategic Plan to improve the overall situation in the power sector.

In addition, provision will be made to support a number of pilot small-scale HPP projects that incorporate climate analysis, based on the outputs of the ongoing EBRD project "*Preparing Small-Scale Hydropower Projects for Private Sector Participation*". This support will be subject to two conditions. The first condition is Government approval of the proposed Regulatory Action Plan for small-scale HPPs that has been developed as part of the above project. The second is that these pilot projects must be implemented at sites where there is adequate and reliable meteorological and hydrological data that can be used in climate risk analysis, in order to minimise the risk of maladaptation.

### **Section Three: Key indicators and baseline**

#### ***Indicators***

- Identification of climate resilience features that form an integral part of the detailed technical design of the rehabilitation of Kairakkum HPP, and are practical and affordable within the available financing structure;
- Kairakkum dam able to better manage and regulate extreme flows/surges including extreme climatic events to ensure the safety of downstream communities and avoid environmental damage;
- Kairakkum HPP power generation capacity able to be maintained at optimal levels across a wider range of climate variability than at present;
- More reliable, efficient and climate-resilient energy supply in the Sughd region with quantifiable reductions in power outages and load shedding;
- Kairakkum HPP equipment able to operate optimally within a) the range of temperatures currently encountered and b) projected future temperature ranges (based on best available climate change models);
- Development of institutional capacity within Kairakkum HPP management to monitor changes in key climatic/hydrological parameters and adjust plant management accordingly;
- Development of capacity within Barki Tojik and Tajikhydromet to conduct climate change risk analysis and integrate climate resilience measures as part of investment planning in the hydropower sector;
- Generation of replicable lessons on the integration of climate risk analysis and climate resilience measures into hydropower investments that can be applied in other investments in the sector;
- The implementation of at least one pilot small-scale hydropower project that demonstrates how climate analysis can be built into this type of investment.

#### ***Baseline***

Kairakkum HPP is the only electricity generating facility in northern Tajikistan, with a total installed capacity of 126 MW. As well as hydropower generation, it also has an essential role in the regulation of the Syrdarya River, and therefore has a significant role in regional water management including irrigation and drinking water supplies. Built in 1956, the plant's equipment is now ageing and experiences frequent technical failures. Nominal generation capacity has significantly decreased. The Syrdarya river basin is fed by snowmelt and glaciers and its hydrology is therefore sensitive to climate change. The plant is now operating under altered climatic conditions compared to when it was constructed – there have been observed changes in mean and peak temperatures and reductions in glacial extent since then. Furthermore, Kairakkum HPP was built by the Soviets using the same design as Kamskaya HPP near Perm in the Ural Mountains (Russia), several thousand kilometres to the north. This meant that local conditions were not taken into account in its construction. There is evidence that this may include climatic conditions (including the differences in climate



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between Kamskaya and Kairakkum, as well as observed changes in local climate since the 1950s). For example, Kairakkum's turbines were designed for a maximum water temperature of 20°C, but they regularly have to operate at temperatures of up to 28°C, which has a negative impact on efficiency. Furthermore, insufficient consideration was given to the dam's capacity to cope with extreme events such as floods, and to the environmental issues associated with large dam. Spillway capacities are substantially under-designed; there is no bottom outlet for evacuating sediments and very limited spillway capacity which is currently reduced even further due to the lack of maintenance. Any planned rehabilitation that does not take into account future local climatic conditions will lead to maladaptation as the pace of climate change continues.

Lessons learned from the Kairakkum HPP pilot project will be disseminated to the whole country with the intention of providing lessons for future investments in the rehabilitation/construction of other HPPs. The PPCR Secretariat, to be established in the Executive Office of the President with support from ADB, will play an important role in facilitating the dissemination of these lessons. Investment in the country's hydropower sector is urgently needed, both for the rehabilitation of critical HPPs and the construction of new ones, in order to maintain Tajikistan's capacity to meet its current and future energy needs. This challenge is prioritised in the PRSP, which identifies the need for more than \$1.3 billion of investments in HPP rehabilitation and construction, including the rehabilitation of Kairakkum HPP, Nurek HPP, the Varzob cascade, and the Vakhsh cascade, the construction of Sangtuda-2 HPP and Rogun HPP, and a programme to construct eight small-scale HPPs. It is critically important for all of these investments to be made in a way that takes into account the projected impacts of climate change. Analytical work is needed in order to understand climate change impacts on HPP operations, generation capacity, and safety and environmental issues, and to pilot ways of mainstreaming climate resilience into investments in this critically important and highly climate-sensitive sector. The capacity of the Tajik authorities needs to be developed so that they can apply such approaches in the planning and implementation of HPP investments. At present, such analysis has not been carried out and the Tajik authorities have no capacity to perform it or to apply it in HPP investments.

### **Section Four: Anticipated components and activities (including learning and knowledge management activities)**

Project implementation (full investment incorporating PPCR enhancements for climate resilience) may entail the following components/activities, subject to development of the project concept over the coming months:

#### ***1. Feasibility study for Kairakkum HPP rehabilitation incorporating analysis of climate variability and projected climate change***

A detailed feasibility study will be carried out to scope out the project, identify and cost the investment needs and produce a priority investment plan for rehabilitation of the HPP. This will build upon an earlier feasibility study carried out for Barki Tojik by USTDA in 2007. The climate change analysis being carried out under Phase I activity A4 will be an important input to the feasibility study, which will build on this input and drill down to the next level of climate change analysis needed to inform specific decisions on the technical design of the investment, including the identification of specific climate resilience measures to be built into the rehabilitation of the HPP. The feasibility study may also benefit from inputs from the ADB-led Phase I and Phase 2 activities on climate science and modelling.

#### ***2. Environmental and Social Impact Assessment (ESIA) of Kairakkum HPP rehabilitation including assessment of future climate scenarios and their impacts***

The ESIA will be a crucial part of project preparation and will commence alongside (or even in advance of) the feasibility study. Climate analysis will again be a critical input into the ESIA, drawing upon Phase I activity A4 but going into more detail on how climate change may influence the environmental and social risks associated with the project, and providing recommendations on how these risks can be managed. A critically important part of the ESIA will be the development of a Stakeholder Engagement Plan that will set out a comprehensive



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process for consulting a wide range of stakeholders including neighbouring communities, the poor and vulnerable, and women (gender analysis will be an integral part of the Stakeholder Engagement Plan). Understanding stakeholder views on climate change impacts and measures to cope with them will be an important part of this process. The findings of the ESIA, together with the findings of the feasibility study, will determine the detailed design of the HPP rehabilitation.

#### **3. Kairakkum HPP rehabilitation: upgrading existing equipment taking into account climate variability and projected climate change**

Based on the findings of the feasibility study and the ESIA, HPP rehabilitation will focus on upgrading the hydro-mechanical and electro-mechanical equipment of six hydropower plant units at the Kairakkum HPP. The rehabilitation program will provide more reliability to the capacity of the plant. In addition, the project will increase plant installed capacity by replacing the outdated and worn-out hydraulic, electro-mechanical and hydro-mechanical equipment. The overall rationale is to:

- Extend the lifetime of the units so that that the HPP can continue to generate electricity efficiently and safely in the face of projected climate change;
- Improve the environmental impact, reliability and operation costs of the HPP by installing new state-of-the-art generation equipment (turbines, generators) and transmission equipment (switchyard);
- Optimise the use of water resources by increasing efficiency of the units;
- Reinforce the safety of the HPP by rehabilitating the plant gates.

#### **4. Kairakkum HPP rehabilitation: integration of specific climate resilience measures**

Climate change resilience will be mainstreamed into the rehabilitation of the HPP by financing specific climate resilience measures. Although the precise nature of these measures will depend upon the findings of the Phase I climate change analysis, the feasibility study and the ESIA, it is envisaged that they could include:

- Modification of installed capacity in the light of projected changes to river inflows and other climatic variables such as temperature over the lifespan of the facility;
- Modifications to spillway capacity to ensure the safe operation of the facility and the safety of downstream communities in the face of extreme climatic events such as floods;
- Measures to address sedimentation in the light of altered hydrology due to climate change;
- Measures to address changing risks of extreme events that may impact on HPP operations such as landslides, mudflows, etc.

#### **5. Institutional measures to promote climate resilience**

Hydropower climate resilience measures may be institutional in nature, as well as physical. This may include, for example, improved monitoring systems at Kairakkum HPP (and other HPPs) to track changes in key climate or hydrological parameters and adjust plant management accordingly. It may also include modifications to the regulatory environment for the hydropower sector. Phase I A4 will provide recommendations in this area that will be developed further during project design. Coordination with other PPCR activities, such as *Improvement of the Weather, Climate and Hydrological Service Delivery* led by the World Bank, and *Climate Science and Modelling Programme* led by ADB will be essential. This will be facilitated by the PPCR Secretariat in the Executive Office of the President, to be established with support from ADB.

#### **6. Small-scale hydropower pilot projects incorporating climate change analysis**

Additional support may also be provided for a number of pilot small-scale HPP projects that incorporate climate analysis, subject to two conditions being met in advance. The first condition is Government approval of the proposed Regulatory Action Plan for small-scale HPPs that has been developed as part of the EBRD/SECO project on “*Preparing Small-Scale Hydropower Projects for Private Sector Participation*”. This is required to ensure that the investments are institutionally and financially sustainable. The second is that these pilot projects must be implemented at sites where there is adequate and reliable meteorological and hydrological data that can be used in climate risk analysis, in order to eliminate the risk of maladaptation.



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### 7. Lesson learning and knowledge management

Provision will be made for lesson learning in the form of a dedicated activity that will enable lessons from this project to be gathered in a way that will be useful to future investments in the sector in Tajikistan and in other countries facing similar challenges.

#### **Section Five: Risks**

The main areas of risk are summarised below, together with the proposed risk mitigation measures:

Nature of risk	Proposed mitigation measures
<p><b>Data availability risks</b></p> <p>Reliable meteorological and hydrological data are essential for robust climate risk analysis to be carried out as part of HPP investment planning, yet the breakdown of the national and regional systems for acquiring and utilizing such data means an uncertainty on basic design parameters. This further constrains understanding of future hydrology given climate change impacts.</p>	<p>Preliminary work under Phase I activity A4 indicates that adequate amounts of reliable data may be available via Tajikhydromet, especially for river systems where major hydropower facilities are located as data has been collected in such sites for decades. It will also be possible to access transboundary data for major river basins such as the Syrdarya through regional mechanisms such as the SIC-ICWC<sup>23</sup>. Data availability will be a challenge for small-scale HPPs as there may be very little reliable data available on small rivers, limiting the scope for reliable predictive climate analysis.</p>
<p><b>Investment climate risks</b></p> <p>In order to achieve maximum impact, leverage and replicability, PPCR resources should be deployed to support activities where the investment climate is favourable for pilot investment projects to proceed within a reasonable time horizon and be followed by subsequent investments that can benefit from lessons learned.</p>	<p>Several MDBs are seriously considering investments in medium and large HPPs in the next few years, in line with the priorities set out in Tajikistan's PRSP. EBRD is already preparing to invest in the rehabilitation of Kairakkum HPP. WB is considering financing the feasibility study and ESIA for the construction of Rogun and may consider financing the rehabilitation of Nurek HPP. Current work by EBRD indicates that further regulatory reforms are needed before investment in small-scale HPPs can be scaled up sustainably.</p>
<p><b>Technical feasibility risks</b></p> <p>The additional climate resilience measures to be developed during the pilot project must be realistic, achievable, deliver measurable benefits and be affordable within the financing framework of the overall project.</p>	<p>The climate risk analysis being carried out during Phase I activity A4 will be fed into the feasibility study to be carried out during project preparation. This will mean that each of the potential climate resilience measures identified by A4 will be subjected to detailed technical and cost-benefit analysis as part of the feasibility study.</p>
<p><b>Environmental and social risks</b></p> <p>Hydropower dams entail significant environmental and social risks, such as safety concerns for downstream communities, access to water for different groups (farmers, local communities) for</p>	<p>All significant EBRD hydropower dam projects are under EBRD's Environmental and Social Policy and are therefore subject to a full Environmental and Social Impact Assessment (ESIA) that will assess environmental and social risks and identify appropriate mitigation</p>

<sup>23</sup> Scientific Information Centre – Interstate Commission for Water Coordination



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different purposes (irrigation, drinking water), and environmental impacts such as water pollution and potential damage to river ecosystems – all of which may be exacerbated by climate change.	measures. This will include a comprehensive Stakeholder Engagement Plan (SEP) to ensure that the voices of affected communities/people are heard. An assessment of climate change risks (building on Phase I A4) will feed into the ESIA and SEP.
<p><b>Corporate governance risks</b></p> <p>HPPs in Tajikistan are operated by Barki Tojik (BT), which is a state-owned company operating in a very sensitive sector and subject to political influences. BT and the energy sector overall are likely to experience significant delays to effective reorganisation.</p>	<p>ADB is presently negotiating a Restructuring Plan aiming at improving BT's corporate governance to make it commercially viable. EBRD will work with the government to strengthen BT's management and operations with the view of making the company commercially and operationally independent. EBRD will work with BT and the regulatory authorities to establish an appropriate mechanism for implementation of the reorganisation plan. EBRD will also work with other MDBs to ensure that BT completes implementation of its financial management improvement programme.</p>
<p><b>Financial risks</b></p> <p>The ability of BT to repay the loan components of the project will be affected by retail tariff increases insufficient to cover operating costs and financial obligations.</p>	<p>EBRD will work together with other IFIs on the implementation of full cost recovery tariffs for electricity, and will negotiate a Sovereign Guarantee to cover the project.</p>
<p><b>Implementation risks</b></p> <p>Risks may include cost overruns, delays in procurement and failure to achieve expected technical outcomes.</p>	<p>EBRD has experience in working with clients facing similar challenges (e.g. in Albania, Georgia) and of putting in place tight supervision international consulting teams.</p>
<p><b>Coordination risks</b></p> <p>It will be important for this PPCR activity to be closely coordinated with other PPCR activities, especially <i>Improvement of the Weather, Climate and Hydrological Service Delivery</i> led by the World Bank, and <i>Climate Science and Modelling Programme</i> led by ADB</p>	<p>This close coordination will be provided by the PPCR Secretariat to be established in the Executive Office of the President with support from ADB.</p>
<p><b>Co-financing risks</b></p> <p>The project financing involves contributions (loans and grants) from different sources that will need to be coordinated to ensure that the finance is committed in a timely manner.</p>	<p>Discussions are already advanced with the other co-financing sources – EBRD (loan), EIB (loan) and EC (grant) – and the potential co-finance has been identified. The approval of the PPCR grant will make the loan elements easier to obtain as IMF conditionality means that public lending to Tajikistan must have a sizeable grant component.</p>

**Section Six: Indicative investment Costing (notional allocation – PPCR and co-finance including counterpart finance)**

**Proposed PPCR contribution:** \$10 million (grant).

**Other co-financing (tentative):** EBRD (\$30 million loan), EIB (\$15 million loan), EU (€15 million, - \$20 million equivalent)

**Total project size (provisional):** \$75 million



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Component	PPCR support (\$) - indicative	Other support (\$) - indicative	Project total - indicative
Feasibility study (pre loan signing)	250,000 (climate change component)	750,000	1,000,000
ESIA (pre loan signing)	250,000 (climate change component)	250,000	500,000
CAPEX: upgrading of HPP equipment	0	63, 000,000	63,000,000
CAPEX: additional climate resilience features	8,850,000	0	8,850,000
Institutional improvements for climate resilience	100,000	0	100,000
Project Implementation Unit support	0	1,000,000	1,000,000
Pilot small-scale HPP projects (incorporating climate analysis)	500,000	N/A	500,000
Lesson learning and knowledge management	50,000	0	50,000
<b>Total</b>	<b>10,000,000</b>	<b>65,000,000</b>	<b>75,000,000</b>

The allocation of a PPCR grant will leverage significantly more investment. Tajikistan is subject to limitations on the amount of public borrowing and the provision of additional grant resources will allow the loan component to be increased. This means that with PPCR support, total project size is anticipated to be \$75 million, provisionally consisting of a loan of approximately \$30 million loan from the EBRD, a loan of approximately \$15 million loan from the EIB, a grant of up to €15 million from the EU Investment Fund for Central Asia (equivalent to \$20 million), and a \$10 million grant from the PPCR.

EBRD administrative costs for managing the PPCR support will total \$350,000 over the project period.

### **Section Seven: Results and performance framework**

Outcome Indicators	Baseline (Pre-project)	Proposed Project Results
Integration of climate change resilience features into project design	Climate change resilience measures are not considered during the design of hydropower investments	Identification of practical and achievable climate resilience features that form an integral part of the detailed technical design of the rehabilitation of Kairakkum HPP and are affordable within the available financing structure
Kairakkum HPP power generation to be resilient to climatic variation	Generation has declined in recent years due to operational difficulties on and a lack of resources for repairs and rehabilitation	Generation capacity able to be maintained at optimal levels across a wider range of climate variability than at present
More reliable energy supply to the region served by Kairakkum HPP	The Sughd region currently suffers frequent power outages and load shedding (especially during winter) which inhibits economic activity	More reliable and climate-resilient energy supply in the Sughd region with quantifiable reductions in power outages and load shedding



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<b>Outcome Indicators</b>	<b>Baseline (Pre-project)</b>	<b>Proposed Project Results</b>
Kairakkum HPP equipment able to cope with current and projected future temperature extremes	Some equipment at was designed for a maximum water temperature of 20°C, but regularly has to operate at temperatures of up to 28°C, which has a negative impact on efficiency	Equipment able to operate optimally within a) the range of temperatures currently encountered and b) projected future temperature ranges within the lifespan of the facility
Ability of Kairakkum HPP to cope with extreme climatic events	Limited ability to cope with extreme climatic events such as floods as several of the spillway gates are not functional	Dam able to manage and regulate extreme flows/surges including extreme climatic events and ensure the safety of downstream communities and avoid environmental damage
Institutional capacity at Kairakkum HPP to manage climate risks	No capacity currently exists to manage climate risks other than basic hydrological monitoring	Development of institutional capacity to monitor changes in key climatic/hydrological parameters and adjust plant management accordingly
Capacity within Barki Tojik and Tajikhydromet to build climate resilience into hydropower investment planning	No capacity currently exists to consider climate change as part of investment planning	Development of capacity to conduct climate change risk analysis and integrate climate resilience measures as part of investment planning in the hydropower sector
Lessons learned for future investments	No replicable lessons on climate change and hydropower investment currently exist	Generation of replicable lessons on the integration of climate risk analysis and climate resilience measures into hydropower investments that can be applied in other investments in the sector
Integration of climate change considerations into small-scale HPP projects	Climate change impacts are not usually considered in the planning and design of small-scale HPP projects	The implementation of at least one pilot project that demonstrates how climate analysis can be built into this type of investment





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<b>Title</b>	<b>Agriculture and Sustainable Land Management</b>
<b>Government Contact</b>	Ministry of Agriculture and/or Ministry of Land Reclamation and Water Resources/ Committee of environment protection ; others possible
<b>MDB contact</b>	World Bank – Simon Croxton <a href="mailto:scroxton@worldbank.org">scroxton@worldbank.org</a>
<b>Objective of the proposed activity</b>	To enable farmers and rural communities to become more resilient to climate change by supporting improvements to land management and agriculture that will strengthen local livelihoods, reduce hunger, and restore productive natural resources.
<b>Key Dates</b>	Jan 2011: Phase 1 analysis commences; May 2011: Interim results and initial recommendations; Jun 2011: Phase 1 recommendations finalized; Sep 2011: Phase 2 Project Document prepared; FY 2012: PAD to Board; approval FY 2012: Phase 2 implementation commences
<b>Social &amp; Environmental Risk</b>	Probably World Bank Category 'B'
<b>Expected duration</b>	3-5 years
<b>Estimated Level of Funding</b>	\$ 9,450,000
<b>Administrative costs for MDB preparation and supervision</b>	\$ 400,000

**Section One: Background**

Tajikistan's semi-arid agricultural production landscapes are characterized by varying degrees of degradation with detrimental impacts on important economic sectors and ecosystem processes. Rural livelihoods that support the majority of the population are being negatively affected by degradation of arable land (loss of soil fertility, salinisation, and water-logging); degradation of pastures and rangeland (from overgrazing and excessive harvesting); degradation of forests (due to illegal logging, fires, and excessive grazing); erosion, (from landslides, mudflows and wind storms) onto productive land; and dilapidated irrigation infrastructure (water infrastructure is often in a poor state of repair and water availability unreliable).

Over the coming decades, climate change is expected to produce higher air and surface temperatures, reduced rainfall and increased frequency of extreme events such as floods, droughts and storms in Tajikistan. Climate change and variability can contribute to degradation of agricultural production landscapes by straining the capacity of existing management practices to maintain resource quality, thus increasing the vulnerability of agricultural production and rural people to extreme weather events and climate change, as the fertility and buffering capacities of the livelihood assets are depleted.

With the existing asset degradation impacts noted above, sustainable land management (SLM) strategies and practices become even more critical for Tajikistan. SLM can enable farmers and communities to adapt, as well as become more resilient, to the reduced availability and/or increased variability of rainfall



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caused by climate change, by conserving soil and water, restoring productive natural resources, enhancing food security and increasing food production.

Accelerated asset degradation as a result of climate change also calls for better management of the important irrigation assets that Tajikistan has developed so that they are better able to mitigate climate change effects. Strengthening capacities and pursuing institutional reforms are critical elements of such strategy, which is confirmed by the high importance that the GoT attaches to irrigation and drainage (I&D) improvement. However, I&D improvement programs have so far not considered climate change. To ensure that these programs are better able to mitigate against climate change impacts, irrigation efficiency and water resources management need to be improved to increase agricultural productivity, reduce production volatility and improve rural livelihoods when climate impacts lead to less or more variable rainfall.

Current policies governing the management of agricultural production systems constrain moves towards more sustainable practices. A legacy of the Soviet period is that all land is owned by the state. Without long-term rights to land, farmers and communities have no incentive to invest in technologies that sustain land resource quality, as it makes more sense to 'mine' the resource base for immediate returns. This issue is further complicated by the joint pressures of poverty and population growth which also contribute to both under investment in, and short-term extraction of, land resources. In Tajikistan the feminization of poverty is a serious concern and female-headed households control lesser resources to practice sustainable management of land, making SLM a critical issue in tackling gender inequality and disempowerment.

Another legacy of the Soviet period that has a major impact on the management of agricultural production systems is the top-down nature and oftentimes limited accountability of public irrigation and drainage (I&D) service delivery. In the absence of transparent, accountable and reliable service delivery, farmers will have little incentive to improve the efficiency and productivity of water use, as a result of which climate change impacts such as droughts and flooding will be exacerbated.

Within Tajikistan there are a number of ongoing policy initiatives and reforms:

- The National Environmental Action Plan (NEAP) states that a primary challenge for the country is land degradation, including degradation of pasturelands, arable and irrigated lands and forests. The National Development Strategy (2015) and the Second Poverty Reduction Strategy also recognize the importance of addressing environmental issues for the country's development and poverty reduction goals;
- The Ministry of Agriculture of the Republic of Tajikistan has stated that "agricultural development is a national priority of the country". In discussions with and proposed suggestions for PPCR, representatives from the Ministry of Agriculture emphasized that agriculture is the mainstay of the Tajik economy; contributing towards 24% of the GNP, two-thirds of employment, one-fourth of export and 39% of tax revenue. Therefore addressing resource degradation in arable and grazing lands is critical, and even more so when considering the country's vulnerability to food insecurity;
- Irrigation & drainage is high on the agenda of the government of Tajikistan. A number of I&D rehabilitation programs have been under implementation that pursue asset rehabilitation, capacity strengthening and institutional reforms. However, I&D rehabilitation programs have so far not considered climate change;
- Land reform policies are in process (though far from complete) as are other policies that will permit new approaches to land development and management. This is reflected by proposals to provide farmers with longer term rights to arable land and provide communities the right to manage forest areas on long term-leases. These processes are taking place at both national and local level.



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A focus on sustainable management of agricultural production landscapes is also consistent with national efforts in other areas, such as disaster risk management, managing water resources and meeting energy needs.

A specific TA activity was approved in the Grant Application for Phase 1 under the title, 'Analysis of sustainable land management assets for changing climatic conditions in Tajikistan'. This six month study will look across the agricultural sector to determine the detail of Phase 2 investments and activities.

#### **Section Two: Development and specific objectives**

The overarching development objective is to enable rural people in selected areas of Tajikistan to build their productive assets in ways which improve the performance and sustainability of irrigated and rainfed agriculture, curtail natural resource degradation and to contribute to food security and poverty reduction in the face of a changing climate.

More specifically, PPCR funds will be used to increase resilience to climate change through improving management of agricultural production systems in Tajikistan, with a focus on agricultural livelihoods, rangeland and I&D management.

The **specific objectives** of PPCR interventions aimed at sustainable management of agricultural landscapes in Tajikistan will be developed as one of the outcomes of Phase 1.

We will aim to:

- Be transformational at local, national, and regional levels. As climate changes become more severe and pervasive, long-term planned adaptations become increasingly important, and farmers will be challenged to make major changes in agricultural systems.
- Develop SLM strategies and practices that will help farmers and communities to adapt, as well as become more resilient, to climate change by improving local livelihoods, reducing hunger, and restoring productive natural resources.
- Ensure SLM investments in upland areas, especially those supporting rangelands, build the basis to provide critical ecosystem services important for climate change resilience to many millions of downstream populations in Tajikistan and other Central Asian countries who are dependent on irrigation, drinking water, hydropower, and other benefits. Investing in upland SLM to control and prevent land degradation in the wider landscape is an essential and cost-effective way to deliver local, regional and global environmental benefits related to ecosystem services.
- Address the fact that current investments in irrigated agriculture do not include a specific focus on improving climate resilience, nor do they consider capacity strengthening and institutional reforms to improve hydraulic coping strategies to climate change.
- Help rural households implement realistic, feasible field-based responses where policy reform is desirable, but difficult to achieve in the current context of limited capacity and resources. Farmers will acquire the knowledge and capacity to transform their practices.
- Ensure results are assessed and lessons shared to make national and international policy and institutional responses to climate change more informed and effective.

#### **Section Three: Key indicators and baseline**

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Indicators (to be refined following Phase 1)

- Proven improved land management practices and technologies that will strengthen climate resilience are adopted;
- Policy reform processes for common property and hydraulic assets; irrigation infrastructure and similar resources are supported by PPCR;
- Incentives are in place to utilize improved resource management practices;
- Technical norms and guidelines to enhance the climate resilience of irrigation & drainage (I&D) infrastructure prepared;
- At least 80% of the rural production investments are successfully implemented according to agreed economic, environmental, and social standards, and upon investment completion are being sustained;
- At least 50% of households in project villages participate in at least one type of rural investment
- At least 8 Jamoat level rangeland management plans use new knowledge in accordance with agreed standards, are officially approved, and under implementation;
- Indicator for project impact on household economic, poverty or asset impacts to be identified during project preparation;
- At least XXXXX ha (to be determined during project preparation) are covered by effective agricultural, land, and water management practices resulting from project activities.

Where appropriate all monitoring indicators will be disaggregated to show the different impacts on men, women and vulnerable groups.

Baseline

- There are currently islands of existing good practice for sustainable land management and agricultural production that demonstrate climate resilience. These are not as widespread as they could be. 'Climate proofing' existing agricultural practices and infrastructure is not usually prioritised.
- Much of the I&D infrastructure is suffering from years of neglect and under-funding, as a result of which drainage stations, vertical drainage wells and canals are no longer operational.
- Management arrangements and I&D service delivery are weak, with limited accountability, transparency and reliability.
- Extensive research that has been conducted by IWMI and that has led to specific recommendations for irrigated agriculture, including those related to climate change. Past experience has also yielded important lessons regarding the need for institutional reforms and strengthening of local capacities that will be built-in to investments supported through PPCR.

### **Section Four: Anticipated components and activities (including learning and knowledge management activities)**

Actual activities will be determined through Phase 1 analysis. The main thrusts of these are likely to be:

- Investments through projects in proven improved land management practices and technologies, suited to both irrigated and rainfed land, that will strengthen climate resilience.
- Support feasible policy reform processes for common property and similar resources, especially rangelands and hydraulic assets, and opportunities for action within existing frameworks, so that incentives are in place to utilize improved land management practices.
- Strengthen the policy and institutional environment for mainstreaming climate change adaptation in the rehabilitation of irrigation and drainage infrastructure.
- Precise recommendations for interventions will be developed during Phase 1. Examples might be: resource-user groups, drought tolerant crops, advice on crop diversification; improved

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irrigation structures; improved rangeland and pasture management; improving the management and use of forest resources; using trees and vegetation to stabilize river banks; enhancing water productivity in irrigated areas by promoting a more efficient use of water and a higher productivity of irrigated agriculture (including land certification, and promotion of higher value crops); more efficient in-field water (including efficient irrigation technologies, artificial groundwater storage and use, mulching); improving arrangements for operation and maintenance of irrigated agriculture by strengthening capacities and improving the accountability of irrigation and drainage service providers; strengthening the policy and institutional environment for mainstreaming climate change adaptation in the rehabilitation of irrigation and drainage infrastructure.

Phase 2 funding will provide a balance of funds allocated to technical investments in climate resilient resource management on the one hand and support to policy reform processes on the other. The actual balance will be decided and agreed during Phase 1.

Implementation will likely be through existing donor-supported Government programmes that are already addressing the sustainable land management, rural livelihoods and irrigation. Modalities could include providing additional financing for clear climate resilience needs as part of the Second Upland Agricultural Livelihoods and Land Management Project (under preparation) and the Fergana Valley Water Resources Management project.

The following are **examples** of what might emerge through that process. They are just for illustration.

If Upland development becomes a focus following Phase 1, major activities could be:

- Expanding sustainable upland rural production and natural resource management
- Capacity building and institutional support
- Support to relevant policy reform processes

If Irrigation & Drainage development becomes a focus following Phase 1, major activities could be:

- Institutional Development and TA
- Support to relevant policy reform processes
- Capacity strengthening of associations of resources users, and of public and private service providers
- Development of technical norms for climate proofing rehabilitation of hydraulic assets.

### **Section Five: Risks**

Risk	Mitigation
<p><b>Country Governance</b></p> <p>Tajikistan has a highly centralized authoritarian system and the demand for good governance is in its infancy. During the current CAS period, a series of serious domestic policy slippages has underlined Tajikistan’s weak governance. Government’s credibility with the population and donors has plummeted because of its inability to resolve long-standing cotton issues, manage macroeconomic policy, and address the winter energy supply crises and poor performance of the energy state owned enterprises, especially Barki-Tajik and Tajik Gas. Low transparency, blurred accountability lines, and insufficient public-sector capacity to implement reforms pose high risks to Bank-financed operations.</p>	<p>The Bank, closely with partners, has been working with government to strengthen public administration and public financial management (PFM), and to build capacity for sound public fiduciary management. The Bank has also prepared a new CPS within the CGAC framework, which focuses on strengthening transparency and accountability, developing capacity, and fostering demand for good governance, while ring-fencing operations against risks posed by the complex governance environment. CGAC strategy implementation will be supported by a GPF Grant that mainstreams governance engagement in the portfolio. The adoption of a Governance Checklist helps ensure that governance concerns are</p>



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	incorporated in the Bank's everyday business.
<b>Project Governance</b>	
Instances may arise when project funds do not reach intended beneficiaries because officials and/or staff pursue private interests or are under pressure from others to take actions that conflict with their professional duties, e.g., requests for unnecessary payments to access funding.  Rural elites may drive decision-making and are able to capture benefits. Vulnerable people may not benefit from the project.	Adopt procedures that promote (a) widespread, fair and transparent allocation of rural investments, and (b) direct and accountable flow of funds to beneficiaries.  An on-going World Bank study on rural vulnerability (2010-12) can provide additional insight for strategies to reach vulnerable groups.
<b>Project Management Units</b>	
Arrangements for PMU may affect line agency ownership, fiduciary capacity, institutional memory, teamwork among PMU staff, relationships with implementing partners, and/or collaboration with other parts of government.  Changes in the staffing of the PMU may lead to a loss in fiduciary capacity and/or institutional memory and leadership.	During project preparation the World Bank task team will consult the Government and reach agreement on the PMU arrangements.  Project(s) will include support for professional development, use operational manuals, and provide for consultants for advice and/or back-up when needed.
<b>Rural Investments Sustainability</b>	
Rural production investment benefits may not be sustained.	Use procedures developed during the WB's CAWMP (updated as appropriate to promote long term technical, financial and environmental viability)  A focus on livelihoods provides an effective incentive framework.
<b>Social And Environmental Safeguards</b>	
While environmental impacts will be moderate in scale and complexity (including the impact on water quality, soil fertility and threats to biodiversity), the management of these impacts by contractors and environmental authorities will be a challenge due to their low capacity and limited experience.	Include Environmental Management Plan (EMP) that specifies relevant mitigation measures and capacity building activities to enforce environmental safeguards compliance. Include main EMP provisions in the contracts for proposed civil works and ensure implementation as a part of project supervision. The Bank team will provide capacity strengthening support for the Environmental Specialist of the PIU and local environmental authorities.



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### **Section Six: Investment Costing (notional allocation – PPCR and co-finance including counterpart finance)**

Detailed costing will be developed on the basis of the outcomes of Phase 1.

**Bank administrative budget requirements:** World Bank administrative costs for support to this component of PPCR total \$400,000.

### **Section Seven: Results and Performance framework**

A full Results and Performance Framework for will be developed during the preparation of Phase 2.

**Overall project development objective and global environmental objective:** To enable rural people in selected areas of Tajikistan to build their productive assets in ways which improve the performance and sustainability of irrigated and rainfed agriculture, curtail natural resource degradation and to contribute to food security and poverty reduction.

**PPCR objective:** To increase resilience to climate change through improving management of agricultural production systems in Tajikistan, with a focus on agricultural livelihoods, rangeland and I&D management.



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<b>Title</b>	<b>Building Climate Resilience in the Pyanj River Basin</b>
<b>Government Contact</b>	R. Karimov, Director, Project Management Office of WLRWR Deputy Minister, WLRWR /Committee of Environment Protection
<b>MDB contact</b>	Asian Development Bank, Ryutaro Takaku, Water Resources Engineer
<b>Objective of the proposed activity</b>	Building resilience of natural resources and vulnerable communities to climate induced extreme events and climate variability in Khatlon Province along the Pyanj River and its tributaries.
<b>Expected duration</b>	4 years
<b>Estimated Level of Funding</b>	US\$ 15.3 million from PPCR
<b>Key dates</b>	1 <sup>st</sup> quarter 2011 Feasibility Study will commence and be informed by Phase 1 analyses 4 <sup>th</sup> quarter 2011 All component will commence
<b>Environmental and social risks</b>	<b>Environmental Impact:</b> The environmental impact is likely to be classified as category B, as there will be little significant adverse long-term environmental impacts.  <b>Involuntary Resettlement:</b> The nature and location of the investment is not likely to require any land acquisition and resettlement of households because the eco-system and engineering based approach will occupy only government land and most of the activities will take place on existing structures.

**Section One: Background**

Tajikistan is a landlocked country located in southeast Central Asia. Mountains occupy about 93% of the terrain, while glaciers make up 6% of the total country area. The rivers of Tajikistan are the main sources of water replenishing the Aral Sea, and provide neighbouring countries with water for irrigation and power generation.

Tajikistan is vulnerable to climate variability and climate extremes, which will pose additional and significant risks to the country's economy, social welfare, and the eco-systems. Projected climate change and extreme events, such as glacier retreat, floods, drought, and mudslides, threaten food, water and energy security, human health, and the achievement of Tajikistan's development goals.

Climate change is likely to compound existing food security issues and impact heavily upon those dependent on the agricultural sector. These adverse effects are more likely to fall upon those involved in subsistence agriculture and pastoral farming, which are dependent on the availability of natural resources, in particular water. Major glacier-dependent river basins such as the Pyanj River basin contain a large proportion of agricultural land. These lands are increasingly vulnerable to glacial melt and climate and natural disaster-induced extreme events. Increasingly unstable hydrological resources can threaten upstream ecosystems and downstream infrastructure and services, such as irrigation, hydropower, and





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potable water and vulnerable communities. Consequently, these developments could affect the economy, weaken household livelihoods, and potentially have transborder effects on neighbouring countries.

Tajikistan's scientific and hydrometeorological institutions have very limited capacity to conduct basic climate forecasting and climate change impact assessments, or to produce climate impact scenarios and risk assessment measures, especially for vulnerable ecosystems at the river basin level. This capacity limitation severely compromises Tajikistan's readiness to adapt to and prepare for climate change effects.

This proposed investment aims to build resilience of natural resources and vulnerable communities to climate-induced extreme weather and climate variability impacts and risks in Khatlon Province along the Pyanj River, and target tributaries. The investment will build upon the findings of Phase 1 activity A6 (i.e., Analysis of a River Basin Approach to Climate Resilience) and existing ADB investments in the province. This replicable river basin resilience pilot will help to introduce adaptive measures in other river basins across Tajikistan and cross-border.

Pilot findings will be broadly disseminated to river basin managers across Tajikistan, and in neighbouring countries.

### **Section two: Development and specific objectives**

The overall development objective is: to introduce effective and sustainable climate risk management systems in the Pyanj river basin. Specific objectives include:

- **Reduce exposure of Pyanj-based vulnerable communities to flood, mud/debris flows, landslides and other climate induced extreme events** through the incorporation of sector-based climate-proofing measures in vulnerable eco-systems and critical infrastructure, with adaptive redesign and operations and maintenance protocols.
- **Reduce sensitivity to climate risks** via an eco-system based approach to river basin adaptation, with special emphasis on high risk upstream (high mountain) and downstream communities. This will address the unique needs of vulnerable communities residing around the upper watershed catchment, as well as those communities subject to impacts in river basins at lower elevation, each with very distinct eco-systems.
- **Build adaptive capacity of line ministries, local governments, and communities** through climate risk awareness raising, community-based learning, development and implementation of adaptive measures and disaster preparedness, adaptive policy, and knowledge dissemination.

### **Section three: Key indicators and baseline**

#### **Key Output Indicators Include:**

- Overall reduction in extreme event exposure to eco-systems and critical infrastructure in Pyanj River basin.
- Reduction in climate risk sensitivity to vulnerable upstream (high mountain) and downstream eco-systems, and critical infrastructure and communities. Introduction of adaptive redesign and operations and maintenance protocols.
- Increased adaptive capacity of line ministries, local governments, and communities
- Greater socioeconomic resilience to climate change induced impacts (number of households affected by floods, agricultural lands)

#### **Baseline & Project Area**

This investment will include a feasibility study to determine the technical feasibility and economic viability of the PPCR investment, and the potential to build resilience (upscaling) in the existing Khatlon Province Flood Risk Management Project.

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The project will scale-up project investment with incremental adaptation measures. PPCR funding would allow the project to cover several sectors at risk, including water, energy, irrigation, and disaster management. It will benefit many more community inhabitants, and enable local area Pyanj River (Khatlon) residents and provincial officials to address their own climate change risks.

The project would also introduce select hydromet stations in the upper Pyanj watershed (near the Tajikistan-Afghan border) and lower Pyanj (along the Tajikistan-Uzbekistan border) to help determine glacial melt behaviour and downstream water flows. This activity will be coordinated closely with the Phase 2 Hydromet Rehabilitation Programme, the Climate Science Modelling Program, and other PPCR activities to avoid duplication of effort.

This river basin approach is in line with the Ministry of Land Reclamation and Water Resources recent reform legislation shifting from regional priorities to river basin priorities.

#### **Section Four: Anticipated components and activities (including learning and knowledge management activities)**

##### **Component 1 - Reduce Exposure/Risks of Pyanj-Based Vulnerable Communities**

1. Reduction of community vulnerability to climate-induced floods, mud/debris flows, landslides, and land degradation in Pyanj river basin via climate adaptive eco-system and engineering practices, including proper operation and maintenance of the practices such as: flood resistant forest stands, hillside adaptive revegetation and soil containment along river basins, mudflow diverted facilities, etc. Adaptive redesign and operations and maintenance protocols will also be introduced.

##### **Component 2 - Reduce Sensitivity to Climate Risks**

1. Installation and rehabilitation of select upstream and downstream hydrology and hydrometeorology monitoring systems in Pyanj river basin, to help assess glacial melt dynamic and downstream impacts.
2. Strengthening early warning systems for floods and glacial lake overflows, based on downscaled model projections, climate impact assessments, satellite telemetry, and glacial field observations.
3. Development of climate vulnerability and risk maps through participatory approaches and consultations with vulnerable communities, building upon existing work of UNDP, Agha Khan Foundation, GTZ, Focus, and other agencies active in the region.

##### **Component 3 - Building Adaptive Capacity**

1. Raising the awareness of local institutions and communities to understand climate risks
2. Community-based participatory learning and knowledge dissemination (hazard maps, community-based risk frameworks) to identify adaptation measures and empower people in all-hazard risk management planning and decision-making. Hazard management workshops, public training sessions on local adaptation, and risk-reduction demonstration sites would be developed as well.
3. Development and implementation of all-hazard mapping, flood management plans, adaptive land use planning
4. Learning events for policy and decision makers to strengthen capacity of central line ministry and local governments to replicate river basin adaptation & risk management methodology in other river basins.

#### **Section Five: Risks**

Government does not fully implement Strategic Program for Climate Resilience.

Risk Mitigation Measures: Closely monitor Government's compliance with SPCR, with other MDBs partners.

2. Government does not provide proper O&M budget allocation.

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Risk Mitigation Measures: Closely monitor Government's compliance with SPCR, with other MDBs partners.

3. Communities and local residents are not willing to participate in community based and tree planting activities.

Risk Mitigation Measures: Possible involvement of experienced and qualified NGO's or other agency's participation in community based activities for strong involvement of community residents.

4. Agreement between Tajikistan and Afghanistan on the cooperation of hydrological monitoring not ratified in a timely manner.

Risk Mitigation Measures: Closely monitor the status of bilateral agreement and possible cancellation of related outputs.

### **Section Six: Investment Costing (notional allocation – PPCR and co-finance including counterpart finance)**

The costing is indicative and detailed cost breakdown will be developed during the feasibility study

Component	PPCR support (\$ million)	Other support (\$ m)	Remarks
Reduce exposure of Pyanj-Based vulnerable communities	9.8	TBD	Will be divided into ecosystem based (e.g. creation of forest zone) and engineering based (e.g. dike mudflow diverted facilities) approaches
Reduce Sensitivity to climate risks	2	TBD	
Building Adaptive capacity	1.5	TBD	
Investment management and monitoring	1.2	TBD	
Preparation of Feasibility study	0.8	TBD	
<b>Total</b>	<b>15.3</b>		

**Bank administrative budget requirements:** Administrative requirements of the addition of PPCR financed support is expected to be US\$ 400,000 for project preparation and project implementation support.

### **Section Seven: Results and Performance framework**



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Design Summary	Performance Targets and Indicators (Indicative)	Data Sources and Reporting Mechanisms	Risks
<p><b>Impact</b> Building resilience of natural resources and vulnerable communities to climate induced extreme events and climate variability in Khatlon Province along the Pyanj River and its tributaries.</p>	<p>Improved socioeconomic resilience to CC induced impacts (reduced by 20% in 44,000 households; 100,000 ha of agricultural land; population of 220,000).</p>	<ul style="list-style-type: none"> <li>Hydrology and hydrometeorological data</li> <li>Annual monitoring reports of disaster damage to CES by district and community.</li> <li>Household surveys by CES and WLRWR</li> </ul>	<p>(R) Government does not fully follow Strategic Program for Climate Resilience.</p>
<p><b>Outcome</b> To introduce effective and sustainable climate risk management systems in the Pyanj river basin.</p>	<p>Climate change vulnerability and exposure reduced in Pyanj based vulnerable communities, ecosystems and critical infrastructure by 20%.</p>	<ul style="list-style-type: none"> <li>WLRWR and CES reports.</li> <li>Local government reports.</li> </ul>	<p>(R) Government does not provide proper O&amp;M budget allocation.</p>
<p><b>Outputs</b></p> <p>1. Reduce Exposure of Pyanj-Based Vulnerable Communities</p> <p>2. Reduce Sensitivity to Climate Risks</p> <p>3. Build Adaptive Capacity</p>	<ul style="list-style-type: none"> <li>Eco-system based reduction of community vulnerability to climate induced flood, mud/debris flows, landslides, and land degradation.</li> <li>Engineering based reduction of community vulnerability to climate induced flood, mud/debris flows, landslides, and land degradation. Introduction of adaptive redesign and operations and maintenance protocols.</li> <li>Installation and rehabilitation of select hydrology and hydrometeorology monitoring systems in upper Pyanj watershed (near the Tajikistan-Afghan border) and lower Pyanj (along the Tajikistan-Uzbekistan border) to help determine glacial melt behaviour and downstream water flows.</li> <li>Strengthening early warning systems, based on downscaled model projections and climate impact assessments</li> <li>Development of climate vulnerability and risk maps through participatory approaches and consultations with vulnerable communities, building upon existing work of other agencies active in target region.</li> <li>Climate risk awareness raising of local institutions</li> </ul>	<ul style="list-style-type: none"> <li>PPMS quarterly and monthly reports.</li> <li>WLRWR, CEP and local government reports.</li> <li>PPMS quarterly and monthly reports.</li> <li>WLRWR and CEP reports.</li> <li>PPMS quarterly and monthly reports.</li> </ul>	<p>(R) Communities and local residents are not willing to participate in tree planting activities.</p> <p>(R) Agreement between Tajikistan and Afghanistan on the cooperation of hydrological monitoring is not ratified in a timely manner.</p>



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CEP = Committee on Environment Protection, CES = Committee on Emergency Situation, MLRWR = Ministry of Land Reclamation and Water Resources, PPMS = Project Performance Monitoring System, O&M = Operation and Maintenance, PPTA = Project Preparatory Technical assistance, DD = Detailed Design, PMO = Project Management Office, PIO = Project Implementation Office, Loan 2356-TAJ = Khatlon Province Flood Risk Management Project.



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### Annex 6 Logical Framework

<b>TAJIKISTAN SPCR OVERVIEW LOGICAL FRAMEWORK*</b>					
<b>Long Term Country Outcome</b>					
<ul style="list-style-type: none"> <li>• Improved quality of life for the people of Tajikistan, especially those most vulnerable to current climate variability and future climate change;</li> <li>• Increased resilience in economic, social and eco-systems to climate variability &amp; climate change through transformed social and economic development – moving from ‘business as usual’ development to integrate climate resilience into development plans, programmes and policies;</li> <li>• Increased capacity of Government of Tajikistan to move from a reactive, donor-led approach to a proactive country-led approach and create the conditions for ownership of adaptation to climate change within Tajikistan.</li> </ul>					
<b>Overall Catalytic Outcome of the SPCR</b>					
<ul style="list-style-type: none"> <li>• Improved Government structures and processes to respond to climate variability &amp; climate change through coordination of climate change activity within Tajikistan;</li> <li>• Improved ability of Tajikistan’s stakeholders to scale up and replicate climate resilient approaches by building on the SPCR practical experience of integrating climate resilience into development planning;</li> <li>• Enhanced information base on climate change risks and improved understanding of climate change amongst a variety of stakeholders.</li> </ul>					
<b>Phase 2 Investment Program Components</b>					
1 – Improvement of Weather, Climate and Hydrological Service Delivery	2 – Enhancing the Climate Resilience of the Energy Sector	3 – Building Capacity for Climate Resilience	4 – Agriculture and Sustainable Land Management	5 – Climate Science and Modelling Program	6 – Building Climate Resilience in the Pyanj River Basin
<b>Phase 2 Investment Program Outcomes</b>					
Strengthened hydromet service delivery in Tajikistan in support of economic development And disaster risk management and climate change	Increased sustainability and climate resilience of the hydropower sector in Tajikistan through the integration of climate change analysis and climate resilience measures into hydropower investments	Strengthened government capacity for mainstreaming climate change risks into national policy and development plans, increasing the country’s resilience through ( <i>inter alia</i> ) effective management of the PPCR	Increased resilience to climate change to strengthen local livelihoods, reduce hunger and restore productive natural resources	Improved capacity to conduct climate science and glaciology research, develop climate change models and interpret outputs from those models to provide policymakers with data to plan for climate change	Increased resilience of natural resources and vulnerable communities to climate induced extreme events and climate variability in Khatlon Province along the Pyanj River and its tributaries



## Tajikistan - Strategic Programme for Climate Resilience Pilot Programme for Climate Resilience

### - Phase 2 Investment Program Outputs

<ul style="list-style-type: none"> <li>- Strengthened capacity of Tajik hydromet to contribute to climate resilience.</li> <li>- Improved data collection, analysis, and information sharing with government and public.</li> </ul>	<ul style="list-style-type: none"> <li>- Climate analysis informing project design and investment decisions in the hydropower sector to optimise climate resilience.</li> <li>- More reliable, sustainable and climate-resilient power supply that will improve energy security for Tajikistan.</li> <li>- Replicable approach that can provide valuable lessons for subsequent investments in HPP rehabilitation and construction.</li> <li>- Increased capacity of Tajik authorities to conduct climate change analysis as part of HPP investment planning and mainstream its findings into the design of projects.</li> <li>- Increased leverage on policy dialogue and reforms in areas that influence the climate resilience of the energy sector overall.</li> <li>- Increased awareness of the need to consider climate change in investment planning in the hydropower sector.</li> <li>- Improved water resource management systems.</li> <li>- Small-scale HPP projects</li> </ul>	<ul style="list-style-type: none"> <li>- Training and facilitated engagement in national and international climate change events.</li> <li>- Increased awareness of a number of specific audiences, including highly vulnerable groups, civil society, private sector, educational institutions, the media and the general public.</li> <li>- Strengthened institutional and technical capacity on climate change impacts and adaptation, and mainstream climate change adaptation into national and sub-national policies, poverty reduction strategies and development plans, such as the development of a National Climate Change Adaptation Strategy, key sector strategies and local authority's Action</li> </ul>	<ul style="list-style-type: none"> <li>- SLM strategies and practices developed &amp; adopted to help farmers and communities to adapt and become more resilient to climate change.</li> <li>- Investment in upland SLM to control and prevent land degradation.</li> <li>- Investments in irrigated agriculture are designed to address climate resilience.</li> <li>- Capacity strengthening and institutional reforms to improve hydraulic coping strategies to climate change in irrigated agriculture.</li> <li>- Rural households implement realistic, feasible field-based responses.</li> <li>- Knowledge and capacity of farmers created to transform their practices to react to CV &amp; CC.</li> </ul>	<ul style="list-style-type: none"> <li>- Dynamic downscaled modelling capacity within Hydromet to ensure the development of high resolution climate projections and impact scenarios and practical scientific knowledge to mainstream vulnerability and adaptation measures.</li> <li>- Strengthened climate science and glaciology research in Tajikistan to enhance the understanding of glacial melt and downstream impacts on water resources, and glacier-dependent infrastructure.</li> <li>- Enhanced capacity to analyse and interpret output from climate models and science.</li> <li>- Climate modelling outputs mainstreamed in development planning and capital investment decisions.</li> </ul>	<ul style="list-style-type: none"> <li>- Reduced exposure of Pyanj-based vulnerable communities to flood, mud/debris flows, landslides and other climate induced extreme events through the incorporation of sector-based climate-proofing measures in vulnerable eco-systems and critical infrastructure, with adaptive redesign and operations and maintenance protocols.</li> <li>- Reduced sensitivity to climate risks via an eco-system based approach to river basin adaptation, with special emphasis on high risk upstream (high mountain) and downstream communities.</li> <li>- Increased capacity of line ministries, local governments, and communities through climate risk</li> </ul>
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	that incorporate climate analysis as part of their design.	Plans.			awareness raising, community-based learning, development and implementation of adaptive measures and disaster preparedness, adaptive policy, and knowledge dissemination.
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\* More detailed results frameworks are included in the specific annexes. These will be further refined during project design.

**Logic model – Pilot Program for Climate Resilience (PPCR)**





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