ADAPTATION FUND

REGIONAL PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme:	Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate
Countries:	Kyrgyzstan, Tajikistan, Uzbekistan
Thematic Focal Area[1]:	Disaster risk reduction and early warning systems
Type of Implementing Entity:	MIE
Implementing Entity:	UNESCO
Executing Entities:	National entities in charge of Disaster Risk Reduction in the countries, University of Zurich
Amount of Financing Requested:	5,000,000 (in US$ equivalent)

Project / Programme Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve, including both the regional and the country perspective. Outline the economic social, development and environmental context in which the project would operate in those countries.

Central Asia is facing important challenges to cope with adverse effects of climate change. According to the research conducted by the World Bank in 2009 in countries of Europe and Central Asia, Tajikistan and Kyrgyzstan have the highest degree of vulnerability to climate change. In particular, the impacts of climate change on water-related disasters in the region have been recognised as a key threat[2]. The Central Asian (CA) states socio-economically disadvantaged, indigenous groups, ethnic minorities, women, children and elderly are highly sensitive and particularly vulnerable to the impacts of climate change, as resilience and coping capacities are typically low. A most pronounced effect of global warming in CA is the melting of glaciers and associated formation of glacial lakes. Since about 1950, between 14% and 30% of the Tien Shan and Pamir glaciers have melted. Today's rate of glacier loss in CA is 0.2–1% per year in volume. Due to glacier melting and lake formation, there is an increased danger of Glacier Lake Outburst Floods (GLOFs), which confound and exacerbate the

[1] Thematic areas are: Food security; Disaster risk reduction and early warning systems; Transboundary water management; Innovation in adaptation finance.

[2] The declaration of the International conference on water-related natural disaster reduction, held in 2008 in Dushanbe, stated that research on the impacts of climate variability and change on water related disasters should be increased, in particular with the aim to develop adaptation strategies and mitigation measures. Water scarcity coupled with climate change related disasters has been recognized as a critical challenge in Central Asia region during the high level international conference on the implementation of the "Water for Life" decade, held in Dushanbe, Tajikistan in June 2015.

water-related threat to mountain communities, their settlements, livelihood, and infrastructure located on river floodplain areas. The number of glacial lakes and incidences of failure has been increasing globally over the last 40 years, and this threat is expected to further increase as new lakes continue to develop and surrounding steep slope destabilize in response to warming. Events may be far-reaching with significant downstream environmental, economical, and ultimately societal consequences. Hence, the increasing risk of disasters from GLOFs is a significant threat to national and regional security, and sustainable development in Central Asia.

The GLOF in the Shakhimardan River catchment in Uzbekistan, for example, resulted in 93 fatalities in 1998, and the GLOF in Dasht, Tajikistan in 2002 left behind dozens of people dead, and the Zyndan glacial lake led to substantial economic losses in 2009. High temperatures and the rapid melting of snow and glacier ice in July 2015 triggered mudflows in the mountainous regions of Tajikistan. Meltwater outbursts from the Aksai glacier in northern Kyrgyzstan triggered a GLOF as a result of which houses and road infrastructure in villages down the valley have been damaged and the lake still poses a continuous threat to the capital city Bishkek. According to the latest inventory, there are more than 350 glacial lakes in Kyrgyzstan in danger of outburst. Each year, there are twenty lakes that are in acute danger of failure. Approximately 300 settlements are exposed to potential GLOFs. The complex topography of Tajikistan, its high rainfall levels and large number of glaciers mean that Tajikistan is highly exposed to flood hazards, largely caused by GLOFs, which store huge volumes of water behind unstable natural barriers. The south-western Pamir mountain range in Tajikistan contains around 335 lakes with GLOF potential. Very large floods and mudslides in Uzbekistan are generally caused by the outbreak of mountain lakes. According to Uzbekistan Hydromet, the country is threatened with 271 potential GLOFs, most of which are located outside its border. Regional scientific studies suggest that glacier shrinkage is causing more frequent glacier hazards, including GLOFs. Besides owing a large volume of water released by GLOFs, they present a significant transboundary hazard.

In the CA region, which has been part of the Soviet Union, disaster response has been traditionally stronger than prevention and preparedness, and in government structures relevant ministries/committees are still focusing primarily on disaster response. With today's new commitments to disaster risk reduction (DRR) and climate change adaptation (CCA), the issue of monitoring, forecasting and early warnings of natural hazards (including on GLOFs) are gaining importance in the region, although preventive measures are as yet still lacking due to the lack of institutional framework and weak capacities of relevant authorities. Moreover, the low coordination and synergy between existing institutional structures pose a serious challenge for national and regional cooperation in the area of DRR and CCA.

The institutions are poorly equipped with modern technologies for early warning systems (EWS), some lake monitoring exists in countries like Kyrgyzstan and Tajikistan, with regular helicopter flights over the glaciated areas, which is not cost-effective or sustainable. There is no comprehensive system as such in any of the countries, nor is there risk analysis on *populations* affected by GLOFs. Current initiatives do not have the

capacity to manage the risks posed by rising water levels in glacial lakes, including issuing early warning of GLOFs. Moreover, there are no mechanisms available among disaster experts, managers and planners to develop local risk reduction plans from GLOFs, due to the limited information on the expected distribution and impacts of GLOFs. Therefore, accurate and comprehensive knowledge of glaciers and glacial lakes are of utmost importance to understand and manage the risk of GLOFs in CA countries. At present, the countries face a critical gap in knowledge concerning glacier lake distribution, risk mapping and disaster prevention planning from GLOFs. Moreover, as the current status of the glacial lakes is changing, the number of potentially hazardous lakes and their location/origin is shifting, and new lakes are developing rapidly, due to high temperatures in summer. , Thus, there is a need to develop formal monitoring and evaluation systems to validate the information on the status of potentially hazardous glacial lakes. A digital web-based knowledge platform is required to consolidate the existing knowledge on glaciers, glacial lakes, and GLOF events, which will enhance the ability of policy makers in the countries to understand the associated vulnerabilities, implement appropriate DRR and CCA measures and cooperate across the borders. Until now, no regional cooperation exists for assessment and monitoring of transboundary GLOFs, exchange of information or early warning transmission. Since many of the glacier lakes in CA are of a transboundary nature, there is a strong need for regional cooperation in addressing GLOFs, and first and foremost to establish regional cooperation in GLOF hazard monitoring and analysis, as well as early warning. Taking into account the political context in the region, the project provides an excellent platform for regional cooperation on enhancing resilience of the population from GLOFs with contributions towards dialogue among countries, thus also to foster peace and security in Central Asia.

It must be pointed out that there is a lack of extensive scientific research and monitoring of glaciers in the region, and thus a lack of reliable data. Moreover, there is no cooperation between the scientific community, practitioners and stakeholders in the field of DRR, including on GLOFs. This proposal not only would strengthen scientific cooperation among the CA countries as well as with Swiss experts, but it would also help in converting the findings of research and studies into appropriate policies and mitigation measures, as well as ensure proper communication to the authorities in charge of DRR and CCA, and most importantly to local communities.

Inadequate attention by governments to supporting rural communities in DRR and CCA in the CA region is obvious. Communities settling in GLOF-prone mountain areas are highly vulnerable. No access and opportunities for adequate education and training on GLOFs exist at community level, especially for vulnerable groups in remote communities. Communities in GLOF-prone mountain valleys need to be better educated on GLOF threats and will be involved in targeted risk reduction activities through this project. They will be involved in risk management and prevention activities, as community-based implementation of targeted risk reduction activities are planned. Thanks to the support from the Adaptation Fund, the project will have a positive effect not only on resilience of communities, but will also link these often isolated groups with

DRR stakeholders at national level, thus contributing to broader economic and social development.

Building resilience and reducing societal vulnerabilities to climate related disasters is clearly recognized as a key requirement for sustainable development. In fact, the United Nations 2030 Agenda for Sustainable Development specifically pledges to reduce physical and economic losses caused from water-related disasters, with a focus on the most vulnerable communities, and furthermore highlights the need for improved education, awareness-raising, and capacity building in relation to climate change impacts and early warning (2030 Agenda targets 11.5 and 13.3). These are themes targeted specifically within this project design, and are also in line with requirements identified from various stakeholder events held in CA. The three countries have recognized climate change as a significant threat to populations, and have demonstrated commitment at the national level to address global climate change. All three countries are members of the United Nations Framework Convention on Climate change (UNFCCC), they have ratified the Kyoto Protocol and have signed the 2015 Paris Agreement. The Sendai Framework for Disaster Risk Reduction 2015-2030 is instrumental to address increasing climate and disaster risk with its growing negative impact on CA countries. The Sendai Framework also serves to strengthen collaboration across the region. The Regional Platform meeting for DRR for Central Asia and South Caucasus, held in July 2016 in Dushanbe, Tajikistan, called for the establishment of a regional forum to strengthen collaboration and provide important support to implementation of the Sendai Framework at local, national, regional levels.

The project aims to strengthen adaptation to climate change in Central Asia by reducing societal risks and vulnerabilities associated with GLOFs. This is achieved through strengthening the monitoring, analytical and response capacities of institutions and government officials responsible for DRR, emergencies and CCA through community and gender-sensitive ground-level training and awareness campaigns, and through the establishment of early warning systems (EWS), supported with the necessary state-of-the-art monitoring strategies. The emerging and increasing risk associated with GLOFs, together with appropriate response and adaptation strategies will be brought to the forefront of attention for decision makers and communities in all CA participating countries. It is the regional approach that will contribute to improved coping with climate change and its consequences through information and experience exchange with regard to best practices in CCA and DRR.

Project / Programme Objectives:

List the main objectives of the project/programme.

The main objectives of the project are as follows:

1. To have the necessary comprehensive knowledge base established for adaptation planning, including scientific understanding of past and future lake formation and evolution, their relation to changes in the cryosphere, assessment

of glacial lake outburst hazards, identification of populated areas vulnerable to flooding and assessment of the related risks.

2. To strengthen the capacities of responsible institutions and authorities to address immediate GLOF risks, and prepare for new threats that emerge as glaciers continue to retreat across Central Asia.

3. To develop and implement sustainable adaptation strategies, which directly engage and enable local communities to better understand and respond to GLOF risks, and thus adapt to climate change.

4. To implement pilot Early Warning Systems, which are fully embedded within the local institutional and societal contexts, and which serve as both a reference and motivation for similar climate change adaptation (CCA) and DRR activities across the region.

5. To have an opportunity and space for networking and exchange among practitioners from a range of disciplines, including Climate Change Adaptation and Disaster Risk Reduction, environment and development planning, provided to ensure enhanced knowledge sharing and strengthened capacities at the regional scale.

Effective use of innovation and the latest advances in scientific knowledge and techniques to build resilience to GLOF hazards and encourage disaster preparedness will be pursued through the project activities. The wide-ranging objectives of this project directly address SDGs 11 and 13 of the 2030 Agenda (particularly targets 11.5 and 13.1 - 13.3), which aim to take urgent action to combat climate change impacts, and ensure human settlements are safe, resilient and sustainable. All this has also to be seen in the context of the Sendai Framework for Disaster Risk Reduction 2015-2030, where, amongst other aspects related to the proposed project, EWS are emphasized as a key mechanism to achieve DRR and CCA, through reducing societal vulnerability.

Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, outcomes, outputs and countries in which activities would be executed, and the corresponding budgets.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well-defined interventions / projects.

Project / Programme Components and Financing:

Project/Programme Components	Expected Outcomes	Expected Outputs	Countries	Amount (US$)
1. Consolidating common knowledge and building and reinforcing capacities of responsible institutions/authorities to apply advanced methods and technologies in glacier lake monitoring and evolution.	Improved awareness and understanding leading to enhanced societal resilience, with local authorities having the required knowledge and technical skills to implement science based adaptation actions.	Glacier lake monitoring and forward-looking programmes designed and tailored for each country Up-to-date atlas on glacier lakes for each country based on remote sensing data Regional capacity building and twinning programme implemented, focusing on coordinated monitoring of glacier lakes and anticipation of future glacier lake formation	Kyrgyzstan, Tajikistan, Uzbekistan	550,000
2. GLOF vulnerability and risk assessment and elaboration of policy recommendations for adaptation	First regional-wide knowledge on GLOF risks available, providing the basis for collaborative adaptation planning and decision making	Regional-scale evaluation of GLOF risks, and local hazard assessments for critical valleys Vulnerability assessment and exposure maps for endangered communities, including gender and sector-specific analyses Documented review of adaptation options and response strategies that can reduce the risk of GLOF disaster.	Kyrgyzstan Tajikistan, Uzbekistan	1,000,000

3. Elaboration of EWS technologies, tailored to local contexts to ensure long-term maintenance and sustainability.	Site-specific technological EWS solutions elaborated and embedded within the institutional setting for disaster risk management	Local to regional framework of institutional DRR context established and evaluated Documentation of local knowledge on GLOF risks and related adaptation needs Design and implementation plans for three case specific EWS	Kyrgyzstan, Tajikistan, Uzbekistan	800,000
4. Targeted demonstration project to introduce technologies and best practices for EWS for glacier lakes	Societal risk reduced, through implementation of an innovative, replicable and sustainable EWS for GLOFs, with guidelines and recommendations for upscaling established.	EWS implemented Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS Authorities and population trained and drilled through simulation exercises	Kyrgyzstan, Tajikistan, Uzbekistan	1,275,000
5. Establishing synergies and synchronising knowledge exchange, stakeholder engagement and communication activities	Enhanced knowledge through access to information and experience generated through components 1 - 4, provided to all stakeholders.	Web-based knowledge-platform established on GLOF risks and adaptation strategies (link to components 1 - 3). Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters Knowledge and	Kyrgyzstan, Tajikistan, Uzbekistan	700,000

		lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions		
6. Project/Programme Execution cost				250,000
7. Total Project/Programme Cost				4,575,000
8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable) – 8,5%				425,000
Amount of Financing Requested				**5,000,000**

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme

Milestones	Expected Dates (tentative)
Start of Project/Programme Implementation	April 2018
Mid-term Review (if planned)	June 2020
Project/Programme Closing	March 2022
Terminal Evaluation	May 2022

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. *Describe the project / programme components, particularly focusing on the concrete adaptation activities, how these activities would contribute to climate resilience, and how they would build added value through the regional approach, compared to implementing similar activities in each country individually. For the case of a programme, show how the combination of individual projects would contribute to the overall increase in resilience.*

This project will reduce climate change induced risks and vulnerabilities from GLOFs in Central Asia by implementing science and community-embedded adaptation measures. More broadly, the project will build societal awareness and thereby resilience to the threat of climate change, and particularly water-related disasters. Adaptation measures, including EWS, are strongly promoted by the Sendai Framework for Disaster Risk Reduction 2015-2030, to which CA countries are committed. According to the United Nations Office for Disaster Risk Reduction (UNISDR) the following are four key elements of EWS: I. risk knowledge; II. monitoring and warning service; III. dissemination and communication; and IV. response capability. The components of the project are designed to address these four key elements, as described below.

A core strength of this project is the focus on ***regional implementation*** of adaptation activities. This is crucial, as GLOFs represent far-reaching climate driven disasters, that may originate in remote regions, and cause damage considerable distances (hundreds of kilometres) downstream. Examples of far-reaching GLOF disasters have already occurred in Central Asia (e.g., 1998 outburst event from the Archa-Bashy glacier in Kyrgyzstan, with resulting devastation in Uzbekistan), and are a major threat throughout high mountains in Asia. In fact, during the international seminar co-organized by the UN Regional Centre for Preventive Diplomacy in Central Asia and UNESCO, *"The Impact of Glaciers Melting in Central Asia on National and Trans-Boundary Water Systems"* in Almaty, Kazakhstan, April 2013,

GLOFs were specifically highlighted as a key threat to the socio-economic development of the region. Therefore, this project emphasizes the development of common monitoring, assessment, and response strategies, while also recognizing that final implementation must be tailored to local physical, cultural and societal contexts. The project will facilitate several regional exchange workshops, enabling experiences and knowledge to be shared and transferred between partners, while the implementation of three distinct pilot demonstration projects will provide a basis for comparative evaluation, identifying successes and lessons learnt between countries.

The need for improved ***capacity building and development*** related to climate change impacts and adaptation was highlighted in the 2030 Agenda under SDG 13, target 13.1 and therefore education, awareness raising, and strengthening of human and institutional capacities forms a central thread to all components of this project proposal. International experience has demonstrated that early engagement of a wide-range of men and women stakeholders (from the community through to government authorities) leads to local acceptance, ownership, and ultimately successful adaptation interventions. Overall synchronization of the stakeholder engagement and capacity building activities in this project will be achieved under component 5, based on outputs generated within components 1 - 4. Such capacity building and development at multiple levels will ensure that the countries are well equipped and motivated to maintain long-term, sustainable adaptation strategies implemented under this project.

Component 1: Consolidating common knowledge and building capacities of responsible institutions/authorities to apply advanced methods and technologies in glacier lake monitoring and evolution.

This project component recognizes that a comprehensive and successful adaptation project addressing water-related disasters must be built on a robust foundation of best available understanding of current and future glacier evolution, which is the basis of GLOF threats across Central Asia. In a first step, knowledge on past and future variations in essential climate variables (primarily changes in temperature and precipitation, and the response of glaciers and permafrost), which in turn influence development and susceptibility of glacial lakes, will be reviewed, compiled and improved. GLOF threats can develop rapidly, and affect large distances. Hence, first-order monitoring strategies are best implemented at the regional-scale, using remotely sensed imagery, supported with available long-term ground-based measurements, and modelling approaches. Furthermore, anticipation of where new lakes may develop as glaciers continue to retreat, ensures adaptation strategies may be optimized for current, emerging, and future threats, and maladaptation can be avoided. Training of local responsible authorities in these methods and technologies will enable homogenous monitoring programs to be implemented across Central Asia. The capacity building program will be broadened to include training on the fundamentals of glaciers, lakes, and hazards within local educational institutions. While a common regional methodology framework will be applied, such

training will be tailored to the local context of each country, and will help ensure the long-term sustainability of the adaptation measures implemented under component 4.

Component 1 will encompass the following Outputs and indicative activities:

Output 1.1: Glacier lake monitoring and forward-looking programmes designed and tailored for each country:

Indicative activities under Output 1.1 will include:

1.1.1. Review and assessment of observed and projected changes in essential climate variables across Central Asia, providing context and basis for design of the lake monitoring programs, and establishing synergies with ongoing and future regional cryosphere initiatives (see Part II G).

1.1.2. Consultation with country authorities to develop a handbook and best-practice guidance documents, outlining a homogenous strategy for remote sensing and field-based monitoring of glacier lakes and surrounding (periglacial) terrain, using common data sources and techniques.

1.1.3. User-friendly visualization and analytical toolbox for anticipating where new lakes and therefore threats will develop over the 21st century as glaciers retreat.

Indicators for output 1.1: Number of local authorities engaged and quality of their engagement, number and quality of local authorities adopting and implementing new GLOF monitoring strategies

Output 1.2: Up-to-date atlas on glacier lakes for each country based on remote sensing data:

Indicative activities under Output 1.2 will include:

1.2.1. Glacier lakes mapped across Kyrgyzstan, Tajikistan, Uzbekistan for most recently available satellite imagery, (2015 – 2016), e.g. freely available Landsat or Sentinel images.

1.2.2. Retrospective mapping of previous lake distribution and extents for defined periods, to establish change in GLOF threat over past decades, and identify rapidly emerging problems.

1.2.3. Estimation of key lake parameters (e.g. area, volume, mean depth), supported and validated with available in situ measurements.

1.2.3. Integration within a user-friendly database (see Component 5) where mapped information on glacial lakes will be maintained and accessed by local authorities, and combined with output from component 2 (hazard and risk assessment).

Indicators for output 1.2: Percentage of watershed area mapped for all three countries, number of new lakes identified, numbers of field days completed by local authorities, local authorities uploading to and accessing data from the web portal.

Output 1.3: Regional capacity building and twinning programme implemented, focusing on coordinated monitoring of glacier lakes and anticipation of future glacier lake formation.

Indicative activities under Output 1.3 will include:

1.3.1. Training workshops conducted with local authorities in each country to ensure understanding of mapping and monitoring strategies, and providing an introduction to adaptation response strategies.

1.3.2. Capacity building and twinning program developed and implemented in local universities, ensuring next generation of young local scientists are equipped with fundamental knowledge regarding the cryosphere, glacier lakes, and related hazards.

1.3.3. Regional workshops to facilitate exchange of knowledge and experience between countries, with view to establishing a permanent ongoing exchange mechanism.

Indicators for output 1.3: Number of participants (men and women) trained in lake monitoring and anticipatory techniques, new cryosphere focused educational material (number of lectures and practical exercises) introduced in local universities.

Component 2: GLOF vulnerability and risk assessment and elaboration of policy recommendations for adaptation

This component is framed by the concept of climate risk, endorsed by the Intergovernmental Panel on Climate Change in their latest assessment reports (Special Report on Managing the Risk of Extreme Events and the Fifth Assessment Report). The concept encourages a holistic approach, recognizing that climate related risk results from a physical event or hazard (e.g. GLOF) intercepting with an exposed and vulnerable system (e.g. community), with risk reduction strategies such as EWS seen as a key tool for climate change adaptation. There will be two scales to the risk assessment. Firstly, an assessment for all lakes and associated downstream affected land areas will be conducted at the regional scale. While a core assessment procedure will be homogenised, some physical, societal, and economic drivers of risk may vary between countries, such that approaches will be

tailored for the local context. Secondly, based on the regional-scale assessment and consultation with local authorities, critical hot spots of GLOF risk will be identified in each country. These hot spots will be evaluated together with high-priority sites identified by local authorities, leading to local-scale assessments supported by field studies and validation at the most critical sites. This multi-level approach ensures that subsequent monitoring, preparedness, and EWS strategies are targeted to those lakes and downstream areas where risk of disaster is greatest.

Component 2 will encompass the following Outputs and indicative activities:

Output 2.1: Regional-scale evaluation of GLOF risks, and local hazard assessments for critical valleys

Indicative activities under Output 2.1 will include:

2.1.1. Development of a common GLOF hazard and risk assessment procedure, elaborated for the physical, social and environmental context of each country.

2.1.2. Quantified likelihood of outburst established for every current and anticipated future glacial lake, and downstream flood-prone land areas identified.

2.1.3. Assessment of vulnerability and exposure of communities and infrastructure within flood-prone land areas based on proxy indicators (e.g. population density, urban land area etc.).

2.1.4. For selected hot spots of GLOF risk, comprehensive local-scale GLOF hazard assessment and maps will be established for both current and future scenarios.

Indicators for output 2.1: Number of potentially dangerous lakes identified by local authorities, identification of vulnerable communities exposed to GLOF threats, detailed field analyses undertaken by local authorities for highly susceptible lakes.

Output 2.2: Vulnerability assessment and exposure maps for endangered communities, including gender and sector-specific analyses

Indicative activities under Output 2.2 will include:

2.2.1. Ground-level mapping and assessment of infrastructure and assets located within flood-prone valleys.

2.2.2. Community-level studies of vulnerability and perceptions of GLOF risk, through participatory surveys and interviews.

Indicators for output 2.2: Total population and value of assets/infrastructure located within mapped zones of high GLOF hazard, percentage of threatened population

interviewed (by sex) and surveyed, percentage of marginalised population or those representing highly vulnerable sectors (e.g., agricultural sector) engaged in the community survey and expressing positive benefits from this engagement.

Output 2.3: Documented review of adaptation options and response strategies that can reduce the risk of GLOF disaster.

Indicative activities under Output 2.3 will include:

2.3.1. Elaborated basket of hard and soft adaptation options, including no-regret adaptation options.

2.3.2. Community level feasibility study to evaluate the local adaptation needs and expectations.

Indicators for output 2.3: Number of adaptation options proposed and considered feasible by local authorities, percentage of population in threatened communities engaged or feeling represented in the adaptation planning process, percentage of population (by sex) in threatened communities indicating an expected reduction in their vulnerably and/or exposure to GLOF risk as a consequence of the proposed adaptation options.

Component 3: Elaboration of EWS technologies, tailored to local contexts to ensure long-term maintenance and sustainability

Early Warning is "the provision of timely and effective information, through identified institutions, that allows individuals exposed to hazard to take action to avoid or reduce their risk and prepare for effective response". The importance and need to promote, invest in, develop, maintain and strengthen EWS is mentioned several times in Sendai Framework. In Component 3 the institutional mechanisms will be evaluated and established if needed, and EWS concepts will be elaborated for the study sites in each country as defined by the needs of the Governments and based on the findings from Component 2.

Component 3 will encompass the following Outputs and indicative activities:

Output 3.1: Local to regional framework of institutional DRR context established and evaluated

Indicative activities under Output 3.1 will include:

3.1.1. Evaluation of process, roles and responsibilities of institutions and organizations involved in EWS as mandated by law in all project countries. Synchronization of GLOF specific aspects with existing mechanisms, institutional

entities and platforms for other types of hazards for creating an institutional infrastructure for multi-hazard management of disaster risks.

3.1.2. If required, establishment of required institutional mechanisms and framework conditions.

3.1.3. Evaluation and establishment of responsibilities for disseminations of warnings, including the evaluation of potential means for the communication of alerts and warnings to ensure all members of the population receive the message.

3.1.4. Evaluation of long-term funding possibilities of EWS, including maintenance costs.

Indicators for output 3.1: All countries have institutional mechanisms for multi-hazard management of disaster risks established; Number of identified potential funding sources (internal and external) for sustainable EWS financing.

Output 3.2: Documentation of local knowledge on GLOF risks and related adaptation needs

Indicative activities under Output 3.2 will include:

3.2.1. Evaluation of the risk perception of the local communities, including the local knowledge of current hazards and past events, and how this is affecting their daily lives.

3.2.2. Definition of the needs for GLOF early warning based on the documentation of local GLOF risk perception and adaptation needs. Who needs to be warned, why, when, and how.

Indicators for output 3.2: Risk perception and local knowledge compiled/evaluated for each site of planned EWS; Local knowledge applied and needs respected in each of the proposed EWS.

Output 3.3: Design and implementation plans for three case specific EWS

Indicative activities under Output 3.3 will include:

3.3.1. For each study site: Identification of the environmental parameters critical for GLOF hazards and evaluation of monitoring methods (sensors and specifications).

3.3.2. For each study site: Elaboration of a data storage and access system, pre-definition of warning thresholds.

3.3.3. For each study site: Elaboration of institutional integration of EWS protocols with existing authorities, institutional entities and stakeholders.

3.3.4. Information and capacity building with involved authorities on EWS implementation, operation, and maintenance.

Indicators for output 3.3: Number of people (by sex) involved, Interest in/degree of involvement of local governments/authorities in information and capacity building workshops related to planned EWS; Number of planned EWS adopted or implemented by governments/authorities.

Component 4: Targeted demonstration projects to introduce technologies and best practices for EWS for glacier lakes

Based on the recommendation of the local authorities, and the results of the large-scale hazard and risk assessment (component 2), this component will implement one EWS tailored to the requirements of each participating country.

Component 4 will encompass the following Outputs and indicative activities:

Output 4.1: EWS implemented

Indicative activities under Output 4.1 will include:

4.1.1. Identifying a company/institute, if possible local, to take over the technical engineering, including the acquisition of suitable equipment, the construction of the EWS stations, and the electronic and software engineering for the data transfer, processing and storage.

4.1.2. Detailed technical planning of the EWS: Identification of survey, monitoring, and communication stations; design of alerting and warning infrastructure and means of communication

4.1.3. Test phase of EWS (ca. 12 months) for system calibration and adjustment and familiarization by responsible authorities

Indicators for output 4.1: Pilot demonstration EWS successfully implemented and running, protocols developed in collaboration with and approved by involved authorities

Output 4.2: Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS

Indicative activities under Output 4.2 will include:

4.2.1. Elaboration of a maintenance plan in collaboration with the involved authorities

4.2.2. Evaluation of potential internal and external funding sources and financing schemes for ensuring long-term operation of the EWS

4.2.3. Acquisition of funds for long-term EWS maintenance and operation

Indicators of output 4.2: Degree of ensured long-term financing of EWS maintenance and operation

Output 4.3: Authorities and population trained and drilled through simulation exercises

Indicative activities under Output 4.3 will include:

4.3.1. Capacity building and information activities for EWS calibration and operation for involved authorities.

4.3.2. Simulations with authorities and potentially affected population (or portions thereof).

Indicators of output 4.3: Self-dependent adjustments of the EWS by responsible authorities; number of drills conducted with authorities; number of simulations conducted with population

Component 5: Establishing synergies and synchronising knowledge exchange, stakeholder engagement and communication activities

This component oversees the development and implementation of knowledge management, exchange, stakeholder engagement and communication activities arising out of components 1 - 4. The primary goal of this component is to ensure that these activities are harmonised across the region, through joint meeting and workshop organization, design of common products (e.g. web knowledge platform) and shared resources (e.g. guidelines, policy briefs, and educational materials). In this manner, implementation of activities will be cost-effective and duplication of efforts can be avoided. Activities conducted under this component must draw on the strengths and diversity of the regional program, while being sensitive to local and site-specific requirements, thereby providing the foundation for successful and sustainable adaptation interventions.

Component 5 will encompass the following Outputs and indicative activities:

Output 5.1: Web-based knowledge-platform established on GLOF risks and adaptation strategies

Indicative activities under Output 5.1 will include:

5.1.1. Establishment of modern, user-friendly web-based knowledge platforms, where data, maps, information and guidance documents produced under components 1 to 3 will be available to stakeholders and authorities, as a basis for awareness raising and adaptation planning.

5.1.2. Common regional template established for the platform, allowing each country to tailor a cost-effective set-up that best suits their local context and needs

5.1.3. Funding and technical strategy developed to ensure long-term maintenance of the knowledge-platforms

Indicators of output 5.1: Common web-based knowledge-platform implemented for all three countries, number of "hits" to the web-platforms as an indicator of the uptake and use by local stakeholders, percentage of sampled population with awareness and experience of using the web-platform, local authorities provide evidence of long-term web maintenance and funding strategies.

Output 5.2: Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters

Indicative activities under Output 5.2 will include:

5.2.1. Engagement with local Universities to ensure knowledge and understanding emerging from this programme is transferred to the next generation of local scientists working in Central Asia (see also Output 1.3).

5.2.2. Enhancement and fostering of regional collaboration, through cost-effective joint training and education programmes (see also Output 1.3).

5.2.3. Implementation of community level training based on common agreed standards and best practices, elaborated according to local experiences and contexts. (see also Output 4.2)

Indicators of output 5.2: Percentage of targeted population (by sex) within threatened communities who express a noted increase in their awareness of the GLOF threat and their role in preparing and responding to a GLOF disaster. Evidence that disaster response policies have been modified to include best practices developed in this program. Number of regional capacity building workshops implemented.

Output 5.3: Knowledge and lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions

Indicative activities under Output 5.3 will included

5.3.1. Scaling-up experiences and lessons learnt for other EWS implementations in CA.

5.3.2. Exchange workshops with authorities from other than CA regions, and communication of outcomes and experiences to relevant institutions across high mountains in Asia (e.g. ICIMOD, and UN agencies).

Indicators of output 5.3: Overall number of technical documents, guidelines, and reports capturing knowledge and experiences gained in this programme. Number of external organizations both within CA and beyond (not directly involved in the programme implementation) who are aware of the project outcomes and have transferred the lessons learned to their own regions.

B. *Describe how the project /programme would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies and mechanisms.*

This project provides an innovative holistic approach to climate change adaptation in Central Asia, bringing together the latest scientific understanding of glacier changes and related GLOF threats, design of adaptation strategies and implementation of a technologically advanced EWS, and comprehensive strengthening of institutional and societal capacities, including for the most vulnerable communities. The new scientific understanding and baseline knowledge resulting from this program will be centred on state-of-the art approaches used for monitoring glacier lakes and their surrounding terrain, hazard and risk assessment and adaptation. Project partners from Switzerland bring long-standing expertise in these fields and have been at the forefront of developing modern remote sensing, ground-based, and modelling approaches optimised for regional-scale GLOF hazard and risk assessments, which is essentially lacking in CA national and local institutions. This partnership will ensure that local authorities and institutions are best equipped to monitor and respond to the rapidly emerging GLOF threat. Hazard and risk assessment procedures will be implemented within a modern Geographic Information System (GIS), and integrated within an innovative web-platform that provides user-friendly, intuitive, and interactive access to all stakeholders.

As emphasized in the Sendai Framework, EWS are a key mechanism to achieve DRR and CCA, through reducing societal vulnerability. This project will implement a technologically advanced EWS that integrates ground-based sensors with modern satellite-based earth observation techniques, providing full system monitoring. Latest advances in communication technology will ensure timely and reliable transfer of

data and warning services to authorities and the communities. However, experiences have shown that technology needs to be balanced against local capacities, and hence there is heavy emphasis in this project towards education and training of local authorities and communities to ensure long-term success and sustainability of the adaptation measures. In this context it is of vital importance that local schools in the mountains are actively involved in the project through learning exercises and also to ensure that parents and the rest of the community are informed about possible GLOFs and DRR.

Scientific and technological advances in modelling, monitoring and predicting capabilities would bring benefits to early warnings once science is translated into effective DRR actions. Bridging the gap between scientific research and decision making will make it possible to fully exploit capacities of EWS technologies for societal benefit. Therefore, existing research networks will also be supported to allow for synergistic activities and interdisciplinary research. This will improve communication between scientists, and decision-makers, DRR experts, authorities in charge of emergencies and affected segments of the local population. Such coherent initiatives for collaborative action and adaptation to impacts of climate change in mountainous regions of CA, which are planned to be implemented in the project, are lacking in the region.

In recognition of the potential for this innovative project to provide a reference and guidance for broader CCA and DRR activities across Central Asia, the Project Implementation Unit (PMU) will be supported by an Information and Experience Sharing Committee (IESC) (Part III A.). This committee will further contribute towards ownership, high visibility, transparency and improved exchange of knowledge, experiences and information among stakeholder across Central Asia. In the context of Central Asia, the IESC is a real innovation as currently there are no modern/technological mechanisms in place, which lead to a better understanding of DRR caused by GLOFs and climate change.

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

The adverse impacts of climate change and particularly water-related disasters are recognized by the United Nations as one of the greatest threats to sustainable development globally. Frequently it is the most marginalised and vulnerable members of societies who live in the most exposed riverside locations, and therefore the approach to hazard and vulnerability mapping employed under components 2 and 3 of this project will identify such risk “hot spots”. Hence, targeted measures implemented in this project that aim to increase societal resilience, reduce vulnerability, and thereby minimise losses to future GLOF events will provide direct

and significant economic and social benefits, to those sectors and members of society who are most threatened. From an environmental viewpoint, damage and loss of valuable ecosystem services can be reduced, through GLOF mitigation and sustainable management of floodplain areas. For example, emphasis will be given to the conservation of forested slopes which provide natural flood buffering and protection.

Bridging the gap between scientific research and decision making will make it possible to fully exploit capacities of EWS technologies for societal benefit. The project will also bring indirect economic and societal benefits as a result of strengthened capacities, awareness, and engagement in CCA. For example, the hydro-meteorological and cryospheric monitoring that will primarily serve as a basis for the EWS, will also provide data for improved management of hydrological resources and agriculture. In the process of enhancing disaster preparedness, non-governmental and community-based organizations will benefit from strengthened communication and outreach capabilities, which will be crucial to the successful and sustainable implementation not only of the GLOF EWS, but also broader CCA initiatives. In addition, isolated communities will become engaged in initiatives such as management of drainage channels, which provide both a source of employment (income) and reduce climate-related risks.

During the scoping and consultation stage of this proposal, possible project implementation sites have been proposed by local authorities (as input to Component 4), and serve here to highlight the economic, social, and environmental benefits the project intervention could bring.

In Kyrgyzstan, the Ala-Archa River valley is suggested as a project site, where the threat from the glacial lake Ak-Say has been recognized, and monitoring implemented by the Ministry of Emergency Situations of the Kyrgyz Republic. In the mountainous part of the Ala-Archa river valley, population density is low, and hence potential losses relate mainly to the tourism sector and environmental services. Further downstream however, potential losses increase significantly, including villages (such as Kashka-Su, Baityk, Zarechnoe and Orto-Sai) and Bishkek, the capital of Kyrgyzstan. GLOFs could cause here tremendous damage to settlements, roads, power lines, agricultural lands and pastures (see more on site description in ANNEX I)

In Uzbekistan the transboundary Shakhimardan river catchment has been proposed as a project site in view of the 1998 flooding mentioned earlier. A GLOF from Alaudyn glacier lake in the Alay range discharged over 50 000 m^3 from a termokarst lake on a debris-covered dead ice zone and killed 93 residents from Uzbekistan's Shakhimardan village. A key factor leading to the heavy losses in 1998 was the lack of warning, evacuation plans and other response strategies within the Shakhimardan enclave. The selection of a pilot site in Uzbekistan will be agreed upon with national and local stakeholders during the future consultations process.

In Tajikistan the most highly exposed areas are Rivakdara and Varshezdara in the Gunt valley, Sezhdara and Durumdara in the upper Shahdara; Khidorjevdara, Sharfdara and dastdara (where in 2002 a GLOF event occurred) in the lower Shahdara. Among several GLOF-prone sites, the valley of lower Zaravshan has been suggested as pilot site in the northwest of the country, with total population of 57,493. In this area seven potentially dangerous glacier lakes have been identified. The selection of a pilot site in Tajikistan will be agreed upon with national and local stakeholders during the future consultations process.

The proposed project would address such crucial shortcomings, and thereby significantly reduce societal vulnerabilities to future GLOF events, and ultimately minimise human and economic losses.

Finally, at the policy level, the project will provide an enabling environment for the integration of CCA and risk management considerations into GLOF-affected sectors, such as land use planning, agriculture, forestry and disaster management. The interface between the policy level and local level institutions will be enhanced, in order to ensure evidence-based policy making that is informed by community needs. Involvement of communities and other stakeholders throughout the planning and design to the implementation and monitoring stages of the project will further enhance the economic and social benefits of the project, and ensure that communities are empowered to be in charge of their own protection from climate-induced risks.

Implementation of the project, and particularly the EWS, will strictly adhere to local environmental policies and best practices. A typical GLOF EWS does not contribute towards any foreseeable negative environmental impacts. On the societal level, early engagement of the community and other stakeholders within the project scoping and implementation state will ensure the needs, expectations and wishes of the community are addressed.

Since women and men are affected differently by disasters and climate change, their different vulnerabilities and capacities will be analysed, and their gender-specific concerns and priorities will be addressed. Women will be recognized for their resilience in the face of disaster, and for the roles they play as active agents of change in helping communities to recover and adapt. The aim is that during the project cycle, the policy work contributes to gender equality by improving the balance of power between women and men in the CA region to improve adaptation and resilience to climate change, thus contributing to SDG 5 of the 2030 Agenda. In the CA region, especially in rural and mountainous areas, women are responsible for maintaining households due to the outmigration of the working population, primarily men, in order to earn money in cities and abroad. As a rule, however, these women do not have a right to a voice in decision-making processes. Therefore, in the course of the project it is essential to support and increase women’s participatory and leadership role in addressing GLOFs risk reduction in their communities.

Special attention will be paid to the most vulnerable communities, namely, indigenous and ethnic minorities in mountainous areas, by developing of evidence-based adaptation practices. The project sites are home to many indigenous cultures as well as ethnic minorities, which often belong to socially-disadvantaged groups. In Tajikistan only for example the Pamir region is inhabited by Shughnis, Rushanis, Wakhis, Yazgulyamis, Ishkashimis and other groups (Gunt Valley and Shakhdara River valley) while another minority, Yaghnobi people inhabit Zeravshan valley, which is also one of the potential pilot site for the project. These communities are being most directly affected by the climate change impact on glacier melting, which resulted in occurrence of frequent and vast mudflows, damaging houses, and destroying the pastries and irrigation channels. Therefore the vulnerability assessment under component 2 will be carried out in close consultation with and involvement of the exposed community members in each participating country to assess the existing exposure of households, ensuring that the most vulnerable groups in the most exposed locations receive the most benefit from the project.

D. *Describe or provide an analysis of the cost-effectiveness of the proposed project / programme and explain how the regional approach would support cost-effectiveness.*

The cost-effectiveness of the proposed project relates to both the efficient and innovative implementation of the project components, but also the indirect cost-effectiveness as measured on the basis of the increased resilience and reduced vulnerability delivered by it.

On the implementation level, the regional approach of the program will enable methods and approaches to be replicated across countries, with lessons learned and best practices shared between partners. The hazard and risk assessment in Component I will be based on freely available remotely sensed imagery and datasets, using techniques that have been optimised for regional-scale applications. Following the identification of risk hot spots adaptation resources can then be targeted to the most critical locations, and implementation tailored to the local environmental and societal context. Tangible outputs emerging from the program (e.g., guidance documents, policy briefs, education and training materials, web portal) will be based on common templates, which are subsequently fine-tuned for each country, minimising the duplication of efforts and enhancing the cost-effectiveness of program implementation. Remote sensing is considered as the most effective first phase approach in GLOF risk reduction and preparedness. Under this project it will facilitate rapid and complete coverage of large and extremely remote mountainous areas, thus allowing to identify potentially dangerous localities, including at trans-boundary level, for closer study. In this manner, time and expense are reduced.

The damage caused by GLOFs can be very high, not only for primary damage (loss of life, damage to infrastructure, buildings and agricultural land), but also secondary effects (e.g., disruption of main traffic axes, energy supply, and economic isolation of

entire regions), as seen in the aftermath of the July 2015 mudflow in the Gorno-Badakhshan Autonomous Oblast (GBAO) of Tajikistan, where 80% of the communities in GBAO did not have electricity due to infrastructure damage and a temporary lake threatened downstream hydropower plants and infrastructure, including in a neighbouring Oblast. Relief and rehabilitation costs related to GLOF disasters normally vastly exceed the cost of DRR measures, in particular if secondary damages are considered as well. Hence the implementation costs of EWS can be significantly outweighed by the direct avoidance or reduction in damages caused by a GLOF event.

Where possible, links to existing regional programmes and activities will be established and strengthened. The project will utilize existing national institutions, NGOs working locally, including FOCUS in Tajikistan, which will reduce transaction costs. The project will make use of these already established projects, thus diversifying financial risks and increasing financial flexibility.

Furthermore, the integrated EWS implementations to be elaborated in this project, can draw on the experience gained by the partners from universities in Switzerland over several years, in the Andes of South America, where pioneering GLOF EWS have been designed and implemented. This expertise is complemented by long-lasting experience in cryospheric monitoring with different techniques in many mountain regions worldwide, including glaciers in the Pamir and Tien Shan. In both South America and Central Asia, the Swiss partners are long-term strategic partners from the Swiss Agency for Development and Collaboration (SDC). Integrating this know-how, directly into the proposed Central Asia project, including the experience in capacity building for the academic, public and private sectors, brings significant benefits and enhances cost-effectiveness.

In addition to the cost-effective benefits relating to the EWS, emphasis in this project is given to capacity building and training at multiple levels of society (see component 5). These relatively low-cost activities represent classic “no-regret” adaptation responses, which will bring immediate benefits to the communities, while also offering benefits over a range of possible future scenarios. In other words, even if in the best-case scenario a particular EWS is never activated by a GLOF event, the implementation and associated capacity building process will have led to a significant reduction in vulnerability of the threatened communities. As a by-product, the community builds awareness and resilience not only in relation to GLOFs, but more generally in relation to climate-driven changes and related hydro-meteorological threats. At the institutional level, regional workshops will provide a cost-effective opportunity to build and enhance collaboration across Central Asia, strengthening the capacity of the region to respond to the emerging threats of climate change, and particularly those related to the cryosphere. Engagement with local universities to ensure knowledge and understanding emerging from this programme is transferred to the next generation of local scientists working in CA is

also a sustainable way of addressing knowledge on GLOF risks for future generations.

In sum: The development and application of coherent methods, procedures and activities across the region will strongly increase the cost-effectiveness, i.e. the impact per unit of investment will thus be clearly larger as compared to a local or national effort.

E. *Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist*.

The project proposal has been prepared in accordance with prevailing National Sustainable Development Strategies and Adaptation Plans. A wide range of relevant national development programs and plans of Kyrgyzstan, Tajikistan and Uzbekistan were studied to identify the countries' main priorities and needs in the field of CCA, which form the basis of the project concept. The provisions of the following documents were considered during the elaboration of the concept:

Kyrgyzstan:
- National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017;
- Program of the Kyrgyz Republic on Transition to Sustainable Development for 2013-2017;
- Priorities for Adaptation to Climate Change in the Kyrgyz Republic till 2017.

Tajikistan:
- National Action Plan for Climate Change Mitigation;
- National Communication of the Republic of Tajikistan under the UN Framework Convention on Climate Change.

Uzbekistan:
- National Strategy of Sustainable Development of Uzbekistan.

In conformity with the decisions of the Conference of the Parties to the UNFCCC, CA governments have submitted their Intended Nationally Determined Contributions (INDC), which were also considered for the project preparation. Thus, the main common aspects of the official national statements on INDC, including the reduction of vulnerability to the impacts of climate change by means of full-scale integration of climate resilience and adaptation measures into DRR area, as well as improvement of safety, livelihoods and health of the population in the context of climate change and dissemination of knowledge and experience on climate change at various levels, are also reflected in the concept document.

Relevant national strategies on DRR were also considered, including the National Strategy for Comprehensive Safety of Population and Territories of the Kyrgyz Republic from Disasters and Emergencies; National Disaster Risk Management Strategy of the Republic of Tajikistan and the State Programme of Uzbekistan on Forecasting and Preventing Emergency Situations. The DRR strategies of the CA countries are primarily in line with the priorities of the Sendai Framework, which also was instrumental for the project development.

The Sendai Framework which succeeded the Hyogo Framework of Action was adopted by UN Member States, including Kyrgyzstan, Tajikistan and Uzbekistan, on 18 March 2015 at the 3rd World Conference on Disaster Risk Reduction. As a result of this Conference, the CA countries issued a joint regional statement, where the governments of Kyrgyzstan, Tajikistan and Uzbekistan confirmed their commitments to the implementation of the Sendai Framework, emphasizing the need to consolidate the efforts of all interested parties, including international organizations, to foster regional cooperation in DRR. The Sendai Framework has become the accepted approach in dealing with DRR in Central Asia.

In their national statements on DRR the governments of Tajikistan and Kyrgyzstan have highlighted water-related disasters. Considering their prevailing transboundary effects, cooperation between the countries of the CA region was recognized as the only rational way to address water-related disasters and risks associated with them. The need to increase the resilience of populations, communities and countries to disasters, especially water-related disasters, was emphasized as one of the main focuses in implementing the Sendai Framework. Strengthening global and regional cooperation in DRR was recognized as crucial for the region.

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

EWS will build on international standards, including the components of i) understanding risks, ii) monitoring and alert, iii) communication, iv) response.

The project is in full compliance with the Environmental and Social Policy of the Adaptation Fund (see Part II L).

The project concept is in line with relevant national standards of environmental protection, human safety and protection from the natural hazards, including the following:

- GOST R 22.9.09-2014 – National Standard of Kyrgyzstan: Safety in emergency situations. General technical requirements. (since 01.06.2016);
- ST RT GOST R 14031-2010 – National standard of Tajikistan: Environment management. Assessment of ecological efficiency. General requirements.
- O'z DSt 1016:2002 – National standard of Uzbekistan: Safety in emergency situations. Monitoring and forecasting of emergency situations. Main provisions.

- O'z DSt 1017:2002 - National standard of Uzbekistan: Safety in emergency situations. Monitoring and forecasting of emergency situations. Damaging factors. Nomenclature of the parameters of damaging effects.
- O'z DSt ISO 14001:2009 - National standard of Uzbekistan: Environment management. Technical conditions and guidelines for use.

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

At present, there is no national level project in any of the Central Asian countries which exclusively addresses the need for ground-level work on GLOF risk reduction, nor is there a regional project focusing on GLOFs. Even after comprehensive analysis of various water hazard-related activities, the risk of duplication can be assessed as zero.

Therefore, the proposed project will be the only regional initiative addressing GLOFs within the full context of CCA, extending from baseline knowledge and capacity building, monitoring and anticipation, through to development and implementation of adaptation strategies. The funding required from AF thus will enable the implementation of first project in Central Asian countries with a tangible, science-, community- and evidence-based GLOF risk reduction effort.

As described under component 1 of this proposal, synergies and links will be established with the following few ongoing projects in relation to glaciers, glacier melting-related risks and CCA, to ensure the assessment of GLOF hazard and risk, and associated implementation of adaptation strategies draw upon the best available hydrometeorological and cryospheric baseline data from the region, and existing knowledge platforms:

The World Bank project (2015-2021) on "Climate Adaptation and Mitigation Program for the Aral Sea Basin", which does not cover risks associated with GLOFs and the establishment of EWS, but focuses on enhancing regionally coordinated access to improved climate change knowledge services for key stakeholders (e.g., policy makers, communities, and civil society) in CA countries, by establishing a regional climate knowledge services. It aims to provide technical assistance, as well as minor civil works, goods (including software and equipment), and training, at both the regional and national levels, to develop a unified, integrated regional analytical platform for climate-resilient and low emission development, with improved data, information, knowledge, and decision-support tools. The activities under Component 5 of the project will be coordinated closely.

One of the ongoing activities in Central Asia is the project "Debris flow and outburst flood hazard in Tian Shan under impact of changing climate (DEFenCC)" financed under the SCOPES initiative, and led by the University of Bern, Switzerland. The DEFenCC project aims primarily at improving the understanding of past and current GLOF and debris-flow processes at case study sites in the Tien Shan Mountains.

This research project has neither the budget (approximately US$ 200,000) nor mandate to complete a regional scale assessment, or to facilitate the design and implementation of adaptation strategies. However, well-established linkages between the Swiss university partners will ensure that relevant scientific understanding emerging from the DEFenCC project will feed into the larger, adaptation-focused project proposed here.

Networking with global and regional research and resource centres working on GLOF issues will be established to institutionalize a well-connected knowledge base and analytical framework. In particular linkages will be established with the FOCUS Disaster Response Team in Tajikistan, which implemented a remote geohazard capacity building and monitoring project in 13 communities in Zaravshan Valley in Tajikistan. This team will be a crucial partner in collaborating in activities under Components 2 and 4 notably, in Tajikistan.

Partnership will be also established with the SDC-funded project, implemented by the World Glacier Monitoring Service (WGMS) and the University of Fribourg in Central Asian countries (2017-2020) on “Climate Services: Enforcing and utilizing baseline data for DRR und WRM in Central Asia”. Cooperation with UNESCO is already foreseen in capacity development of young researchers in glacier monitoring and development of education modules for universities on glaciology and glacier-melting associated risks, including GLOFs. The proposed project could also benefit from data obtained in the course of the given project, thus linking it with Components 1 and 2 of the proposal.

Linkages will also be established with two other ongoing UNESCO efforts at the global level: i) The impact of glacier retreat in the Andes: International Multidisciplinary Network for Adaptation Strategies, for exchange of information including links with the Snow Glacier Networks; and ii) Addressing Water Security: Climate Impacts and Adaptation responses in Africa, Asia and LAC, on knowledge management, as well as sharing the experiences of this project with other similar initiatives in participating countries, the wider region and the international community.

ICIMOD in Nepal will also be an important source of knowledge. All knowledge, experiences and information will flow into the knowledge management (KM) system (see H. below)

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

Knowledge is defined as the understanding of reality based on people’s experience, analysis and exchange. In the context of the proposed project, knowledge is recognized as the key to adapt successfully to climate change in the mountainous areas of Kyrgyzstan, Tajikistan and Uzbekistan. This knowledge has to be created,

co-produced, compiled and made available for stakeholders and the interested public.

As described in Section A of Part II of this document, the project will develop an internationally, regionally, nationally and locally institutionalized knowledge base and analytical framework for long-term tracking and management of GLOF and related climate change risks in the target countries. A result based KM system will be designed and implemented in consultation with all stakeholders using the latest technical expertise. A KM platform needs to tailored to the local context and is a strategic part of the project. It reflects the activities and outputs all five components of the project. Clear mechanisms to manage knowledge and share/disseminate experiences need to be defined and created from the beginning. These mechanisms need to be institutionalized at a national and regional level such that the benefits of the regional cooperation are sustainable.

Guiding principles and objectives for the KM system are:
- Keeping track of experience gained, presenting global, national and especially local knowledge on CCA with special reference to GLOFs, what kind of interventions work, identification of learning objectives and indicators;
- Develop an enabling environment for sharing the climate change knowledge amongst the CA stakeholders;
- Establish a climate change KM coordination framework, which engages all stakeholders;
- Develop the capacity of the coordinating unit to effectively lead the management of GLOF/climate change knowledge;
- Develop and implement a mechanism for monitoring the application of GLOF/climate change knowledge by policy makers and people at the frontline of climate change impacts;
- Maintain a robust and up-to-date GLOF/climate change KM system.

The KM system is a central part of the overall communication strategy of the project. It has to be developed with the participation of all project partners and stakeholders to identify the needs and capabilities of everybody directly involved and of all relevant target groups (media, politicians, public). The aim is to get strong identification with the project, to develop ownership and have a high visibility, which will eventually lead to sustainability.

As a regional project there will be challenges from a language (English, Russian, Kyrgyz, Tajik, Uzbek), as well as from a technological (web-based, multi-media, radio, TV, print) point of view. It will be crucial to communicate effectively and efficiently. Therefore, a communication strategy for the project will be developed and implemented, which will highlight dissemination of project experiences to communities, educational institutions, NGOs, Civil Society Organizations, private sector institutions with a stake in the issue, and the larger public. This strategy will detail the use of print and electronic media and other communication channels (roundtables, participative community workshops, posters, brochures, booklets,

pamphlets, news articles, radio and TV broadcasts, and web-based items). Lessons learnt from the project will be provided via a number of national, regional and international communication channels to increase their outreach (including radio and TV news pieces). This will enable adoption of project experiences in the up-scaling of EWS and other response strategies outside of the immediate project area.

In addition, this project's web site will serve as a workspace to be shared by project experts and stakeholders. Awareness campaigns through social media to the public and available communication tools for reaching the most remote populations are planned. Highest priority will be given to sustainability. Web site/resources beyond the duration of the project must be maintained. This can be achieved through a strong involvement of national governments, regional institutions and NGOs.

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

The declaration of the International conference on water-related natural disaster reduction, held in 2008 in Dushanbe, stated that research on the impacts of climate variability and change on water related disasters should be increased, in particular with the aim to develop adaptation strategies and mitigation measures. Water scarcity coupled with climate change related disasters was also recognized as a critical challenge in the CA region during the high level international conference on the implementation of the "Water for Life" decade, held in Dushanbe in June 2015.

Similarly, UNESCO with partner agencies such as the UN Centre for Preventive Diplomacy in Central Asia (UNRCCA), the World Bank, International Fund for Saving the Aral Sea (IFAS) in 2013 started an initiative on *"The Impact of Glaciers Melting in Central Asia on National and Trans-Boundary Water Systems"*, bringing together scientists and policy makers to discuss the issue of climate change and agree on a joint roadmap*.* During the international seminar in Almaty, Kazakhstan, April 2013, it was highlighted that natural disasters like landslides and GLOFs will affect the socio-economic development of the region.

In a follow-up seminar, held in Dushanbe, Tajikistan in November 2014, with participation of delegations (national representatives) of five CA states and Afghanistan, a special action plan was designed on glacier monitoring and glacier-induced hazard risk reduction, in which the GLOFs were highlighted[3]. During the last seminar, held in Bishkek, Kyrgyzstan in November 2016, which discussed the progress made on the Dushanbe, and during which the project proposal was reviewed by all CA country participants and international experts in a group work, the following was agreed:

[3] http://unrcca.unmissions.org/Portals/unrcca/Articles%20and%20Publications/Glacier_book_ENG.pdf

- To support UNESCO's project proposal "Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate" for Kyrgyzstan, Tajikistan and Uzbekistan to be submitted for funding to the Adaptation Fund.
- To support the interest of Kazakhstan and Afghanistan to participate in the above project.
- To develop uniform criteria of glacier lake outburst risk, their classification and the assessment of risk and vulnerability of the population living below the mountain valleys.
- To develop a methodology for glacier lake monitoring and EWS in the project countries.
- To facilitate the organization of glacier lake monitoring in the project countries.
- Three key areas for each participating country were suggested as potential project sites, but more information needs to be obtained *in situ*.
- To analyse and evaluate existing projects/data/situation in the field of GLOFs.
- To recommend undertaking a socio-economic analysis of risks for the population and infrastructure in the potential project sites.
- To promote education/training for local communities in the potential project sites, as well as strengthen the training of specialists in the field of glacier lake monitoring and installation of EWS.

The project proposal has been prepared in accordance with prevailing National Sustainable Development Strategies, Adaptation Plans and DRR strategies. A wide range of relevant national development programs and plans of Kyrgyzstan, Tajikistan and Uzbekistan were studied to identify the countries' main priorities and needs in the field of CCA, which form the basis of the project concept.

The capacity and needs assessments were conducted by UNESCO from the end of 2014, during and following the above UNESCO co-organized seminars held on the topic of Glacier Melting and Climate Change, implemented in close cooperation with relevant government and scientific counterparts in DRR and water from the region.

From September 2015 to July 2017 additional consultations were conducted with preselected potential project partners in countries and international partners/experts in the area in the course of various meetings. Ensuring that the identified area for action would meet the priorities and needs of the Governments and receive support from key national partners was crucial. For this purpose, UNESCO held consultative meetings with number of international actors involved in DRR and CCA active in each country, but notably national institutions that are involved in this subject (Ministries of Emergency Situations, State Agencies on Environment Protection and Forestry, Academy of Sciences, research institutions, NGOs). Separate consultations on specifically on the project proposal were held in Kyrgyzstan (including community level) in February 2017 and in Tajikistan in April 2017. All these consultations proved successful and received full support by key national partners and relevant government counterparts. More consultations are needed in

order to agree on the full project proposal and notably on identification of pilot areas for Tajikistan and Uzbekistan.

Given unanimous requests from the countries for support in the field of DRR, UNESCO's high reputation and earned trust in CA, and the very positive response obtained during the various consultations on project design that took place during preparation of the present concept, there is great confidence in the potential success of this project.

It must be pointed out that discussions are ongoing with Kazakhstan's authorities on technical aspects for joining the project, more consultations will take place in the next phase, during the full project proposal preparation. An endorsement letter for the project concept has been received by the Committee on Emergency Situations, Ministry of Internal Affairs of Kazakhstan in July 2016.

The whole consultation and project drafting process was guided by the AF recommended approach as described in the AF documents: Results Framework and Baseline Guidance - Project Level, Environmental and Social Policy of November 1003 and the Instructions for Preparing a Request for Project Funding of November 2013. Thereby special attention has been given to the inclusion of marginalized groups, women, ethnic minorities, indigenous people.

The stakeholder Involvement Plan is tentatively as follows, and it will be finalized for the full proposal:

List of Stakeholders/Name of Agencies
Kyrgyzstan: 1. Ministry of Emergency Situations 2. Central Asian Institute for Applied Geosciences (CAIAG) 3. University of Central Asia 4. Kyrgyz National University 5. State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic 6. Kyrgyzhydromet 7. Local government in the Ala-Archa project site area 8. Institute of Water Problems and Hydro-Power, National Academy of Sciences **Tajikistan**: 1. Committee of Emergency Situations and Civil Defence under the Government of the Republic of Tajikistan 2. Ministry of Energy and Water Resources 3. Committee for Environmental Protection under the Government of the Republic of Tajikistan 4. Tajikistan National Agency for Hydrometeorology (Tajik Hydromet) 5. Institute of Geology, Academy of Sciences 6. Department of Geology under the Government of Tajikistan 7. Institute of Water Problems, Academy of Sciences

8. Tajik National University 9. Centre on Climate Change and DRR 10. Local government in the project site area 11. FOCUS and NGOs (TBD) **Uzbekistan**: 1. Ministry of Emergency Situations 2. State Committee of the Republic of Uzbekistan for Nature Protection 3. Centre of Hydrometeorological Service at Cabinet of Ministers of the Republic of Uzbekistan (Uzhydromet) 4. National University of Uzbekistan named after Mirzo Ulugbek 5. Institute of Geology, Academy of Sciences 6. Local government in the project site area
Regional stakeholders: 1. Central Asian Regional Glaciological Centre under the auspices of UNESCO (Almaty, Kazakhstan) - TBC 2. Regional Environmental Centre for Central Asia (CAREC)
International stakeholders and partners: 1. Zurich and Fribourg Universities, Switzerland 2. UN agencies involved in DRR and CCA 3. International Financial Institutions (IFI) 4. Bi-lateral aid agencies 5. Research institutes 6. ICIMOD

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

Component 1: Consolidating common knowledge and building capacities of responsible institutions/authorities to apply advanced methods and technologies in glacier lake monitoring and evolution.

Baseline (without AF resources):

The Soviet Union had a long tradition in glaciology and a strong hydro-meteorological monitoring system with well-trained specialists. After the fall of the Soviet Union this system collapsed and the CA states found themselves left alone with the consequence that most research on and monitoring of glaciers ceased for decades. With financial and technical support of IFIs and bi-lateral aid agencies the situation changed slowly with the result that knowledge about climate change and the effects of glacier melting in the CA mountains became available: “The situation is alarming - glaciers melt at a very fast rate”. Today no comprehensive or homogenous first order mapping and monitoring program on the regional level has been implemented, and databases on glacier lakes remain unequally developed and maintained. The lack of a regional approach to monitoring glacial lake development means that the threats are not addressed equally and there is no common basis for

the design of response and adaptation strategies. Without a common regional approach, lakes which may provoke far-reaching or transboundary floods have not been systematically addressed. Monitoring systems are installed sporadically. The level of expertise within local responsible authorities remains unequal both between countries as well as between areas with different population levels. The involvement and capacity of the young scientists remains extremely low.

Adaptation alternative (with AF funding):

In conjunction with greater regional cooperation in the framework of this project, the strengthening of relevant institutions will take place for developing strategies towards hazards of a trans-boundary nature, such as GLOFs. Responsible authorities extend their capabilities beyond simply monitoring known threats, to the anticipation of where new potentially hazardous lakes will emerge as glaciers continue to retreat, allowing adaptation planning to be forward looking, and avoiding possible maladaptation. Rapidly emerging threats are identified and a common approach to monitoring and reporting lake developments is implemented across the region, with particular emphasis given to transboundary catchments. The causes and processes leading to hazardous lake formation are understood, and communicated to a wide-range of stakeholders. Engaging communities within the knowledge generation process enhances their understanding of the changing natural environment in which they live, and raises their awareness of the threats that are faced. In this manner, knowledge and awareness become the foundation for building resilience and reducing societal vulnerabilities. Regional workshops and joint training enables knowledge to be exchanged and methodologies fine-tuned based on local experiences. Training of the next generation of young scientists ensures the long-term sustainability of the monitoring programmes across the region.

Component 2: GLOF vulnerability and risk assessment and elaboration of policy recommendations for adaptation

Baseline (without AF resources):

No comprehensive or homogeneous first order GLOF risk assessment has been completed for Central Asia, meaning that some significant threats could remain undetected. Without a common assessment framework, the regional distribution of GLOF risk remains unclear and transboundary threats have not been systematically assessed. This may have prevented capacity building programs and other adaptation initiatives from reaching the most endangered or marginal communities and sectors, where potential losses from GLOFs could be greatest. Consideration has not been given to the possible changes in frequency and magnitude of future GLOF events, or change in exposure of communities and infrastructure, that will result from the growth and formation of new lakes over coming decades.

Adaptation alternative (with AF funding):

A first homogeneous assessment of GLOF risk across Kyrgyzstan, Tajikistan and Uzbekistan, providing the scientific basis for informed and collaborative adaptation planning. Risk hot spots are identified under both current and future climatic conditions, allowing adaptation resources to be targeted to those locations where society or sectors can benefit most. Within these hot spots, local hazard maps created for both current and future conditions, and exposed communities engaged with local authorities to develop a set of possible adaptation solutions, which are firmly embedded and supported within the local context. Transboundary risks identified and communicated across partner countries.

Component 3: Elaboration of EWS technologies, tailored to local contexts to ensure long-term maintenance and sustainability

Baseline (without AF resources):

The country preparedness and capacity of risk mitigation remains uneven including country capacity to react in case of the transboundary threats. Information for local communities is dispersed unevenly, and threats to remote and indigenous communities remain higher in all countries. Usually in CA the ministries have disaster management departments at national as well as province level and, in some cases, district level. However, a common problem is the general lack of equipment and finance available to these entities. Furthermore, despite the large amount of information that is available to them, resources and working practices are outdated. Another issue involves forecasting departments which although they are included within the ministries and have a good technical understanding of disaster prevention and preparedness, they lack a practical approach and coordination. As indicated by Tajik authorities, there is a lack of EWS on geohazards and water-related hazards. Moreover, those that exist are not properly translated into the local context, and local populations (local communities are not educated) especially the most vulnerable, remain at a highest risk from these hazards.

Adaptation alternative (with AF funding):

Institutional mechanisms and framework conditions for effective DRR are established in all three countries, enabling transboundary hazards to be addressed as well. For the selected sites (one in each country) an adequate EWS solution is designed and implementation plans are elaborated, based on the findings of component 2 and taking into account the local knowledge as well as the needs of the potentially affected population. On the local and regional level, roles and responsibilities related to the designed EWS are clarified between involved authorities to ensure better coordination. The established institutional mechanisms allow not only the successful implementation of the designed GLOF EWS, but provide the required framework conditions for effective DRR in general. Local

populations, especially the most vulnerable are engaged, informed, educated, and develop GLOFs resilience.

Component 4: Targeted demonstration project to introduce technologies and best practices for EWS for glacier lakes

Baseline (without AF resources):

The capacity of local research and public institutions, as well as companies will continue to evolve only slowly and sporadically.

There is currently a lack of complex, comprehensive and coordinated EWS in Central Asia. Only in few places some hydrological measurements are taken, with cameras installed, for example in Kyrgyzstan in Aksai valley, or monitoring of some lakes in Tajikistan is taking place from helicopters. However no complex and coordinated system exists up to date in each of the countries. Besides the EWS response protocols remains outdated and uncoordinated between the countries, which is extremely important in case of Kyrgyzstan and Uzbekistan where the hazard has a transboundary nature.

Adaptation alternative (with AF funding):

At one site a state-of-the-art EWS for GLOFs has been implemented in collaboration with the local private sector. The EWS is operated by the responsible authorities, which were capacitated and trained for the operational service and maintenance. Financing for long-term maintenance is assured. Authorities and local population are well-trained to respond immediately and appropriately if a warning is activated. This demonstration EWS serves as an example for information and capacity building of authorities from the other two countries, and lessons learnt from this implementation can be transferred and scaled up to other potential EWS implementation sites in CA and beyond.

Component 5: Establishing synergies and synchronising knowledge exchange, stakeholder engagement and communication activities

Baseline (without AF resources): Despite numerous international/regional meetings and conferences, institutionalised knowledge exchange between countries/stakeholders remains very low, especially between responsible government bodies. Modern communication media (e.g., web-based knowledge exchange platforms) have not been developed in the context of CCA and disaster risk management. Emergency preparedness remains uneven between communities, especially for those communities for which the level of threat is currently deemed low, but which might change in the future.

Adaptation alternative (with AF funding):

Risks associated with the rapidly changing cryosphere are elevated to be both a focus and stimuli for regional cooperation and exchange in the area of CCA across Central Asia. All key stakeholders have access to the knowledge and information needed for robust adaptation planning. Technical capacities and financial strategies are in place to ensure the long-term maintenance and sustainability of monitoring and adaptation strategies, and to ensure knowledge exchange mechanisms (e.g., the web-platform) remain active and accessible to all stakeholders. Permanent mechanisms are in place to ensure that local knowledge continues to feed into the decision making process, and vice-versa, enhanced communication is maintained between the authorities and communities. Lessons learned and best practices established from the implemented project serve as a template for regional-scale CCA projects across high mountains in Asia, and more globally.

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

The project idea and design is the result of a long process, which started during consultations with CA governments and discussions during conferences and national and local consultations over the last three years. From the very beginning sustainability was the guiding principle when defining objectives, expected outcomes, outputs and activities of this project.

The project builds on existing institutions and will work out accepted mechanisms for efficient DRR action. Involvement of and close collaboration with Governments and responsible regional and national and local authorities at all stages of the project are crucial as well as collaboration with and involvement of the local population from the beginning of the design throughout the entire implementation. The involvement of school children in local educational programmes, as well as strengthening knowledge of students - future researchers in Central Asia - also contributes towards sustainability in addressing GLOF risks.

The following strategies and lines of action are planned to secure sustainability of the EWS:
Sustainability must be ensured along three main components of the EWS, which are 1) technical, 2) institutional, 3) social components. Full sustainability can only be achieved when all three components are sustainable on their own but also in relation to the other two:
1. Sustainability on a technical level requires appropriate technical instruments for the local conditions, both in terms of physical high-mountain environment and local technical capacities available at the sites and in the region. The technical components of the EWS need to be adapted to local capacities, including to a level that capacities can be built and strengthened within the project.

2. Sustainability on an institutional level is particularly important and the frequent source of failure as past experience demonstrates. Technical capacities of the responsible institutions are again an important element but not sufficient. Clear responsibilities need to be defined during the process of the design and implementation of the EWS. Key is the long-term maintenance of the EWS and for this purpose financial and personnel resources need to be planned and secured in the budgets of the local or national institutions. Budget restrictions need to be taken into account from the beginning of the project.
3. Sustainability on the social level can only be achieved when the EWS has high acceptance within the local population. Their involvement from the beginning is critical to achieve this objective. The social conditions need to be carefully analysed from the beginning and strategies be defined to achieve long-term acceptance and support by the local affected population. Ownership is the ultimate objective.
4.
The following aspects, derived from different project components, will also contribute to the sustainability of the project:

- Capacity development at multiple levels will ensure that the countries are well equipped and motivated to maintain long-term, sustainable adaptation strategies implemented under this project.
- Education, capacity building and twinning programmes developed and implemented in local universities, will ensure that young local scientists are equipped with fundamental knowledge regarding the cryosphere, glacier lakes, and related hazards.
- Identifying a company/institute, if possible locally, to take over the technical engineering, including the acquisition of suitable equipment, the construction of the EWS stations, and the electronic and software engineering for the data transfer, processing and storages, is also foreseen.
- A maintenance and financing strategy will be developed during the project for ensuring long-term sustainability of the EWS in the countries.

The urgency of the matter is also underlined by an increasing number of natural hazards, which for example took place this summer in the Panj river basin along the Tajik-Afghan border. Entire villages were buried by mudflows, the river changed its course and the Pamir highway was blocked for 10 days. The dangers are real and the governments in the region recognize that non-action is more expensive than action and they ask the international community to make knowledge, information and experience available. Because of more and more reoccurring water-related hazards the governments are increasingly concerned and therefore projects to monitoring of glacier lakes, thus adapt to climate change, will become a high priority and subsequently will lead to sustainability.

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

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	*The project is in compliance with all applicable domestic and international laws.*	
Access and Equity	*The project does not exacerbate existing inequities. On the contrary marginalized and vulnerable groups in the targeted mountainous areas will benefit from the project through the provision of knowledge and participation in project activities.*	
Marginalized and Vulnerable Groups		*Impacts on these groups will be positive as particularly women and children and marginalised communities, such as socio-economically disadvantaged, ethnic minorities, will be strongly involved in activities.*
Human Rights	*Through knowledge, high visibility, participation and transparency the project will make a positive contribution to the promotion of international human rights*	
Gender Equity and Women's Empowerment		*Men and women will participate fully and equitably. Gender assessment in the target communities*
Core Labour Rights	*Core labour standards will be respected.*	

Indigenous Peoples		*Participation in the project of indigenous people must be guaranteed and encouraged by the local authorities*
Involuntary Resettlement	*There is no involuntary resettlement planned*	
Protection of Natural Habitats	*As a side effect of the project the natural habitat will be protected.*	
Conservation of Biological Diversity	*There will be no significant or unjustified reduction or loss of biological diversity or the introduction of known invasive species.*	
Climate Change		*We anticipate small positive influences on climate change, through flood risk reduction measure such as flood-plain reforestation, green spaces etc. which have a positive CO^2 balance.*
Pollution Prevention and Resource Efficiency	*Not applicable*	
Public Health		*Injuries and loss of life will be prevented through the flood DRR strategies implemented in this project.*
Physical and Cultural Heritage		*Village and community infrastructure, including cultural assets will be protected through DRR strategies implemented in this project.*
Lands and Soil Conservation	*As a consequence of the project soil conservation will take place and the degradation of productive lands prevented.*	

PART III: IMPLEMENTATION ARRANGEMENTS

A. *Describe the arrangements for project / programme management at the regional and national level, including coordination arrangements within countries and among them. Describe how the potential to partner with national institutions, and when possible, national implementing entities (NIEs), has been considered, and included in the management arrangements.*

This project will be implemented by the UNESCO Regional Office in Almaty in collaboration with the Governments of Kyrgyzstan, Tajikistan and Uzbekistan and in partnership with the Universities of Zurich and Fribourg, Switzerland, as well as the participation of national and regional institutions and authorities.

A unique strength of this project will be the integration of international expertise and experience from the Swiss partners, with regional and local experts in Central Asia under the auspices of UNESCO. To optimise the exchange of knowledge and capacity building between partners, all project activities will be implemented with teams consisting of experts at various levels.

As the UN specialized agency in the sciences, UNESCO aims at developing a deeper scientific comprehension of the occurrence and distribution of natural hazards in time and space. By operating at the interface between natural and social sciences, education, culture and communication, UNESCO plays a vital role in constructing a global culture of resilient communities. The Organization is closely involved in the conceptual shift in thinking away from post-disaster reaction to pre-disaster action. UNESCO has many scientific programmes in place that deal with the study of natural hazards and the mitigation of their effects. UNESCO is committed to the Sendai Framework and operates in accordance with its four Priorities for Action. Specifically, UNESCO's mandate and mission in the field of disaster risk reduction. UNESCO also works to build the scientific knowledge base to help countries manage their water resources in a sustainable way through the UNESCO International Hydrological Programme (IHP). In close cooperation with scientists worldwide, the IHP plays a vital role to establish a scientific and technological base for the sustainable management of water resources threatened by global climate change. The IHP strategy (Phase VIII, 2014-2020), "Water Security: Responses to Local, Regional and Global Challenges" among other themes is focusing on water-related disasters. UNESCO is coordinating projects and activities at global level on scientific collaboration including monitoring glaciers, snow and permafrost conditions and evaluating the implications of climate change on water resources and will provide feedback to develop appropriate adaptive strategies that countries need.

UNESCO is engaged in supporting capacity building activities in glacier monitoring. It has been co-organizing and co-sponsoring trainings for young specialists from the CA (both in Tien Shan and Pamir mountains) and Andean region in the methods of glaciological monitoring for determining the parameters of glaciers mass balance.

Two summer schools on “Glacier Mass Balance Measurements and Analysis for young researchers from Kyrgyzstan, Tajikistan and Russia” and “Permafrost and Potentially Dangerous Glacier Lakes”, were held in July - August 2016 in Kyrgyzstan, supported by UNESCO.

The University of Zurich has longstanding experience and a scientific track record in glacier lake research, including aspects of past and future lake formation, lake and slope instability assessment and monitoring, both on the ground and by remote sensing methods, GLOF modelling, as well as assessment of hazards, vulnerabilities and risks. Recently, the University of Zurich has been instrumental in designing and implementing GLOF early warning systems in the Andes of Peru, in close collaboration with national and local partners from the public and private sectors and governmental authorities. Further recent expertise is also available from collaborations on GLOFs in Pakistan, India or Tajikistan, including capacity building of local experts, both governmental and non-governmental.

The project technical and scientific activities will be conducted under the guidance of the UNESCO staff in UNESCO Almaty Office in consultation with UNESCO Headquarters in Paris and in cooperation with the UNESCO National Office in Tashkent (for Uzbekistan). UNESCO will have responsibility to secure the establishment and supervision of the Project Management Unit (PMU) that will be located in the UNESCO Almaty Office.

Financial management of the funding is the responsibility of UNESCO. It will manage the funds in accordance with its financial rules and regulations, monitor expenditures and maintain fiscal oversight of all expenditures.

The management structure will be as follows:

Project Steering Committee (PSC) will be established, which will provide strategic guidance for the implementation of the project. The PSC will be chaired by UNESCO, composed of one senior government official from each country, UNESCO representatives, main international implementing partners, as well as the project manager. The PSC will oversee the project execution and will act as the main policy guidance body for it.

The Project Management Unit (PMU) which will be based in UNESCO Almaty Office, has the following tasks:
- co-ordinating institutional arrangements for management of the activities in the participating countries, the information sharing committee and the steering committee;
- co-ordinating policy and legislative development regarding GLOF;
- development of the KM and communication strategy;
- overseeing awareness and education activities;
- ensuring that possible partner agency programmes are fully integrated into the project framework;

- monitoring the results of the demonstration projects and supporting their integration into wider development programmes;
- monitoring technical assistance provided by the contracting agencies, including all institutional strengthening services provided to local communities and government bodies;
- monitoring all training activities;
- ensuring linkages to regional GLOF activities;
- reviewing annual work plans;
- developing the KM system.

Information and Experience Sharing Committee (IESC) will be established as part of the project and will represent a hub for international cooperation within the project's context and beyond. It will have an interministerial nature, formed by high level representatives of the various governmental agencies/ministries of the three countries involved in CCA and DRR. Its composition, functions and structure will be agreed upon among countries during the next stage of the project proposal.

National Execution Teams (NET) will be established in each of the three project countries. The NET will be headed by the national coordinator and one to three national experts. National coordinators will assist the Project Manager in coordinating project activities, they will also assist in securing regular engagement and coordination with the regional and local organizations, institutions and authorities involved in project implementation. They will be chosen among candidates nominated by the countries on the basis of agreed criteria.

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

Mitigation measures against unexpected circumstances will be considered in the full project design, which will be defined through an inception phase undertaken with all involved stakeholders. Potential risks include:

Risks:	Mitigation measures/strategy
Financial and Economic	
• The overall economic situation is deteriorating and migrant workers are returning to Central Asia and governments in the region do not consider DRR a high priority any more. • Governments reduce their funding for DRR	The project will ensure that the necessity for DRR is continuously emphasized through public awareness campaigns, meetings with specialists and decision makers. Parliamentary committees will be kept educated through translation of project results into policy briefs.

Technical	
• The proposed technical solutions might prove to be too ambitious. • The web-based management/content management system might face acceptance problems. • There is a lack of internet access in rural areas.	Early involvement of stakeholders in project planning to ensure solutions meets with their expectations and requirements. Main EWS strategy will planned in a way that a lower technical solution will be feasible, too Instead of only internet access based solutions, also 3G / 4G solution will be considered. The project will lobby for affordable internet access in mountainous areas.
Social and Political	
• The political and security situation in pilot districts may affect project implementation or weaken the interest of stakeholders to address adaptation planning issues. • Lack of incentives for local communities to cooperate in activities that do not yield immediate results, but aim at longer-term resilience, may reduce stakeholder engagement and strong participation. • Implementing partners for local level initiatives and pilot sites for project implementation may shift during project implementation, due to unforeseen (e.g. political, lack of interest) reasons. • Hazard and risk mapping can lead to marginalised and vulnerable communities being potentially victimised, when their land-holdings or habitations are identified as being located within high risk zones.	Project implementation is based on a combination of field-based investigations and remotely based monitoring. Can be tailored in the event of political or security instability. Our project will emphasize DRR strategies that bring both immediate and longer term benefits. For example, “no-regret” adaptation strategies. Early and ongoing engagement with communities will be critical, so that they are aware of the benefits to their lives and livelihoods. The project will engage and communicate with a wide-range of local experts and implementing partners, so that there is no dependency on a single agency.

	The comprehensive training undertaken with local authorities and decision-makers will highlight the full range of adaptation options available. EWS is a measure which protects exposed people and resources, and enables inhabitants to live safely in high risk zones. This avoids their victimisation.
Institutional/Management/Governance	
• Delays in recruitment of qualified project staff may affect the timeframe of project activities. • Government and non-governmental agencies do not contribute adequately to the project at different levels. Changing staff is slowing down project implementation.	Providing good perspective to collaborators in order to keep them in the project. Top government officials consider the project as a high priority Ensure local governments take ownership of the project through early engagement. Participation of local government officers to partner countries (e.g. Switzerland) where they may learn from common experiences with CCA. Capacity building at university level, to ensure next generation of young scientists is well qualified for future government positions.
Environmental	
• Adverse climatic conditions may damage adaptation measures being implemented. • Technical construction of the EWS requires access and	Project implementation will use latest best-practices and equipment used and proven in harsh

some potential disturbance to the natural landscape, at least during the installation phase. • Identified high risk flood zones may be considered of low importance for environmental protection, and therefore neglected.	environmental conditions. The technical equipment does not require heavy lifting or transportation, minimising disturbances to the natural environment during the installation phases. EWS represent an environmentally friendly adaptation measure, with no permanent alteration of the natural landscape (compared to engineering measures for example). Training of communities and local authorities will highlight the importance of maintaining and even enhancing the natural environment in high risk flood zones. For example vegetation stabilises river banks and reduces erosion.

Over the course of the project, a risk log will be regularly updated at intervals of no less than every six months in which critical risks to the project have been identified and addressed.

Consistent involvement of a diverse set of partners, including local government agencies/departments, NGOs and communities will further reduce these risks.

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

The proposal is considered a category B project, where all risks identified above are small in scale, reversible and can be easily mitigated. Please see also Part II B.

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

Project M&E will be in accordance with established UNESCO procedures.

Dedicated support by the PMU of the UNESCO Regional Office in Almaty will be provided on a regular basis. A comprehensive Results Framework of the project will be defined with execution indicators for project implementation as well as the respective means of verification. An M&E system for the project will be established based on these indicators and means of verification. Targeted M&E activities for the proposed project include the following:

A Project Inception Workshop will be conducted within three months of project start up with the full project team, relevant government counterparts and UNESCO. The Inception Workshop is crucial for building ownership for the project and to work out the first year annual work plan. An objective of the Inception Workshop will be to present the modalities of project implementation and execution, document agreement for the proposed executive arrangements amongst stakeholders, and to assist the project team to understand and take ownership of the project's goals and objectives. Another key objective of the Inception Workshop is to introduce the project team which will be instrumental in project implementation. An Inception Workshop Report will be prepared and shared with participants to formalize agreements decided during the meeting.

A risk log will be regularly updated at intervals of no less than every six months in which critical risks to the project have been identified. Half yearly Progress Reports will be prepared by the PMU and verified by the Project Steering Committee. Annual Project Reports will be prepared to monitor progress made since the start of the project and in particular for the previous reporting period. These annual reports include, but are not limited to, reporting on the following:

• Progress made towards project objectives and project outcomes - each with indicators, baseline data and end-of-project targets;
• Project outputs delivered per project Outcome (annual);
• Lessons learned/good practices;
• Annual expenditure reports;
• Reporting on project risk management.

Government authorities, members of Steering Committees and PMU will conduct regular field visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress.

In terms of financial monitoring, UNESCO will provide with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by a legally recognized auditor of the Government, or by a commercial auditor engaged by the Government (TBC). The project will undergo an independent Mid-Term Evaluation (MTE) at the mid-point of project implementation, which will determine progress being made toward the achievement of outcomes and identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight

issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. An external Terminal Evaluation will be conducted two months after project closure.

The budgeted M&E plan is as follows:

Type of M&E activity	**Responsible Parties**	**Budget US$ (excluding project team staff time)**	**Time frame**
Inception Workshop (IW) and Report	PMU, UNESCO	Indicative cost: 10,000	Within first three months of project start up
Measurement of Means of Verification for project indicators	PMU National Project Coordinators (NPC)	To be finalized in Inception workshop	Start, mid and end of Project and annually when required
Annual and Quarterly Progress reviews	PMU, NPC	0 (staff time only)	Quarterly and Annually
Steering Committee Meetings	PMU	Travel, indicative cost 10,000	Following Project IW and subsequently at least once a year
Periodic status reports	PMU NPC	0 (staff time only)	To be determined by PMU but following UNESCO regulations
Technical reports	PMU and NET	Indicative cost: 7,000	To be determined by PMU
Mid-term External Evaluation	PMU, NPC External Consultants (i.e. evaluation team)	Indicative cost: 38,000	At mid-point of planned project implementation.
Terminal Report	PMU UNESCO Local Consultants	0 (staff time only)	At least 1 month before the end of the project

Audit	UNESCO PMU, NPC	Indicative cost per year: 3,000 (all 9,000)	Yearly
Visits to field sites	Project staff, Government representatives	Indicative costs: 24,000	At all stages of project implementation
Final Evaluation	PMU, UNESCO, Independent external Consultants	Indicative costs: 112,000	At least 1 month before the end of the project
	TOTAL indicative COST	US$ 210,000	

E. Include a results framework for the project / programme proposal, including milestones, targets and indicators.

See Annex I

F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Project Objective(s)[4]	**Project Objective Indicator(s)**	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (US$)**
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (US$)**

[4] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

G. Include a detailed budget with budget notes, broken down by country as applicable, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

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

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

A. Record of endorsement on behalf of the government[5] *Provide the name and position of the government official and indicate date of endorsement for each country participating in the proposed project / programme. Add more lines as necessary. The endorsement letters should be attached as an annex to the project/programme proposal. Please attach the endorsement letters with this template; add as many participating governments if a regional project/programme:*

Mr. Abdykalyk Rustamov, Director of State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic	Awaiting
Mr. Khayrullo Ibodzoda, Chairman, Committee of Environmental Protection, Republic of Tajikistan	August 23, 2016
Mr. Victor E. Chub, General Director, Minister, Uzhydromet, Republic of Uzbekistan	July 27, 2016

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

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

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017 and Priorities for Adaptation to Climate Change in the Kyrgyz Republic till 2017; National Action Plan for Climate Change Mitigation of the Republic of Tajikistan; National Strategy of Sustainable Development of Uzbekistan) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.
Krista Pikkat, Director, UNESCO Cluster Office in Almaty Implementing Entity Coordinator

Date: *04.08.2017*	Tel. and email: +7 7272 582643 ext. 1402; e-mail: k.pikkat@unesco.org

Project Contact Person: **Kristine Tovmasyan**, Dr, Programme Specialist, UNESCO Cluster Office in Almaty
Tel. And Email: +7 7272 582643 ext. 1414; e-mail: k.tovmasyan@unesco.org