



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:	Kazakhstan, Tajikistan, Uzbekistan ¹
Thematic Focal Area ² :	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:	USD 5,000,000

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 coping with the adverse effects of climate change. According to research conducted by the World Bank in 2009 in Europe and Central Asia, Tajikistan and Uzbekistan had the highest degree of sensitivity to climate change in the entire region and the lowest degree of adaptive capacity. In particular, the impacts of climate change on water-related disasters in the region have been recognised as a key threat³. In Central Asia, 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. One of the most significant effects of global warming in Central Asia is glacial melting and the 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 water-related threats to mountain communities, their settlements, livelihood, and infrastructure located on river floodplain areas.

¹ Discussions with the Government of Kyrgyzstan are underway regarding their project participation; additional information is provided in Section II.A. and a letter of interest is appended.

² Thematic areas are: Food security; Disaster risk reduction and early warning systems; Transboundary water management; Innovation in adaptation finance.

³ 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.

GLOF Hazards and Exposure

In the past two decades, GLOFs have resulted in significant economic damages and loss of life. In 1998, a GLOF in the Shakhimardan River catchment in Uzbekistan resulted in 93 fatalities, and in 2002, a GLOF in Dasht, Tajikistan left dozens of people dead. More recently, high temperatures and rapid melting in July 2015 triggered mudflows in the mountainous regions of Tajikistan. In 2008, a GLOF at the Zyndan glacial lake in Kyrgyzstan killed three people and led to substantial economic losses. Meltwater outbursts from the Aksai glacier in northern Kyrgyzstan triggered a GLOF that damaged houses and roads in villages down the valley. The lake still poses a continuous threat to the capital city of Bishkek. In 2015, a GLOF near Almaty, Kazakhstan caused the evacuation of over 1,000 people and 78 injuries. In addition, 127 houses were damaged. Across the region, nearly 100,000 people in mountainous areas face GLOF threats, with many others at risk downstream.

The incidence of dangerous glacial lakes in Central Asia is also increasing. A 2015 study in Kazakhstan identified 32 lakes in the Ile Alatau region and 110 lakes in Zhetysu Alatau region that had a water volume exceeding 100,000 m³. In Kyrgyzstan, the latest inventory indicates that there are more than 350 glacial lakes in danger of outburst. Each year, there are twenty lakes that are in acute danger of failure, and approximately 300 settlements are exposed to potential GLOFs. Threats can appear rapidly; in the case of the Zyndan GLOF, the lake formed over a period of only two and a half months. In Tajikistan, complex topography, high rainfall levels, and a large number of glaciers lead to a high level of exposure, and the south-western Pamir mountain range contains around 335 lakes with GLOF potential. In Uzbekistan, very large floods and mudslides are generally caused by the outbreak of mountain lakes. According to Uzbekistan's hydromet agency, the country is threatened with 271 potential GLOFs, most of which are located outside its border.

The number of glacial lakes and incidences of failure are expected to increase further as new lakes continue to develop and surrounding steep slopes destabilize in response to warming, particularly warmer summer temperatures. In Central Asia, regional scientific studies suggest that glacier shrinkage is causing more frequent hazards, including GLOFs (see Figure 1). In addition to the large volume of water released by GLOFs, they present a significant transboundary hazard. Hence, the increasing risk of disasters from GLOFs is a significant threat to national and regional security and to sustainable development in Central 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.

Figure 1: GLOF Climate Risk Factors

Vulnerability: Exposed communities lack knowledge and means of reducing risks; DRR agencies focused on remediation

Exposure: Glacial lake locations are changing; # of lakes is increasing

Hazards: GLOFs cause loss of life, infrastructure damages; economic losses

DRR and Adaptation in Central Asia

In the Central Asian region, which was part of the Soviet Union, disaster response has been traditionally stronger than prevention and preparedness. At present, the relative ministries/committees (the Committee for Emergency Situations in Kazakhstan, the Committee of Emergency Situations and Civil Defence in Tajikistan, and the Ministry of Emergency Situations in Uzbekistan) still focus primarily on disaster response. With the global emergence of 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) is gaining importance in the region. In 2015, representatives from Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan endorsed a joint statement of support for a post-2015 framework for disaster risk reduction and expressed a commitment to “develop, assess, and monitor regional and national programs of disaster risk reduction in accordance with the post-2015 framework for disaster risk reduction.”⁴ At a subsequent regional platform meeting for DRR in 2016 in Dushanbe, Tajikistan, participants called for the establishment of a regional forum to strengthen collaboration and provide important support to implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 at local, national, regional levels.

With the emergence of DRR as an area of cooperation, several country-level and bilateral programs have begun to address the issue. Countries in Central Asia maintain some common legislative links through their membership in the Commonwealth of Independent States (CIS). For example, in 2014, Kazakhstan, Kyrgyzstan, Uzbekistan, and Tajikistan adopted a model act on international disaster assistance through the Inter-Parliamentary Assembly of the CIS. In January 2017, the four countries participated in a regional consultative conference on the legal aspects of disaster risk reduction. In programming, the EU-funded Disaster Preparedness ECHO Programme (DIPECHO) has supported a variety of policy and education/training activities in Central Asian Countries. In 2016, DIPECHO also supported the establishment of the inter-governmental Kazakhstan-Kyrgyzstan Center for Emergency Situations and Disaster Risk Reduction (CESDRR) in Almaty, Kazakhstan. Non-governmental actors are also involved in DRR activities: the Aga Khan Agency for Habitat, for example, is currently cooperating with

⁴ Joint Statement of the Countries of Central Asia and South Caucasus regarding the post-2015 framework for disaster risk reduction. Approved by the participants of the Regional Ministerial Meeting of Countries of Central Asia and South Caucasus for cooperation in the post-2015 Framework for Disaster Risk Reduction January 30, 2015, Bishkek, Kyrgyz Republic.

CESDRR on emergency response and DRR. However, country programming on DRR is at a relatively early stage, and it faces shortages of funding and qualified personnel. Furthermore, GLOFs have not been addressed explicitly in programming to date. Finally, research institutes have undertaken some work in GLOF monitoring in conjunction with partners from other regions. However, this research is not coordinated across Central Asian countries, and it does not necessarily feed into policy-making.

The participating countries also recognize that building resilience and reducing societal vulnerabilities to climate related disasters is a key requirement for sustainable development. 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). 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 participating countries in this project are on record that they “Confirm commitment to promotion of coordinated and mutually-supporting approach in the post-2015 framework for disaster risk reduction, the sustainable development goals, and the climate change agreements....”⁵

Barriers to Adaptation

Multiple barriers prevent effective DRR and adaptation to climate threats at a national and regional level in Central Asia.

Institutional barriers: at the institutional level, there is a lack of a policy framework for day-to-day coordination between local and national authorities and between countries in the region. This means that there is no regional cooperation for the assessment and monitoring of transboundary GLOFs. The lack of formal cooperation makes it extremely difficult to deal with transboundary threats, and it prevents authorities from benefitting from knowledge and good practice in other areas within and adjacent to their own country.

Moreover, there is low coordination and synergy between existing institutional structures. At present, there is no way to consolidate the existing knowledge on glaciers, glacial lakes, and GLOF events, which could enhance the ability of policy makers in Central Asia to understand the associated risks.

Organizational barriers: At the organizational level, the capacity of relevant authorities to monitor and reduce risk is weak. An underlying lack of knowledge about the distribution and severity of GLOF threats makes it very difficult to identify communities that are at high risk. This is caused by insufficient monitoring. While lake monitoring exists to a certain extent in countries like Kazakhstan and Tajikistan, it consists of regular helicopter flights over the glaciated areas, which is not cost-effective or sustainable.

Furthermore, disaster management authorities lack the funding and expertise to conduct a risk analysis of the *communities* affected by GLOFs, which hinders authorities in identifying the most vulnerable communities exposed to GLOF threats. 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. Institutions are poorly equipped with modern technologies for early warning systems

⁵ Ibid.

(EWS). Furthermore, there are no mechanisms available among disaster experts, managers and planners to develop local risk reduction plans in response to GLOFs. In fact, DRR stakeholders at the national level do not have linkages with vulnerable groups at the community level that could inform their work.

In the research community, there are no formal links and very little cooperation on GLOF-related research across Central Asia, although joint research would be extremely beneficial, especially regarding transboundary hazards.

Individual-level barriers: At the individual level, relevant authorities face a critical gap in knowledge concerning glacier lake distribution, risk mapping, and disaster prevention planning from GLOFs. They also lack information on how implement early warning systems and other adaptation measures. Furthermore, communities at risk are not trained in emergency planning or safety measures. In addition, young local scientists have not had an opportunity to acquire fundamental knowledge regarding the cryosphere, glacier lakes, and related hazards that will allow them to make substantive contributions to mapping, monitoring, and DRR. All stakeholders lack a consolidated source of information on GLOFs and GLOF risks and risk reduction, and vulnerable groups cannot get the information they need through the formal and informal communication channels they use. Vulnerable groups also lack adequate education and training opportunities on GLOFs at the community level, especially in remote areas.

Project / Programme Objectives:

The objective of the proposed project is to strengthen adaptation to climate change in Central Asia by reducing societal risks and vulnerabilities associated with GLOFs. This objective also addresses SDGs 11 and 13 of the 2030 Agenda, particularly targets 11.5 and 13.1 - 13.3.

The project objective will be achieved by assessing societal risks and vulnerabilities associated with GLOFs and then addressing these risks and vulnerabilities. The approach will strengthen 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 of the participating countries.

The overall approach of the project is to assess vulnerability through work with researchers and communities and then address vulnerability through targeted systems and measures while building capacity for prevention activities. The logic of the project intervention is provided in Figure 2. 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. Discussion of the benefits of a regional approach is provided in Section II.A.

Project / Programme Components and Financing:

Table 1: Project Components and Financing

Project/Programme Components	Expected Outcomes	Expected Outputs	Countries ⁶	Amount (US\$)
1. Strengthening national and regional capacity to monitor and assess GLOF hazards	Authorities in participating countries have improved knowledge of potential GLOF hazards and a coordinated national and regional approach to mapping and monitoring potential GLOF sites.	<p>Appropriate mapping and monitoring strategies developed and endorsed</p> <p>Up-to-date atlas on glacier lakes for all participating countries based on remote sensing data developed and maintained</p> <p>Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on transboundary hazards.</p>	Kazakhstan, Tajikistan, Uzbekistan	550,000
2. Strengthening sub-national, national, and regional policies and approaches to meet needs of vulnerable communities	Decision-makers and vulnerable households are aware of GLOF threats and have the necessary information to plan measures to adapt to those threats.	<p>Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses</p> <p>Local knowledge on GLOF risks and related adaptation needs documented and local risk reduction plans drafted for selected communities vulnerable to GLOFs.</p> <p>DRR and CCA</p>	Kazakhstan, Tajikistan, Uzbekistan	1,000,000

⁶ As the Government of Kazakhstan has expressed interest in participating in the project, this list of countries may be modified in the project formulation stage, and the budget and activities will be adjusted as needed. See Section II.A for additional information.

		concepts mainstreamed into sub-national development planning in the relevant country context.		
3. Design and launch of EWS and risk reduction measures tailored to local contexts	An coordinated EWS network is designed and embedded in the institutional setting for disaster risk management at all levels.	Local to regional framework for EWS established and evaluated Design and implementation plans for three site-specific EWS completed	Kazakhstan, Tajikistan, Uzbekistan	800,000
4. Targeted demonstration projects to introduce EWS technology and low-cost adaptation measures in vulnerable communities.	Pilot communities reduce risk from GLOF hazards and relevant agencies have a means of maintaining adaptation measures and upscaling to other vulnerable communities.	EWS and complementary adaptation measures tested in selected vulnerable communities. Authorities and population trained through simulation exercises and other means as needed. Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and the expansion of adaptation activities to other vulnerable communities.	Kazakhstan, Tajikistan, Uzbekistan,	1,275,000
5. Knowledge exchange, stakeholder engagement, and communication.	Researchers, government authorities, and communities can access and exchange information they need on GLOF hazards and risk	Web-based knowledge-platform established on GLOF risks and adaptation strategies Education and	Kazakhstan, Tajikistan, Uzbekistan	700,000

	reduction measures to adapt to them.	training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters Knowledge and 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:

Milestones	Expected Dates (tentative)
Start of Project/Programme Implementation	January 2019
Mid-term Review (if planned)	January 2021
Project/Programme Closing	December 2023
Terminal Evaluation	January 2023

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 through coordinated risk identification and community-embedded adaptation measures. More broadly, the project will build societal awareness and thereby resilience to the threat of climate change, particularly water-related disasters. Adaptation measures, including EWS, are strongly promoted by the Sendai Framework for Disaster Risk Reduction 2015-2030, to which Central Asian 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. In addition, the project will enhance risk knowledge and response capability with activities that map potential threats and implement low-cost adaptation measures to reduce community risk. Capacity strengthening, highlighted in the 2030 Agenda under SDG 13 Target 13.1, will also be addressed in all project components through training, institutional twinning, participatory planning, and knowledge exchange. Finally, the project will support explicit measures to promote sustainability: the identification of post-project and expanded financing for EWS in vulnerable communities, and the dissemination of GLOF information and good practice in risk reduction in GLOF areas.

A core strength of this project is its focus on a **regional approach** to adaptation activities. This is crucial, as GLOFs represent far-reaching climate hazards that may originate in remote regions and cause damage in areas that are hundreds of kilometres downstream. Far-reaching GLOF disasters have already occurred in Central Asia; for example, the 1998 outburst event at the Archa-Bashy glacier in Kyrgyzstan caused the deaths of more than 100 residents of Shahimardan in neighboring Uzbekistan. Furthermore, a regional approach will allow the countries to utilize additional research capacity, such as the Central Asian Regional Glaciological Center in Almaty and policy capacity, such as the Kazakhstan-Kyrgyzstan Center for Emergency Situations and DRR.

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.

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: Strengthening national and regional capacity to monitor and assess GLOF hazards

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 have far-reaching effects. 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 it 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: Appropriate mapping and monitoring strategies developed and endorsed

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 that uses 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 authorities (women and men) engaged in mapping and monitoring and quality of their engagement, number of authorities adopting and implementing new GLOF monitoring strategies and the degree to which the strategies are implemented.

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

Indicative activities under Output 1.2 will include:

1.2.1. Glacier lakes mapped across Kazakhstan, Tajikistan, and Uzbekistan for the 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 of findings into a user-friendly database (see Component 5) where mapped information on glacial lakes will be maintained by and available to local authorities along with the vulnerability assessment findings and community mapping carried out in Component 2.

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; number of local authorities uploading to and accessing data from the web portal.

Output 1.3: Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on regional cooperation on transboundary hazards.

Indicative activities under Output 1.3 will include:

1.3.1. Training workshops with local authorities in each country to ensure understanding of mapping and monitoring strategies and to introduce adaptation response strategies.

1.3.2. Design and implementation of a capacity building and twinning program 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 a 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; number of regional workshops.

Component 2: Strengthening sub-national, national, and regional policies and approaches to address the needs of vulnerable communities

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). In this conceptual model, risk reduction strategies such as EWS are seen as a key tool for climate change adaptation.

There will be two scales to the risk assessment. Firstly, a *hazard 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, the project will conduct community assessments, working with local authorities and community members to assess their baseline knowledge of risks, to gather local knowledge, and to identify local patterns and behaviours that may affect vulnerability and access to DRR information. The project will liaise with national organizations for the

advancement of women and local authorities to ensure meaningful participation in the community assessments by women.

As a result of the assessments, critical GLOF risk hot spots 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. In these hot spots, the project will support the development of Local Risk Reduction Plans in conjunction with the vulnerable communities. The number of participating communities will be determined during the project preparation stage.

Finally, Component 2 will support mainstreaming of DRR and CCA concepts into sub-national development plans. During the project preparation phase, the sub-national planning process for provinces and districts will be surveyed for the participating countries and entry points for mainstreaming will be identified. These findings will serve as a baseline for the project activities under Output 2.4.

Component 2 will encompass the following outputs and indicative activities:

Output 2.1: Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses

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. Quantification of the 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. Identification of hotspots (based on the findings from 2.1.1. – 2.1.3.) and compilation of comprehensive local-scale GLOF hazard assessment and maps for both current and future scenarios.

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

Output 2.2: Local risk reduction plans drafted for selected communities vulnerable to GLOFs.

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 through participatory surveys and interviews. Evaluation of the risk perception of men and women in local communities exposed to GLOF hazards, including the local knowledge of current hazards and past events, and how this is affecting their daily lives.

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

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

2.2.5. Development of Local Risk Reduction Plans and discussion of plans with participating communities

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; number of local risk reduction plans developed for communities that are potentially affected by GLOF hot spots; 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.

Output 2.3: DRR and CCA concepts mainstreamed into sub-national development planning in the relevant country context.

Indicative activities under Output 2.3 will include:

2.3.1 Compilation of good practice in mainstreaming DRR and CCA into sub-national development planning, particularly in mountainous regions, and a review of its applicability for men and women in participating Central Asian countries.

2.3.2 Preparation of policy/planning roadmaps for integrating DRR and CCA concepts into sub-national planning documents,

2.3.3 Technical support for mainstreaming in selected districts, including training for district-level authorities on DRR and CCA concepts.

Component 3: Design and launch of EWS and risk reduction measures tailored to local contexts

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 the 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 participating governments and informed by the findings from Component 2. Information on potential pilot sites is provided in Annex 1 of this concept.

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 the 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. Establishment of required institutional mechanisms and framework conditions (if necessary).

3.1.3. Evaluation and establishment of responsibilities and protocols for the dissemination 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: Design and implementation plans for three site-specific EWS completed

Indicative activities under Output 3.2 will include:

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

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

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

3.2.4. Definition of community 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.

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

Indicators for Output 3.2: 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; Local knowledge applied and needs respected in each of the proposed 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 risk assessment (Component 2), this component will implement one EWS tailored to the requirements of each participating country. Communities will also implement complementary low-cost / no-cost adaptation measures to increase resilience, such as hazard zone demarcation, the identification of evacuation routes and safe zones, and the management of drainage channels. The advantage of promoting these complementary measures is that they can be scaled up to communities even in the absence of an EWS, and the project will consider using peer educators to reach target groups.

Component 4 will encompass the following Outputs and indicative activities:

Output 4.1: EWS and complementary adaptation measures tested in three vulnerable communities.

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

4.1.4. Adoption of low-cost / no-cost measures such as hazard zone demarcation and identifying safe zones and evacuation routes in the EWS communities and possibly in additional communities.

Indicators for output 4.1: Pilot demonstration EWS successfully implemented and running, protocols developed in collaboration with and approved by involved authorities; low-cost / no-cost measures in place in selected communities.

Output 4.2: Authorities and population trained through simulation exercises and other means as needed.

Indicative activities under Output 4.2 will include:

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

4.2.2. Simulations with authorities and potentially affected population (or portions thereof) based on the EWS and supporting measures (e.g. evacuation routes and safe zones).

Indicators of output 4.2: Self-dependent adjustments of the EWS by responsible authorities; number of drills conducted with authorities; number of simulations conducted with population (with attention to full participation by men and women)

Output 4.3: Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and the expansion of adaptation activities to other vulnerable communities

Indicative activities under Output 4.3 will include:

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

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

4.3.3. Development of specific recommendations for scaling up low-cost / no-cost measures to other communities exposed to GLOF risks

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

Indicators of output 4.3: Degree of ensured long-term financing of EWS maintenance and operation; Report on scaling up low-cost / no-cost adaptation measures; Number of additional communities adopting low-cost / no-cost adaptation measures

Component 5: Knowledge exchange, stakeholder engagement, and communication

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 meetings and workshops, knowledge products (e.g. a web platform), and shared resources such as guidelines, policy briefs, and educational materials). In this manner, implementation of activities will be cost-effective and duplication of efforts can be avoided. The project will also attempt to build on existing agency information portals in order to ensure that the information provided will have a sustained, post-project presence on the Internet.

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. The project will pay special attention on communication channels for different target groups, which vary by type of media, community influencers, and language; it will also bear in mind that men and women in a given community may use different channels of communication.

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 and other project reports (workshops, meetings) will be available to stakeholders and authorities as a basis for awareness raising and adaptation planning.

5.1.2. Adoption of a common regional template 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 or other organizations 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 include:

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).

5.3.3. Knowledge products (radio spots, infographics) for communities at risk.

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.

Figure 2 on the following page provides an overview of the logic of the proposed intervention and how the proposed activities correspond with the barriers identified in the project scoping process.

		Assess Vulnerability		Address Vulnerability		
Actions and Measures		Strengthening Capacity to Monitor GLOF Risks	Policies and Approaches for Vulnerable Communities	Development of EWS and On-the-Ground Measures for Sites	Targeted EWS Demonstrations	Knowledge Exchange and Communication
		<ul style="list-style-type: none"> *National and Regional Mapping / Monitoring Strategies *Regional GLOF Atlas for Central Asia *Coordinated monitoring for region 	<ul style="list-style-type: none"> *Exposure mapping and hotspot identification *Vulnerability assessments local risk reduction plans for endangered communities *Mainstreaming DRR / CCA into regional development plans 	<ul style="list-style-type: none"> *New local-to-regional coordination system for EWS *Design infrastructure and training for pilot EWS sites 	<ul style="list-style-type: none"> *Piloting low-cost adaptation measures *Construction, testing, and training for EWS stations *Financing and scaling-up for EWS, other measures 	<ul style="list-style-type: none"> *Web-based knowledge platform *Education and training programmes *Dissemination of knowledge, lessons learned
Barriers		<ul style="list-style-type: none"> *No means of coordination on transboundary GLOF monitoring *Lack of Information on Changing GLOF Exposure Risks *Lack of Regional Coordination on GLOF Monitoring 	<ul style="list-style-type: none"> *DRR authorities lack information to prioritize and address GLOF risks *Communities are not aware of options to reduce and mitigate disaster risk from GLOFs *DRR / CCA considerations are not mainstreamed into sub-national development plans 	<ul style="list-style-type: none"> *Local warning needs are not known to DRR agencies *Endangered communities lack EWS infrastructure *Low coordination between regional DRR practitioners and local / regional authorities on risk reduction 	<ul style="list-style-type: none"> *Communities lack training in preparedness and practical DRR measures *DRR practitioners focus primarily on response. *Lack of financial support for EWS systems 	<ul style="list-style-type: none"> *Lack of communication between researchers and practitioners *Low levels of information /awareness on GLOFs *Good practice is not disseminated
		Lack of Capacity to Identify and Assess GLOF Risks and Threats	Lack of Capacity to Address Threats in Endangered Communities and Support Adaptation			

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 1 and 2 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. 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.

Note: Project preparation activities will develop estimates of potential damages due to GLOFs and the economic and social benefits of reducing GLOF-related risks in vulnerable communities. In addition, the project formulation will also include on-site community consultations that will allow a qualitative assessment of benefits based on community input.

Environmental and Social Considerations

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. It is important to note that *the project as designed will not involve construction or earthworks that would be subject to an environmental impact assessment*. The adaptation measures in addition to the EWS are instead focused on danger zone demarcation and the identification of evacuation routes and and safe zones.

On the societal level, early engagement of the community and other stakeholders during the project preparation period will ensure that the needs, expectations and wishes of the community are addressed. The community consultations will be conducted in such a way so that each step of the project implementation is complemented by the outcomes of these consultations with specific indicators to be jointly developed. Community leaders and womens' group leaders will be participating in the meetings to be organized. Furthermore, consultation in affected communities will be ongoing throughout project implementation.

As women and men are affected differently by disasters and climate change, in particular due to the higher likelihood of women to be living in poverty, 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 policy-related work is designed to contribute to gender equality by improving the balance of power between women and men in Central Asia to improve adaptation and resilience to climate change, thus contributing to SDG 5 of the 2030 Agenda. In the 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. For example, women consultants will be used to obtain information in women-only community meetings. During the project preparation phase, the initial gender assessment and gender action plan for project implementation will address these and similar issues.

The project will also pay special attention to the most vulnerable communities, namely, indigenous and ethnic minorities in mountainous areas, by developing 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 Shakh dara 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 community consultations during the project preparation period and throughout 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 (GBO) of Tajikistan, where 80% of the communities in GBO 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; these elements are incorporated into all of the project components. 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 participating regions 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:

Kazakhstan:

- Kazakhstan 2050 Strategy
- National Communications to the UNFCCC (III-VI and VII)

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 addition, the following documents have been reviewed from Kyrgyzstan with a view to their probable participation in the project:

- 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.

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 in the region 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. Recently, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan all committed to the use of the Sendai Framework Monitor to improve disaster loss data collection.

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 government of Tajikistan has 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 laws and standards of environmental protection, human safety and protection from the natural hazards, including the following:

- Civil Defense Law of the Republic of Kazakhstan (1997)
- Law providing for legal conditions of disaster management of the Republic of Kazakhstan (1993)
- 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.
- Model Act on International Disaster Assistance through the Inter-Parliamentary Assembly of the CIS (2014 -- regional)

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 hydro-meteorological 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 Kazakhstan, 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 be tailored to the local context and is a strategic part of the project. It reflects the activities and outputs of 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 standpoint (English, Russian, Kazakh, Tajik, Uzbek), as well as from a technological standpoint (web-based, multi-media, radio, TV, print). 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, the project website 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 highlighted⁷. 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:

- To support UNESCO’s regional project proposal "Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate" for submission 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. Given the potential participation of all relevant Central Asian countries, a wide range of relevant national development programs and plans of Kazakhstan, 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.

⁷ http://unrcca.unmissions.org/Portals/unrcca/Articles%20and%20Publications/Glacier_book_ENG.pdf

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 during the project preparation stage:

List of Stakeholders/Name of Agencies
Kazakhstan <ol style="list-style-type: none">1. Committee for Emergency Situations, Ministry of Internal Affairs2. Ministry of Energy (Department of Climate Change)3. Kazhydromet4. Kazselezaschita5. Institute of Geography of the Academy of Sciences of Kazakhstan6. Selected local governments

6. Regional stakeholders based in Kazakhstan (see below)

Kyrgyzstan⁸

1. Ministry of Emergency Situations
2. Central Asian Institute for Applied Geosciences (CAIAG)
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

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:

Central Asian Regional Glaciological Centre under the auspices of UNESCO (Almaty, Kazakhstan)
Center for Emergency Situations and DRR in Almaty (an inter-governmental body serving Kazakhstan and Kyrgyzstan)

International stakeholders and partners:

Zurich University, Switzerland
Agha Khan Agency for Habitat (AKAH)
UN agencies involved in DRR and CCA

⁸ Kyrgyzstan is still conducting internal government discussions regarding its role in the project; this list of stakeholders is indicative and would be conditional upon their participation in the full project.

International Financial Institutions (IFI) Bi-lateral aid agencies Research institutes ICIMOD

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

Component 1: Strengthening national and regional capacity to monitor and assess GLOF hazards

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: Strengthening sub-national, national, and regional policies and approaches to address the needs of vulnerable communities

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 the participating countries, 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: Design and launch of EWS and risk reduction measures tailored to local contexts

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 projects 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. Lake monitoring, for example, uses helicopters in Kazakhstan and Tajikistan. 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.

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: Knowledge exchange, stakeholder engagement, and communication

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
<i>Compliance with the Law</i>	<i>The project is in compliance with all applicable domestic and international laws.</i>	

Access and Equity	<i>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.</i>	
Marginalized and Vulnerable Groups		<i>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. Vulnerable groups will be consulted in on-site, in-depth community assessments at the project preparation stage and in Components 2, 3, 4, and 5 of the project. Project indicators will include participation and quality of engagement by members of vulnerable groups in project activities to ensure that these groups realize an equitable share of project benefits.</i>
Human Rights	<i>Through knowledge, high visibility, participation and transparency the project will make a positive contribution to the promotion of international human rights</i>	
Gender Equity and Women's Empowerment		<i>Men and women will participate fully and equitably. Women will be consulted in on-site, in-depth community assessments at the project preparation stage, and an Initial Gender Assessment and Gender Action Plan will be developed to ensure that women are meaningfully engaged in project activities and realize an equitable share of project benefits. Specific project indicators will ensure that results-based management will cover meaningful gender participation.</i>
Core Labour Rights	<i>Core labour standards will be respected.</i>	

Indigenous Peoples		<i>Participation in the project of indigenous people must be guaranteed and encouraged by the local authorities. Indigenous peoples have been identified, and the project will utilize similar approaches to their involvement in activities and benefits as with vulnerable groups.</i>
Involuntary Resettlement	<i>There is no involuntary resettlement planned</i>	
Protection of Natural Habitats	<i>As a side effect of the project the natural habitat will be protected.</i>	
Conservation of Biological Diversity	<i>There will be no significant or unjustified reduction or loss of biological diversity or the introduction of known invasive species.</i>	
Climate Change		<i>Small, positive influences on climate change are anticipated due to flood risk reduction measures, such as flood-plain reforestation, green spaces, etc., which will have a positive CO² balance.</i>
Pollution Prevention and Resource Efficiency	<i>Not applicable</i>	
Public Health		<i>Injuries and loss of life will be prevented through the flood DRR strategies implemented in this project.</i>
Physical and Cultural Heritage		<i>Village and community infrastructure, including cultural assets will be protected through DRR strategies implemented in this project.</i>
Lands and Soil Conservation	<i>As a consequence of the project soil conservation will take place and the degradation of productive lands prevented.</i>	

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 Kazakhstan, Tajikistan and Uzbekistan and in partnership with the University of Zurich, 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	
<ul style="list-style-type: none"> • 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 	<p>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.</p>
Technical	
<ul style="list-style-type: none"> • 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. 	<p>Early involvement of stakeholders in project planning to ensure solutions meets with their expectations and requirements.</p> <p>Main EWS strategy will be 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.</p> <p>The project will lobby for affordable internet access in mountainous areas.</p>
Social and Political	

<ul style="list-style-type: none"> • 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. 	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
<p>Institutional/Management/Governance</p>	
<ul style="list-style-type: none"> • 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. 	<p>Providing good perspective to collaborators in order to keep them in the project.</p> <p>Top government officials consider the project as a</p>

<p>Changing staff is slowing down project implementation.</p>	<p>high priority</p> <p>Ensure local governments take ownership of the project through early engagement.</p> <p>Participation of local government officers to partner countries (e.g. Switzerland) where they may learn from common experiences with CCA.</p> <p>Capacity building at university level, to ensure next generation of young scientists is well qualified for future government positions.</p>
<p>Environmental</p>	
<ul style="list-style-type: none"> • Adverse climatic conditions may damage adaptation measures being implemented. • Technical construction of the EWS requires access and 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. 	<p>Project implementation will use latest best-practices and equipment used and proven in harsh environmental conditions.</p> <p>The technical equipment does not require heavy lifting or transportation, minimising disturbances to the natural environment during the installation phases.</p> <p>EWS represent an environmentally friendly adaptation measure, with no permanent alteration of the natural landscape (compared to engineering measures for example).</p> <p>Training of communities and local authorities will highlight the importance of maintaining and even enhancing the natural</p>

	environment in high risk flood zones. For example vegetation stabilises river banks and reduces erosion.
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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) ⁹	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\$)

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.

⁹ The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

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

A. Record of endorsement on behalf of the government¹⁰ *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:*

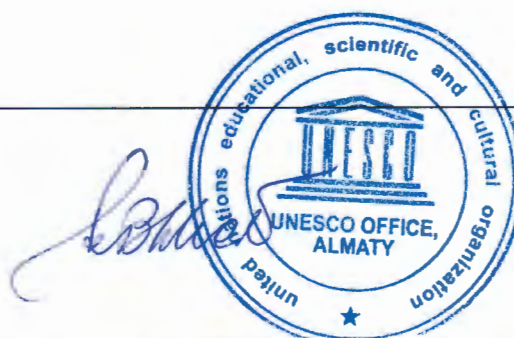
<i>Mr Olzhas Agabekov, Head, Climate Change Department, Republic of Kazakhstan</i>	Pending. The focal has just been assigned (attached letter of nomination and email from Mr Agabekov, dated 16.04.2018, ANNEX 2)
<i>Mr. Khayrullo Ibodzoda, Chairman, Committee of Environmental Protection, Republic of Tajikistan</i>	August 23, 2016
<i>Mr. Kolimjon Aripov, Director General, Uzhydromet, Republic of Uzbekistan</i>	April 3, 2018

^{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 (Kazakhstan 2050 Strategy; 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: 16.04.2018

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