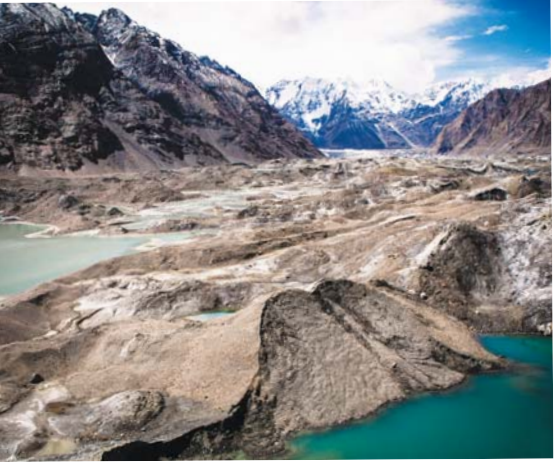
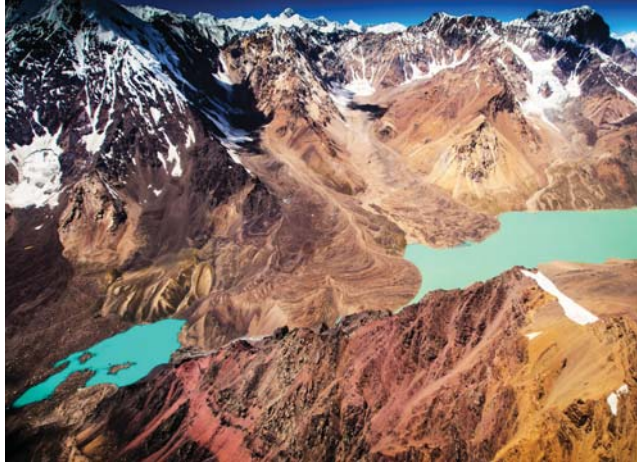
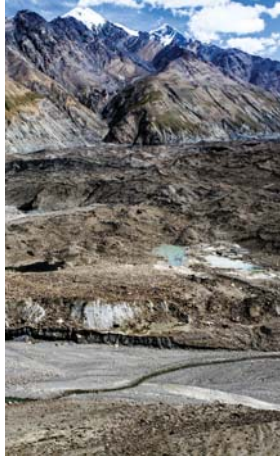

UNITED NATIONS REGIONAL CENTRE FOR PREVENTIVE DIPLOMACY FOR CENTRAL ASIA

SEMINAR REPORT

GLACIERS MELTING IN CENTRAL ASIA: TIME FOR ACTION

Dushanbe, Tajikistan • November 11-12, 2014

ACKNOWLEDGEMENTS:

UNRCCA gratefully acknowledges the funding provided by the US Government for the organisation of this seminar and for the preparation of this report. This publication has been produced in the framework of the *Central Asia and Afghanistan Regional Cooperation on Trans-boundary Water Sharing project*.

DISCLAIMER:

The 2014 Dushanbe Seminar Report, including a draft Action Plan, has been prepared by an independent consultant for the United Nations Regional Centre for Preventive Diplomacy for Central Asia (UNRCCA). The report is based on the presentations, group works and discussions during the International Seminar on *"Glaciers Melting in Central Asia – Time for Action"* co-organized by UNRCCA, UNESCO Almaty office, the Executive Committee of IFAS and the World Bank. The seminar was held in Dushanbe, Tajikistan, on 11 and 12 November, 2014.

This report does not necessarily reflect the official position or the views of the UNRCCA or the United Nations system as a whole. The document also includes findings of the World Bank Almaty 2014 seminar, the publication "Water Unites – From the Glaciers to the Aral Sea", websites of the UN, EU-WECOOP project, articles of Wikipedia and graphics of ZOI Environmental Network. While UNRCCA seeks to ensure that information contained in the report is accurate, no liability or responsibility is accepted for further use of this information.

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Alfred Diebold. *Glaciers Melting in Central Asia: Time for Action.* Seminar report held in Dushanbe, Tajikistan, on November 11-12, 2014. UNRCCA: Ashgabat, 2014.

Cover page and other photos by: Alfred Diebold.

Design and Layout: Alexander Atayev, Designer, and Bahar Amangeldyeva, UNRCCA Public Information Coordinator

Published by the UNRCCA. A copy of this report may be requested at the address below:

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April 2015, Ashgabat, Turkmenistan

GLACIERS MELTING IN CENTRAL ASIA: TIME FOR ACTION

Dushanbe , Tajikistan

November 11-12, 2014

Co-organized by the UN Regional Centre for Preventive Diplomacy for Central Asia (UNRCCA), the Regional Office of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Executive Committee of the International Fund for Saving the Aral Sea (EC IFAS) and the World Bank with support of the Government of the United States of America

LIST OF ABBREVIATIONS

ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
CA	Central Asia, refers in this report to the countries: Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
CAEWDP	Central Asian Energy Water Development Program
CAIAG	Central Asian Institute for Applied Geosciences
CAREC	Regional Environmental Centre for Central Asia
CAWa	Reginal Research Network Central Asian Water
CATCOS	Capacity Building and Twinning for Climate Observing Systems
CIF	Climate Investment Fund
DRR	Disater Risk Reduction
EC IFAS	Executive Committee of the International Fund for the Aral Sea
ESD	Education for Sustainable Development
EU	European Union
EWS	Early Warning System
FAO	(United Nations) Food and Agriculture Organisation
GFZ	Deutsches Geoforschungszentrum
GIZ	Gesellschaft für Internationale Zusammenarbeit
GLIMS	Global Land Ice Measurement from Space
GLOF	Glacial Lake Outburst Flood
ICSU	International Council for Science
IFAS	International Fund for the Aral Sea
IHP	International Hydrological Programme
IPCC	International Panel on Climate Change

Source: Alfred Diebold

LIST OF ABBREVIATIONS

IOWater	International Organisation for Water
IWAC	International Water Assessment Centre
IWRM	Integrated Water Resources Management
KazHydromet	Kazakhstan Hydrometearological Services
NAMA	Nationally Appropriate Mitigation Action
PPCR	Pilot Program for Climate Resilience
RGI	Randolph Glacier Inventory
SIC ICWC	Scientific-Information Centre of the Interstate Commission for Water Coordination
TajHydromet	Talikistan Hydrometeorological Services
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Cultural and Scientific Organisation
UNRCCA	United Nations Regional Centre for Preventative Diplomacy in Central Asia
US	United States
USA	United States of America
USAID	United States Agency for International Development
UzHydromet	Uzbekistan Hydrometeorological Services
WGMS	World Glacier Monitoring Service
WHO	(United Nations) World Health Organisation

PREFACE

The two-day seminar in Dushanbe in November 2014 **"Glaciers melting in Central Asia: Time for action"** commenced with in-depth introductory and guiding statements by the event organizers. It was followed by statements of delegations from Central Asia including Afghanistan. A scientific overview of the state of glaciers and snow-ice resources of high mountains and prevailing trends regarding the melting of glaciers, as well as scientific activities in Central Asia (CA) was presented. Stakeholders were given the opportunity to express their views on the problems and their readiness to get involved in joint actions to adapt to the changing environment and to cope with immediate challenges of the glaciers melting/climate change in CA. The need of education and public outreach in the context of climate change and glaciers melting was discussed on the second day before working groups got together to draft an action plan, which was discussed and agreed upon in principle by the working groups and subsequently presented in a plenary session. The draft action plan will be presented to the six participating countries for comments and approval. UNRCCA will have consultations in the capitals and will seek funding among others from the Global Environment Facilitity (GEF).

The Dushanbe seminar has to be seen as a follow-up seminar to the Almaty 2013 seminar, which had the topic: *"The impact of glaciers melting in Central Asia on National and Trans-Boundary Water Systems".* It was held in Almaty, Kazkhstan, on 11-12 April, 2013 and attended by representatives of Central Asian states, Afghanistan and international organisations as well as scientists and international experts. The seminar at that time was also made possible through the financial support of the US Government.

Conclusions of the Almaty seminar were:

Global warming and climate change will have effects on the high mountains of Central Asia. Most likely glaciers will be melting more rapidly. This will have consequences not only for the water balance in the Aral Sea basin. It will lead among others to natural disasters like land slides, glacial lake outburst and it will affect the socio-economic development of the region. Still, not enough research has been conducted in this regard and not enough reliable knowledge and information is available. Additional efforts are urgently needed to fill these gaps in order to provide better policy advice.

It is vital to improve regional and international cooperation on glacier monitoring, data sharing among regional and international partners will foster better understanding of the glacier situations. Engaging the local populations and local authorities can greatly improve and expand monitoring activities; digitizing of printed-on-paper data and analysis of the data would help to partially fill the knowledge gaps.

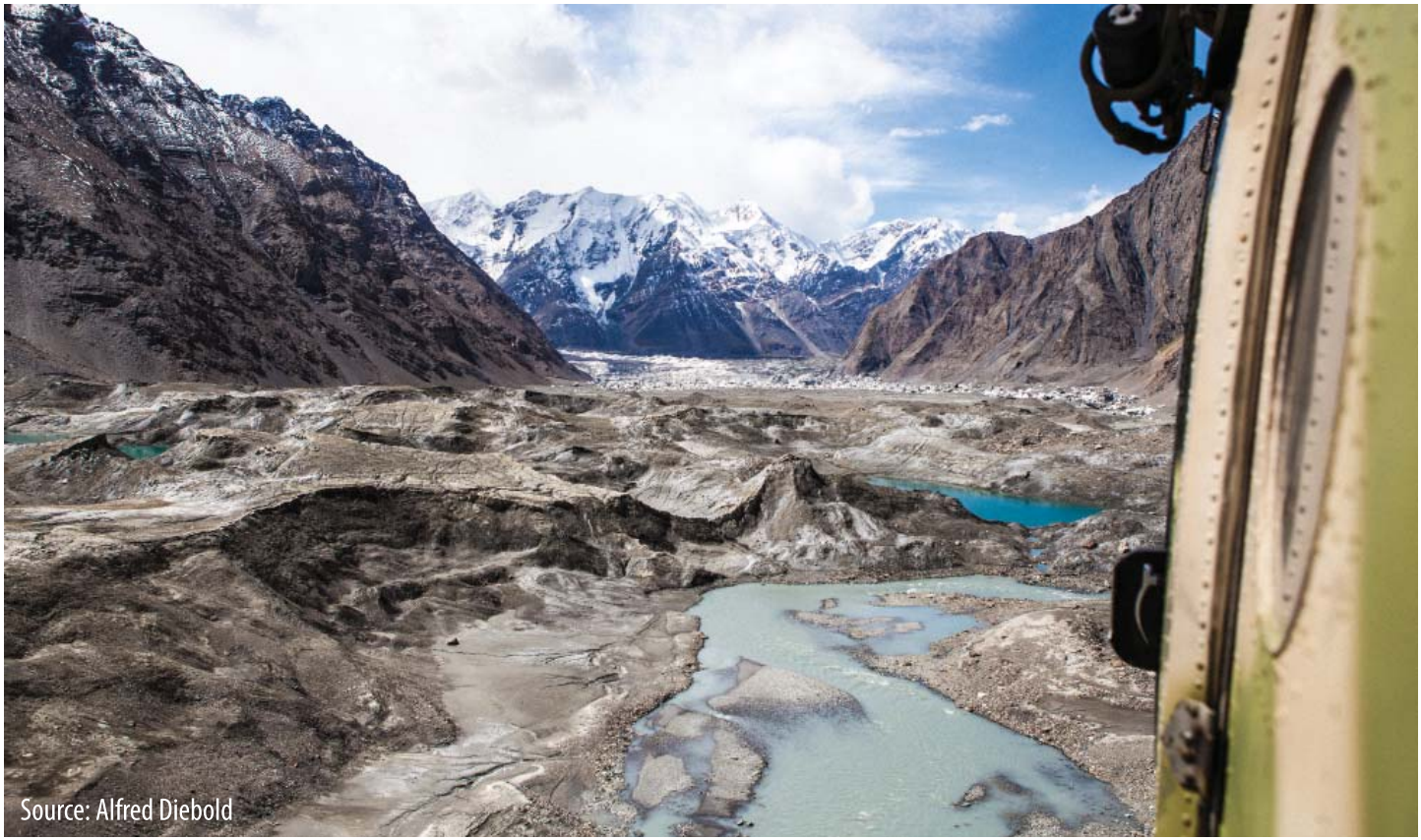
The participants of the Almaty 2013 seminar considered the following to be essential:

1. *Integrated glaciers studies in the mountains of Central Asia and studies of the mountain ecosystem.*

2. *The study of patterns and correlations of precipitation intensity and melting of glaciers with climate change.*

3. *Modelling of processes and monitoring in the upper watersheds.*

4. *The prediction of glaciers in size and volume using satellite monitoring and aerial visual observations.*



5. Development of measures for adaptation to climate change in Central Asia and risk reduction, in particular in the framework of the ASBP-3 (Aral Sea Basin Program-3)

6. The development of regional cooperation and the study of mountain ecosystems, changes of glaciers and snow cover in mountains and their impact on water resources, socio-economic processes and environmental changes in the region.

7. The consolidation of the efforts of national, regional and international organizations, as well as support for these efforts by the donor community.

8. Capacity building/training of personnel.

Building on the outcomes of the Almaty seminar and the discussions of the Dushanbe seminar, UNRCCA, UNESCO and the co-organizers got stakeholders involved and worked out project proposals within a framework of an action plan.

CONTENTS

OBJECTIVES OF THE DUSHANBE SEMINAR AND APPROACH TO MOVE STEPS FORWARD

The Dushanbe seminar attempted to move much needed steps forward as compared with the Almaty seminar. The Almaty seminar contributed towards a better understanding of the present challenges in the Central Asian region with regard to issues of glaciology, glaciers melting, climate change and its effects on ground and surface water as well as on transboundary water management. It contributed towards improved knowledge and understanding of climate risks and the need for actions at both national and regional level. It also formulated recommendations to improve the cooperation in Central Asia, identified research priorities, proposed general ideas for capacity building, legislation and outreach. But it did not work out an action program, no concrete proposal, which would reflect these recommendations. Therefore the objective of the Dushanbe seminar was to propose an action plan, which will allow the people of the countries in the region to adapt better to the changing environment, glaciers melting and to better manage water resources as well as enhance regional cooperation. It points out responsibilities and possible actions of the international community and all other stakeholders concerned. The overall objective is to improve living standards in Central Asia through actions taken as proposed in the draft plan.

Source: Alfred Diebold

Seminar approach to move steps forward: First an attempt was made to come to a common understanding on the impact of climate change/glacier melting on water resources/transboundary water resources management and on the lives of the people in Central Asia. Secondly, a look was taken at responsibilities and possibilities/ideas of all stakeholders to get more involved in climate adaptation and mitigation projects before the need for education and public outreach was discussed and agreed upon.

Finally, as a conclusion, proposals were developed for specific activities within the programme of action. This action plan will be brought to the attention of the international community for possible funding, after its approval in the capitals of the region.

SEMINAR OPENING

Opening remarks were made by: Government of Tajikistan: Sulton Rahimzoda, First Deputy Minister of Energy and Water Resources, UNRCCA: Fedor Klimtchouk, Deputy Head, UNESCO: Serguei Lazarev, Director of Almaty Cluster Office and UNESCO Representative to Kazakhstan, Kyrgyzstan and Tajikistan, EC IFAS: Vokhidjon Akhmadjonov, Head of Information and Analytical Department an the World Bank: Rustam Arstanov, Environmental Specialist, World Bank Central Asia office.

Speakers of the opening session agreed that climate change is a global problem and special attention has to be given to Central Asia including Afghanistan. Global warming and climate change will definitely have effects on the high mountains and the whole region of Central Asia. It is assumed that glaciers most likely will be melting more rapidly. This will have consequences on the water balance in the Aral Sea basin. It will lead among others to natural disasters like land slides, glacial lake outburst and it will affect the socio-economic development of the region. Already projects like the Climate Investment Fund financed "Pilot Program for Climate Resilience (PPCR)" are under way in Tajikistan. The PPCR aims to demonstrate ways in which climate risks and resilience may be integrated into core development planning and implementation. In this way, the PPCR provides incentives to adapt better and quicker to climate change. More investments in disaster risk prevention, regional programs and a regional monitoring system are needed. In this context EC IFAS had organized a donors' conference in Urgench, Uzbekistan in October 2014, which mobilized resources for the Aral Sea basin.

It was also mentioned that research on glaciers has a long tradition in Central Asia. Already in 1932 German and Soviet scientists started with an inventory of glaciers. Since that time research is being conducted in the region and it can be oberserved that many glaciers have been shrinking, like the Fedshenko glaciers, for which reliable data is available. But the data base on all glaciers in CA needs to be improved and more coordinated research conducted to make reliable projections for the future. Ground and surface water is seen as the key resource for sustainable development in the region and it has a social and religious value.

Since the visit of the UN Secretary-General Ban Ki-moon in the region in 2010 more awareness for regional cooperation has been created. Specially, information exchange among governmental and non-governmental organizations has to be improved and networks have to be strengthened to build capacity for better regional cooperation. Another aspect was the productivity of water resources, which must be increased for water and energy security. Raising the analytical knowledge of researchers and decision- makers is crucial for effective joint projects and programmes. Improving regional dialogues for the review of base-line data on hydrological systems, forecasting, knowledge sharing, and development of water sharing agreements were proposed.

Source: Alfred Diebold

PLENARY SESSION 1: "GLACIERS MELTING IN CENTRAL ASIA: TIME FOR ACTION" - THE PERSPECTIVES OF THE CENTRAL ASIAN COUNTRIES AND UNRCCA

Objective: ***Find common ground for the understanding of the problems the Central Asian countries are facing with regard to glaciers melting/climate change and the consequences that come with it.***

All Central Asian countries, including Afghanistan, recognize that climate change and glaciers melting in the region are threats to sustainable development: There is a nexus between climate, water availablity, energy and food production, which must not be neglected. National, bi-lateral, regional and international programs are necessary to cope with the challenges, which come with the climate change.

The UNRCCA provided background information on the topic of the seminar. The region should be considered in a global context due to the fact that climate change is not limited to Central Asia. States in the region should be involved in the discussion on this topic at the international level and articulate their interests. Central Asia is not the only region in the world, which is facing climate change and its impact on cross-border water resources has to be recognized. Climate change has become a global issue, which was reaffirmed in the recent climate summit convened by the UN Secretary-General in September this year in New York. An unprecedented number of world leaders attended the summit, including 100 heads of state and government. They were joined by more than 800 heads of big businesses and representatives of civil society organizations. World leaders agreed that climate change is the most important challenge of our time and that specific and urgent action is needed to respond adequately. It is expected that a new climate agreement will be approved in the next year in Paris, and come into force in 2020. It will boost the actions of nations in international and national climate policy.

It is necessary to recognize the glaciers as resources to be shared by the countries in the Aral Sea basin. In this regard, governments in the region should take the responsibility to adapt to the impacts of climate change/melting glaciers in various ways such as reservoirs and more effective and efficient water management. Adapting to climate change requires changes in the legislation, educational programs, and the allocation of funds. To date there is a lack of coordination of national policies in the region. This is a major problem and it becomes an obstacle for better water and energy cooperation. The reason is that the countries seem to be considering the possibility of cooperation in the light of the policy of self-sufficiency in energy and water resources. Policy of non-cooperation, associated with minimal dependence on other countries, is costly to all countries. According to the UNDP, the economic benefits of cooperation in the field of water management in the region quantifiable factors each year could be around 5% of regional GDP.

The process of decision-making, public participation, access to information and education in the context of climate change/glaciers melting must not be underestimated. It is clear that knowledge of this important subject should be made available to the general public. Decision-making for


Source: Alfred Diebold

adaptation and mitigation of climate change should take place in the framework of a participatory process. The public should be aware of the issues involved and to lobby for support of the government/NGOs for the implementation of project activities. Education is an effective way to change behavior, increase public awareness of the necessity to adapt to climate change and the treatment of water as a scarce resource.

In summary: There is evidence that glaciers are shrinking in the high mountains of Central Asia. There is a lack of balance between environmental protection, hydropower generation and agricultural production. This can be seen around the Aral Sea, which has been drying up for the last 50 years. While up-stream countries need the water mainly for hydropower in winter, the down-stream countries need the water for irrigation agriculture during the vegetation period. Up-stream (Kyrgyzstan, Tajikistan, Afghanistan) and down-stream countries (Uzbekistan, Kazakhstan, Turkmenistan) in the Aral Sea Basin do not share the same interests and have not been agreeing on a common approach to deal with the consequences of climate change. Let us keep in mind what the UN Secertary-General Ban Ki-moon said: "One single country in the region cannot solve the problems alone". Adaptation to climate change is urgently needed and the international community has the responsibility to support the countries of CA.

PLENARY SESSION 2:
THE STATE OF GLACIERS AND SNOW-ICE RESOURCES OF HIGH MOUNTAINS IN CENTRAL ASIA AND PREVAILING TRENDS

Objective: ***To agree on where we stand regarding scientific studies and knowledge in the field of climate change/glaciers melting in Central Asia and provide guidance for the seminar working groups in order to develop ideas/projects for future action.***

In this session scientist from the Russian Federation (Department of Glaciology, Institute of Georgraphy, Moscow), Kazakhstan (Institute of Geography, Almaty), Kyrgyzstan (CAIAG Bishkek), and Tajikistan (Insitute of Geology, Dushanbe) presented their research findings. UNESCO, World Bank experts and the Capacity Building and Twinning for Climate Observing Systems (CATCOS) project reported on their work.

UNESCO brought to the attention that there are number of activities and programmes in place addressing water resources management, notably through the International Hydrological Programme, climate change and disaster risk reduction. It is well understood that climate change will lead to a loss of rare and endangered species, modified water balances (including glacial melt), and changing land use in mountainous regions modifying socio-economic conditions and livelihoods of people. Decreasing snowfall may lead to lower rivers and groundwater recharge even if precipitation remains constant. Higher erosion is expected in areas where snow melt is occurring and permafrost is being lost. There is a need for a vulnerability assessments, mapping and implementation of adaptation strategies in different mountainous regions of the world. Also raising awareness on potential impacts of climate change on mountain glaciers and downstream water supply is important. A global knowledge forum should be established. With regard to Central Asia UNESCO predicts that with a decline in glacier fed surface water, the use of groundwater will likely increase to meet the growing demand for drinking and irrigation water. The glacial retreat in Central Asia may have strong impacts on the availability and sustainability of the region's water resources. If surface water supplies decline the demand on groundwater resources will increase. Central Asia needs continued investment in capacity building, knowledge dissimination and monitoring of ground and surface water resources as well as on climate change and glaciers melting. In this context the websites „Groundwater Resources Assessment under the Pressures of Humanity and Climate Change" www.graphic-network.net and the exhibition "Climate Change impacts on mountains" www.unesco.org/new/en/natural-sciences/resources/communication-materials/exhibitions/climate-change-impacts-on-mountain-regions-of-the-world/ were presented as examples.

The Capacity Building and Twinning for Climate Observing Systems (CATCOS) project based in Bishkek, Kyrgyzstan, which is coordinated by the University of Fribourg, Switzerland, came to the following conclusions and recommendations in the context of glacier monitoring in CA:

- Glacier monitoring has to overcome national boundaries in order to coordinate observations over entire mountain ranges.

- Glacier observation data should be provided, via the corresponding data centres, to the scientific community and wider public according to international standards and strategies.


Source: Alfred Diebold

- This requires the recognition of the importance of monitoring activities, data standards and metadata by the sponsoring agencies and the research institutions.

- Modelling, Mapping (with different modern methods) and monitoring belong always together (=> calibration and validation is important).

- In situ Monitoring is still very important and can be performed on several levels of sophistication.

- Capacity building of young scientists is essential for re-establishing of glacier monitoring in CA, however this process needs time and resources to be sustainable.

World Bank experts from the University of Montana in the United States studied glaciers melting in the Amu Darya and Syr Darya river basins. They concluded and recommended:

- The mountain headwaters of the Amu Darya and Syr Darya rivers are the sources of approximately 50% of the total estimated runoff in the Aral Basin.

- The glacier component of this runoff volume represents approximately 10% of the total estimated runoff in the Basin.

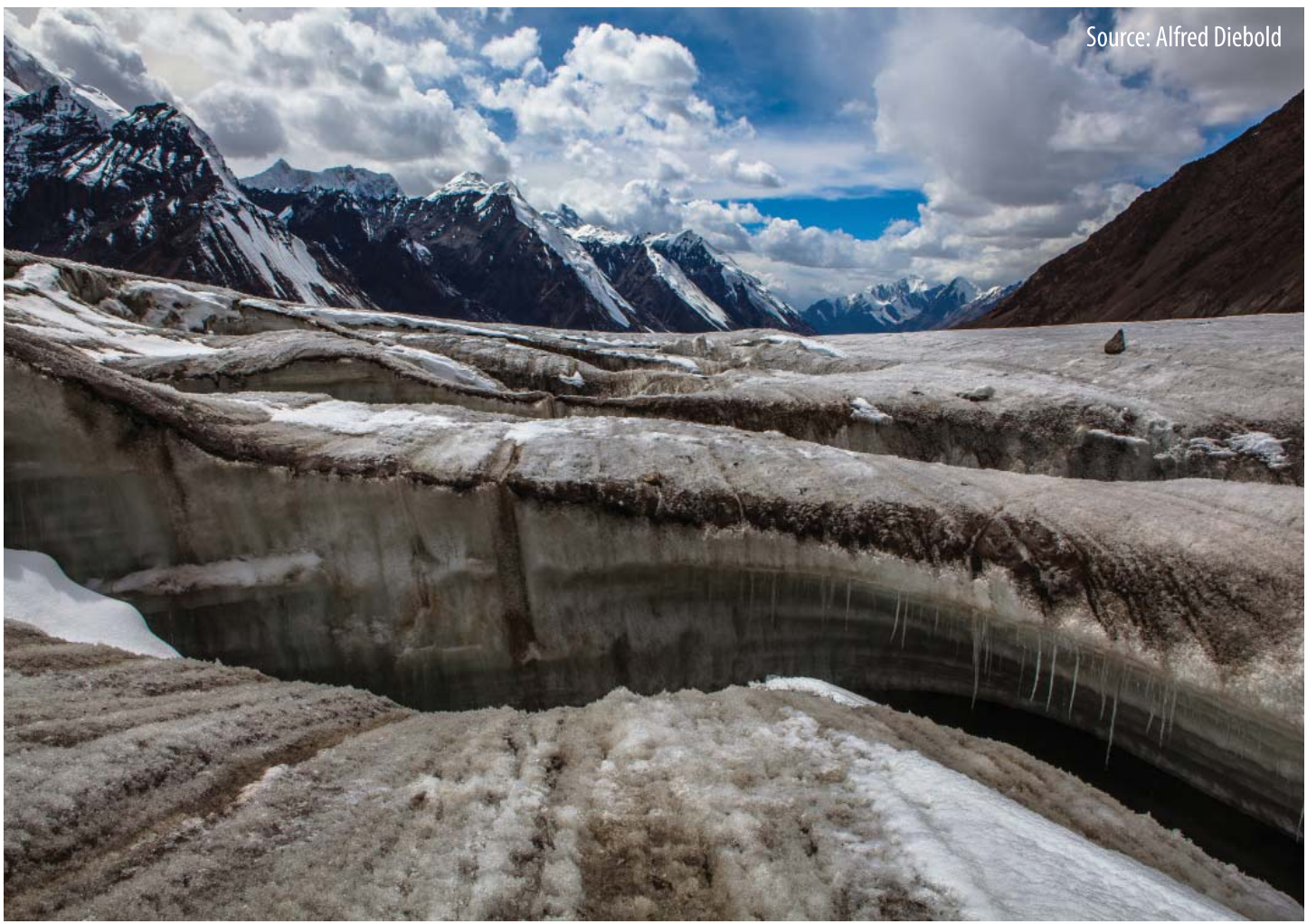
- The seasonal snowpack, in the Amu Darya headwater basins, and a combination of snow and summer rain in the Syr Darya headwater basins, are the primary components of runoff.

- The development of annual runoff forecasting procedures is the most realistic near-term activity.

- This would require the establishment of a program to monitor the snow water-equivalent depth in the mountain basins of the Pamir and western Tien Shan Mountains.

- Such a program would require international funding, and would benefit from collaboration with western snow monitoring programs.

For GEF and a number of participants from the region the protection of transboundary mountain ecosystems in Central Asia is of priority. The mountains of the Central Asia are under threat: Illegal logging, uncontrolled livestock grazing, and the plowing of slopes has led to an increased

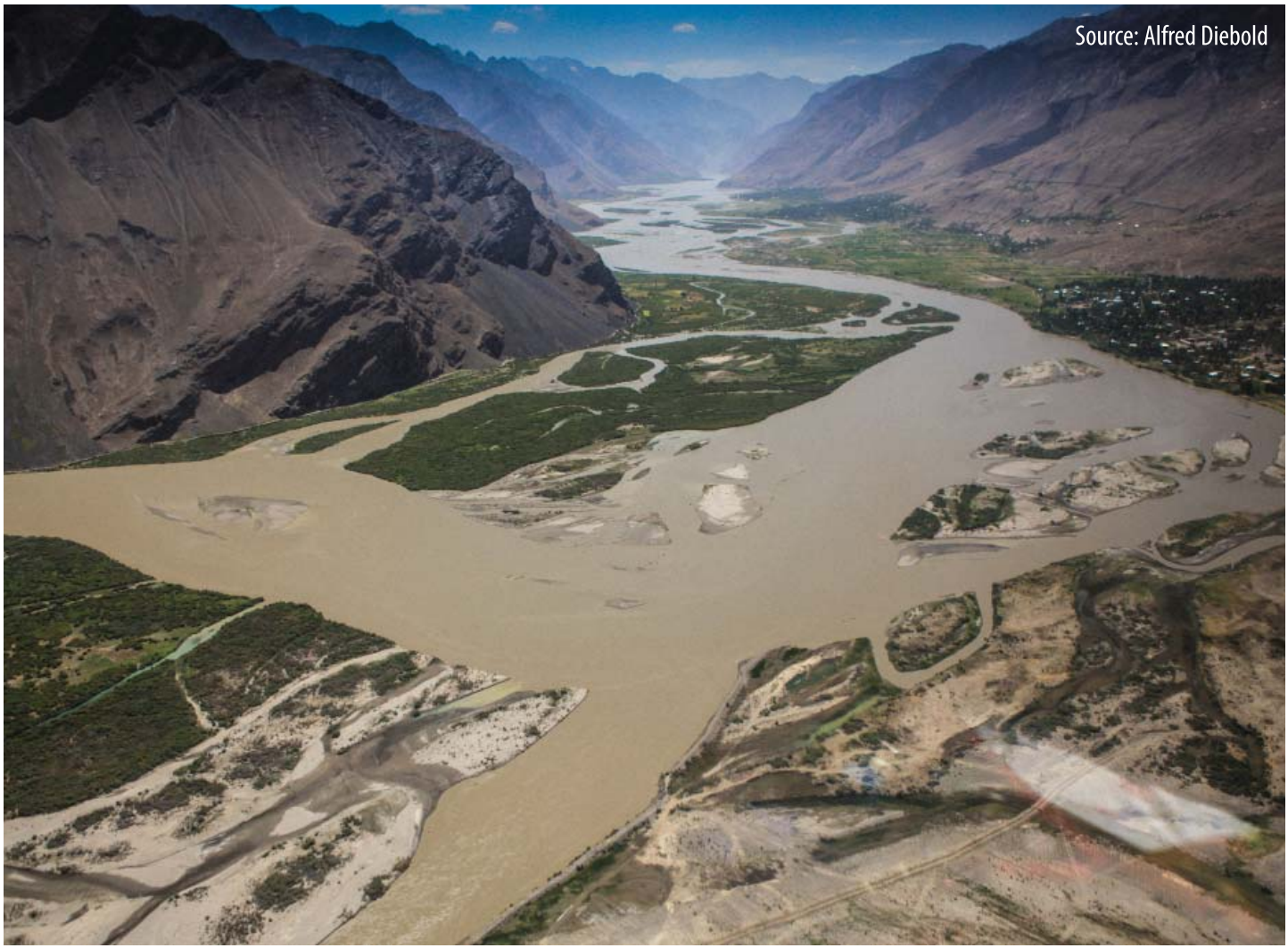

Source: Alfred Diebold

number of landslides, mudflows and soil erosion. Over-exploitation of natural resources, unsustainable land practices, and deficiencies in forest management are causing problems. These problems could be mitigated by the development of an agreed strategic approach to managing the natural resources of mountain areas, and implementing them in a number of pilot sites, such as UNESCO sites. Projects aimed at developing strategies for conserving biological resources/diversity in mountain areas and implementing them in pilot sites set up in the region are urgently needed.

In summary: Meteorological data of the last decades confirm, global warming has led to an increase in the surface temperature in Central Asia. Climate warming in the winter months is stronger than in other seasons. However, peak temperatures in summer have also been rising. Since the 1950s, the number of days with temperatures above 40°C has been increasing in the southern areas of Central Asia. Climate change scenarios for Central Asia forecast a 1° to 3°C increase in temperature by 2030-50. By the end of the century, temperatures could increase by up to 6°C if emissions worldwide are unmitigated and greenhouse gas continues to accumulate. Climate change will have a huge impact on water security. Future increases in both rainfall variability and extreme weather events will make water availability less predictable while raising temperatures increase water demand. Climate change has also altered precipitation patterns. It caused more precipitation in northern parts of Central Asia and less in the south, where most agricultural areas are. But the most disturbing effect of global warming in Central Asia is the melting of glaciers. Since about 1950, between 14% and 30% of the Tien Shan and Pamir glaciers have melted. Today's rate of glacier loss in Central Asia is 0.2–1% per year in volume. Some of the small glaciers (smaller than 0.5 km^2) have already totally melted. Connected with this process is the danger of so-called Glacial Lake Outburst Floods, which happen when water dammed by a glacier is released. Due to glacial retreat, the number of glacial lakes and incidences of failure has been increasing globally over the last 40 years. This danger is also acute in Central Asia. Scientists warn that in Kyrgyzstan alone, more than 20 glacial lakes are in danger of outburst.

In this context the cataloguing of glaciers worldwide became known when the IPCC started to publish reports on the effects of climate change and rising sea levels. The Asian continental glaciers are included in this catalogue, which is known as the Randolph Glacier inventory (RGI). RGI is a global data base of glacier outlines. It is intended for estimates of ice volume and glacier mass at regional and global scales. The data are organized into 19 large regions, with a shapefile provided for each region. The RGI is produced as part of the Global Land Ice Measurements from Space (GLIMS) initiative, a project to compile glacier information using remote sensing, primarily from optical instruments such as ASTER (Advanced Spaceborne Thermal Emission and reflection Radiometer). Central Asia figures under REGION 13. Contributing organizations among others are: University of Zürich and Fribourg, Switzerland, GFZ Potsdam, Germany, CAWa, Institute of Geography, Russian Academy of Science, Moscow, Russia. As mentioned before, large parts of Central Asia are covered by the database of the GLIMS. Its database consists in China of data from the first Chinese glacier inventory. Large parts of the Tien Shan in Kazakhstan and Kyrgyzstan were mapped semi-automatically using ratio images from ASTER. Important missing areas such as the Central Pamirs, Naryn basin, northern Tien Shan and the Dzungar Alatau were mapped semi-automatically with manual corrections using Landsat scenes. Other missing data come among others from the World Glacier Inventory, which is part of the World Glacier Monitoring Service (WGMS). The service collects standardised observations on changes in mass, volume, area and length of glaciers with time (glacier fluctuations), as well as statistical information on the distribution of perennial surface ice in space (glacier inventories). Such glacier fluctuation and inventory data represent high-priority key indicators of climate change and are monitored as terrestrial variables within global climate-related observing systems directed by WMO, UNESCO, UNEP, FAO and ICSU. They form a basis for hydrological modelling with respect to possible effects of atmospheric warming, and provide fundamental information in glaciology, glacial geomorphology and quaternary geology. The participants recognized the importance of young scientists' capacity building.

Participants recognized that mountains are the most sensitive regions to climate change. The glaciers and ecosystems in Central Asian Mountains provide some of the clearest indicators of this global phenomenon. All these values can be addressed using the conceptual framework of ecosystem services: a standardized approach to classify and quantify natural resources in ways that are meaningful in both ecological and socio-economic terms. Moreover, ecosystem-based adaptation provides opportunities to decrease this vulnerability, which has significant consequences not only for people in mountainous areas, but for many of those depending on water from mountains in the region or other ecosystem services they provide. The participants agreed that strengthening research on ecosystem services provided by mountainous areas, and enhancing regional cooperation in order to facilitate ecosystem-based adaptation, is essential.



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PLENARY SESSION 3:
PARTNER, DONOR, REGIONAL ORGANIZATION AND NON-GOVERNMENTAL STAKEHOLDER STATEMENTS IN THE CONTEXT OF "GLACIERS MELTING IN CENTRAL ASIA – TIME FOR ACTION"

Objective: ***Have an understanding that the stakeholders are in the context of glaciers melting/climate change in CA, which interests they have and which means are available to them. Come up with recommendations for better cooperation and coordination among stakeholders.***

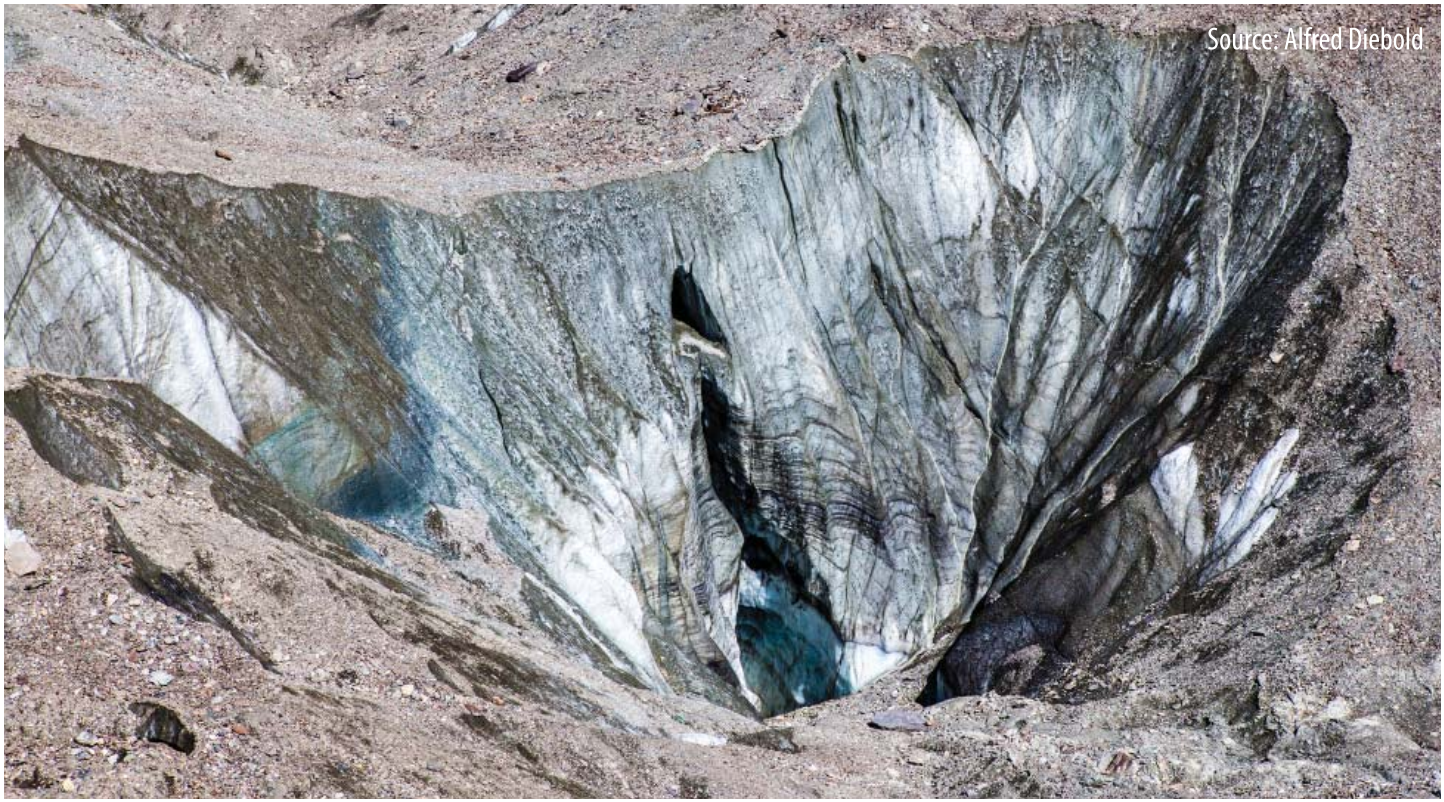
A stakeholder in our context is somebody (also a group of people or an organization) who is affected by climate change/glaciers melting. The term can be broadened to include anyone who has an interest in this matter. Stakeholder analysis in climate change/glaciers melting/transboundary water management is the process of identifying the individuals/groups/organizations that are likely to affect or be affected by a proposed action or legislation, and sorting them according to their impact on the action and the impact the action will have on them. This information is used to assess how the interests of those stakeholders should be addressed in a project plan, policy, program, or other action. A stakeholder analysis ensures that all stakeholders affected will be considered. Stakeholders may include the following institutions/individuals: *International Organzations, governments (national and foreign), International non-governmental organizations, farmers, labor unions, industry trade groups, professional associations, NGOs and other advocacy groups, local communities, national communities, public at large (global community), schools, future generations, analysts and media, research centers, employees, etc. at international, regional, national, cross-border, local level.*

The role of the international community: International cooperation and exchange can play a major role in supporting national and regional activities on climate change adaptation, mitigation, education, training and public awareness. Many governments need access to expertise and financial and technical resources to develop their own climate change programs. And all countries can benefit from sharing success stories, exchanging personnel and strengthening institutional capacities.

In addition to the scientific institutions, which reported on their work during the plenary session 2, NGOs, international and national organizations were given the opportunity to contribute in this session.

The German Foreign office reported on the Berlin Process, which was initiated in 2008 by the German governement to support political, scientific and educational cooperation with Central Asia in the water sector: http://waterca.org/berlin-process.

The agency FOCUS is part of the Aga Khan Development Network. It reported on its work in Tajikistan. The aim is to decrease a community's vulnerability to natural disasters such as landslides, floods, mudslides, epidemics, and earthquakes, catastrophic rain or snow, and prepares them to respond


Source: Alfred Diebold

rapidly and effectively to natural disasters. In this way, the initiative also seeks to ensure that communities are empowered in the learning process: http://www.akdn.org/tajikistan.

UNECE reported on their activities in Central Asia, which include among others a Regional Dialogue and Cooperation on Water Resources Management in Central Asia: http://www.unece.org/env/water/centralasia.html.

World Bank has an on-going program CAWEDP aims to support these countries make well-informed decisions, manage water and energy resources, strengthen regional institutions, and stimulate investment: http://www.worldbank.org/en/region/eca/brief/caewdp.

UNDP/GEF informed about the new initiative: The objective of the GEF project proposal is to increase the resilience and flow of ecosystem services in the Central Asian high altitude glaciers. It comprises five components: Climate scenario analyses, regional cooperation, capacity building, knowledge management and demo projects.

It was concluded that an in-depth stakeholder analysis is needed to get a complete overview of all stakeholders in CA and past and on-going activities/projects should be mapped. This analysis will be instrumental for better and transparent cooperation among stakeholders.

PLENARY SESSION 4: EDUCATION AND PUBLIC OUTREACH IN THE CONTEXT OF CLIMATE CHANGE, GLACIER MELTING, ENVIRONMENTAL PROTECTION AND TRANSBOUNDARY WATER MANAGEMENT

Objective: ***To agree that education is an effective way to change the behavior and to adapt to new challenges, which come with climate change and glaciers melting in CA. Knowledge has to be made available to the public in order to find a better understanding of the problems and to implement policies, which are accepted and supported by the public. Guidance should be given to the seminar working groups for their development of ideas/projects for future action.***

In an introductory statement the Stern Review was quoted: *"Fostering a shared understanding of the nature of climate change and its consequences is critical in shaping behaviour, as well as in underpinning national and international action… Educating those currently at school about climate change will help shape and sustain future policy making, and a broad public and international debate will support today's policy-makers in taking strong action".*

All country delegations supported the idea of strengthening the eduction at pre-school, school and university level. They also agreed to have the population better informed about the issues of climate change and glaciers melting. Trainig of trainers is a priority, internet-based resources are needed, and NGOs have to be more involved. It was also mentioned that changing public attitudes towards treating water as a scarce resource is also crucial. In this context it is of importance that the public and decision makers commit to the understanding that water is a common pool resource. Water consumption should be organized in such a way that it will be used to the greatest benefit of the societies. Water should be recognized as a human right! The general public should have more accurate information related to water and should be more involved in the development and implementation of plans and strategies aimed at addressing problems, particularly related to water scarcity and negative effects of climate change. Involving the general public in saving water activities, in keeping water sources clean and mitigating the consequences of the environmental crisis in the Aral Sea region would greatly help improve the situation.

Education for Sustainable Development (ESD) as an instrument in addressing the topic of climate change, DRR and water education, needs to be better capitalized and addressed. ESD as defined by UNESCO allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future.

Key sustainable development issues have to be included into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption. It also requires participatory teaching and learning methods that motivate and empower learners to change their behaviour and take action for sustainable development. Education for Sustainable Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way.

WORK IN FOUR GROUPS ON THE DRAFT OF THE PLAN OF ACTION

Objective: *Have a first draft of the action plan ready for review by the governments of Central Asia*.

1) Enhancing scientific cooperation – led by UNESCO Almaty office

On the basis of a draft project proposal the topic of scientific cooperation was discussed. The result is a project proposal, which can be found under action plan A in this report.

2) Education and Public Outreach – led by UNRCCA

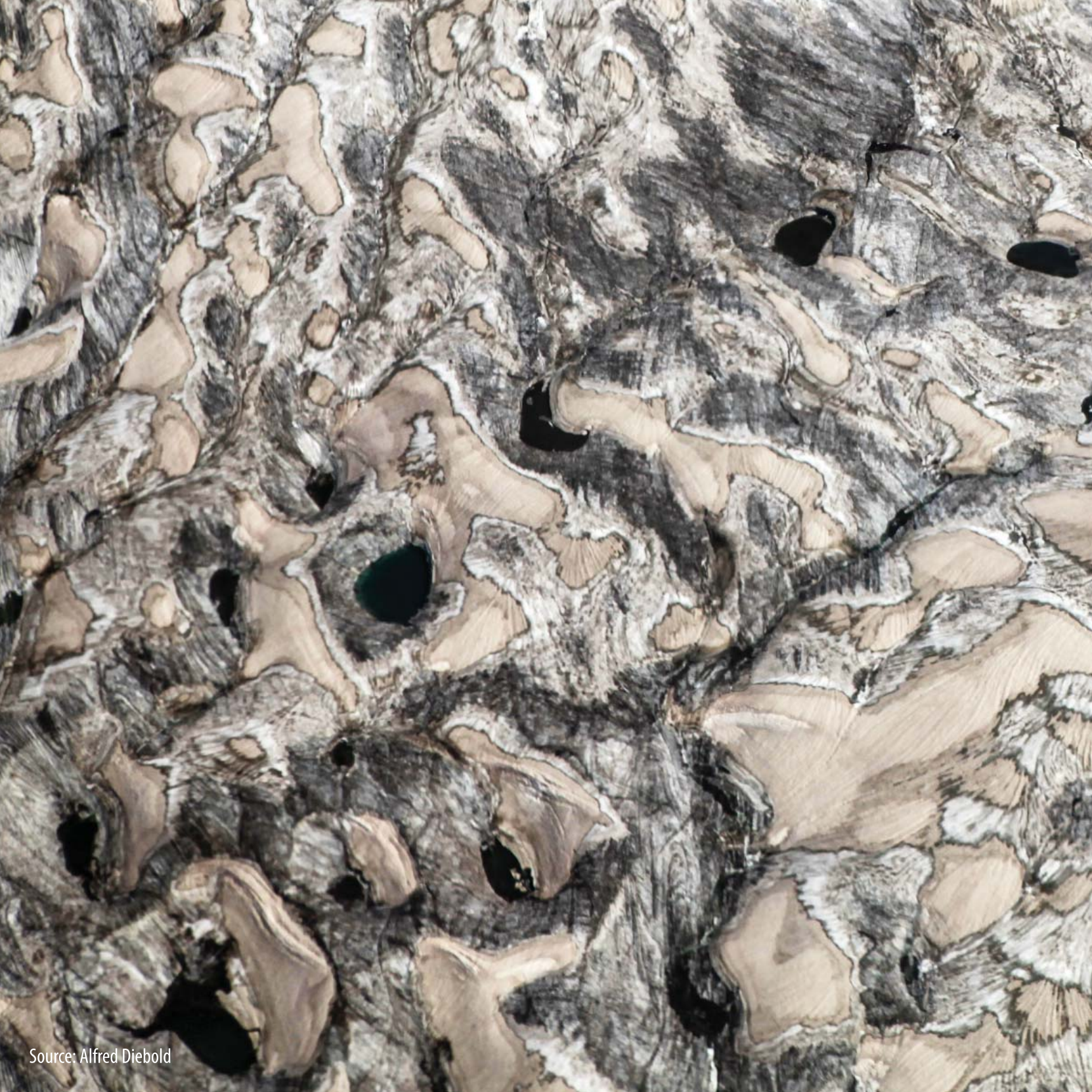
On the basis of draft project proposals the topics were discussed. The results can be found under action plan B and C in this report.

3) Regional cooperation – led by UNRCCA and EC IFAS

Discussions led to the recommendations that there is need to identify formats for cooperation and interaction in the area of glaciers melting, which refer specifically to regional agreements. It was suggested that it is necessary to conduct a comprehensive monitoring in the Aral Sea basin with regard to water resources in CA. Encouragement was also articulated for capacity building activities. UNESCO should be encouraged to train more experts from Central Asia at the UNESCO-IHE Institute.

4) Climate change - led by GEF/UNDP

The Global Environment Facility (GEF) project "Enabling regional cooperation in assessment and sustainable management of Central Asia high altitude glacier systems" is ready to work with Central Asian governments in an effort to adapt to climate change. Details about the content of possible projects were discussed.



Source: Alfred Diebold

PLENARY SESSION 5: GROUP WORK PRESENTATIONS, CONCLUSIONS, RECOMMENDATIONS AND NEXT STEPS

1. *Each of the four groups reported on their work[1]. It was agreed that an action plan has to be worked out on the basis of the discussions during the plenary sessions of the seminar and the work in groups.*
2. *An in-depth stakeholder analysis is needed to get a complete overview of all stakeholders in CA and past and on-going activities/projects should be mapped for future better regional cooperation.*
3. *There is a need for a better understanding of the consequences of climate change and glaciers melting for the countries of CA among the scientific community, decision makers and the general public.*
4. *There is a need for scientific cooperation among scientific institutions in the region and internationally, and a need to make research findings available to all stakeholders in order to develop public policy and action programmes at international, regional, bi-lateral and country level.*
5. *Education plays a vital role in order to change peoples´ behaviors for better adaptation to climate change and glaciers melting.*
6. *Public outreach programs, public participation in decision making and access to information are needed to develop and implement adequate policies and investment programmes with the objective to cope with natural disasters and to adapt better to climate change/glaciers melting in CA.*
7. *As next steps: The report and draft action plan will be discussed with all participating countries. After approval the action plan will be put forward for financing to the international community.*
8. *GEF could be approached and be a financing partner for the proposed action plan.*
9. *Kazkhstan proposed to call the years 2015/16 as the years to preserve the glaciers! The proposal was supported by all delegations.*

The proposed draft action plan is the contribution of the UNRCCA, UNESCO and its partners to advance the water-climate-agenda with special focus on the high mountain regions in Central Asia. Its final draft was prepared by UNESCO Almaty office and UNRCCA.

[1] Results are listed under "Work in four groups on the draft Plan of Action" in this report.

Source: Alfred Diebold

COMPONENTS OF THE PROPOSED ACTION PLAN ARE:

- Scientific Cooperation on glacier monitoring and glacier-induced hazard risk reduction
- Improvement of formal Education with focus on Climate Change and IWRM
- Awareness Raising – Public Participation – Public Access to Information – Public Outreach

DRAFT ACTION PLAN
A. SCIENTIFIC COOPERATION ON GLACIER MONITORING AND GLACIER-INDUCED HAZARD RISK REDUCTION

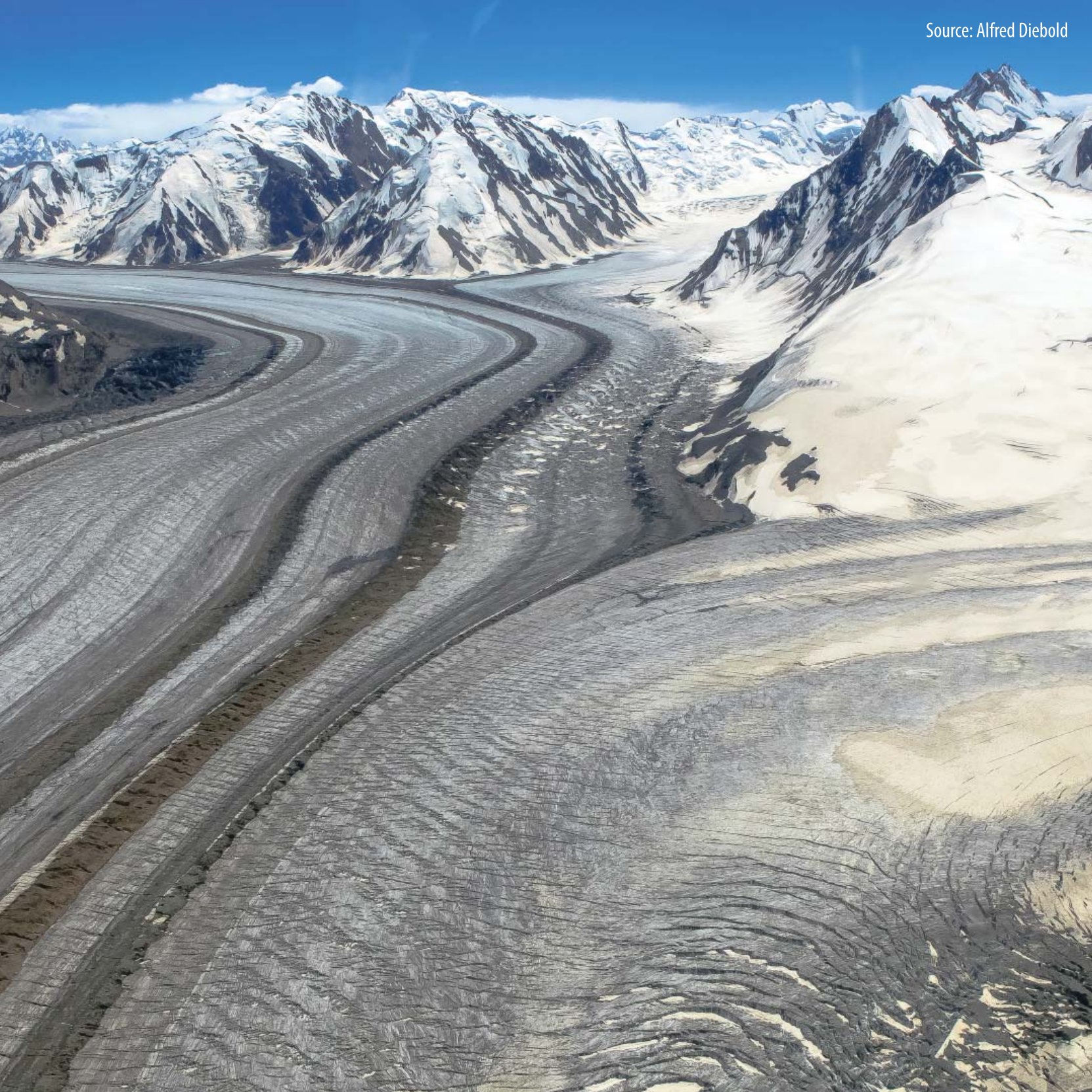
DEVELOPMENT OBJECTIVE:

The proposed project is aimed at promoting scientific cooperation between CA countries, enhancing capacity building for the local staff in research institutions and putting a joint CA glacier monitoring program in place. The project activities will contribute to enhanced resilience to climate change, through improved scientific understanding of vulnerabilities, opportunities and potentials for adaptation, and the development of strategies and policies based on scientific/evidence-based knowledge in major mountain regions of CA: Tian-Shan and Pamir. It is aiming also at adopting early warning system**s** for critical glacial lakes in the Central Asia region. The project includes several activities which will contribute to enhanced understanding of the distribution of the glacial lakes, projections of the future changes and rate of glacial lake formation, glacial Lake Outburst risk, affected areas by flooding and means to adopt early warning systems.

BACKGROUND:

The Central Asian States Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, as well as Afghanistan face various water-related problems, which bear a high potential for conflicts. Water is the key factor for economic development in the Central Asian region, but its resources are distributed unevenly and its use differs widely. While the states in the mountainous upper reaches of the major rivers Amu Darya and Syr Darya are rich in water resources and use the river water mainly for energy production in winter, the downstream states mainly need the water to irrigate cropland in summer. The situation is aggravated by out-dated irrigation infrastructures, such as leaky irrigation channels, and inefficient irrigation methods which cause high losses of water. Sound water management decisions require a reliable hydro-meteorological data basis. Unfortunately, after the collapse of the Soviet Union in the 1990ies, the existing hydro-meteorological monitoring network degraded too. Many monitoring stations were abandoned due to the lack of financial support by the new independent republics. The remaining stations are often equipped with out-dated sensors, which provide only non-digital data of low temporal resolutions. In addition to the prevailing issues, climate change represents a considerable uncertainty factor with respect to the future dynamics of water resources and water-related disasters. While the retreat of the glaciers in the Tien Shan and Pamir mountains has been observed since the 1970ies, the impact of this process on river runoff is still to be cleared in detail.

Nevertheless, the frequency, seasonality and magnitude of water-related disasters are expected to alter forced by changing climatic drivers. Specific attention needs to be paid to surge type glaciers in Pamir and Tien-Shan. Surge type glaciers differ from other glaciers by there characteristic dynamics: long periods of quiscent phase (usually 10 -12 years) of slow movement and steepening of the longitudinal profile and short periods of active phase with characteristic fast ice flow (10's of meters per day) and rapid glacial advance and increased glacial meltwater release. This glacier behavior



Source: Alfred Diebold

is usually associated with varios natural disasters, such as mudflows, outburst floods and similar. At present the data on these type of glaciers is very limited, and most of the data refers to the Soviet times, and needs to be updated.

The glacial system of the mountainous regions also include in perennually frozen ground, rock glaciers as well as buired remnant ice in moraines. It is rapidly adjusting to the climate change, and, with established warming trends of the annual temperatures, it is expected that meltwater from the ice in frozen ground will more and more contribute to the river runnoff. However very little data is available on permafrost for the Central Asia region, stressing the need of enhancing research in this area.

The mountain area in the region is considered as an area prone to both dangerous natural phenomena and anthropogenic factors. These risks are topographic, geo-physical, hydrological, climatic and man-made and include flooding, landslides, mudslides, avalanches, glacial lake outburst floods (GLOF).

The formation of glacial lakes occurs when glacier melt-water production into the glacier frontal lake exceeds the outflow of the lake. Glacial lakes are a danger because of their moraines are fairly loose structures and often contain an ice core. The resulting outburst of water can lead to casualties and material losses. Elevated dangers can be expected at the debris covered glaciers as usually these glaciers produce larger moraines, resulting in potentially larger volume of water stored in the glacial lake.

Source: Alfred Diebold

GLOFs are typically a result of cumulative developments and occur (i) only once (e.g., full breach failure of moraine - dammed lakes), (ii) for the first time (e.g., new formation and outburst of glacial lakes), and/or (iii) repeatedly (e.g., ice - dammed lakes with drainage cycles, or ice fall).

The risk of the sudden failure of the moraine and resulting rapid drainage of the lake is dependant on the water level in the lake on the one hand, and strength of the moraine itself on the other. Therefore monitoring of the glacial lakes, which store large volumes of water and potentially threaten human life and civil property, is needed.

BENEFICIARIES:

Scientific institutions, State control bodies, local authorities, agencies responsible for environment protection, local communities.

PARTNER ORGANIZATIONS:

UNESCO, UNDP, Regional Glaciology centre under auspices of UNESCO (Institute of Geography of Kazakhstan), Ministries of Environment, GFZ German Research Centre for Geosciences, Central Asian Institute for Applied Geosciences (CAIAG), National Hydromet Centres, Fribourg University, Institute of Geography, Russian Federation, WGMS, CAREC, Bonn University, FOCUS.

PROPOSED ACTIVITIES:

- Selection of the key glacier monitoring regions in Central Asia for glacier mass balance and other glacier parameters studies – March 2015;
- Establishing interagency groups and appointing national experts for coordination and data assemblage on glaciological, hydrological and climatic observations in each country - March 2015;
- Capacity building of young scientists in glaciology and transboundary water problems in Central Asia countries, including summer schools and workshops on modelling approaches and applying remote sensing data – within 3-5 years;
- Adaptation of new monitoring techniques and equipment by local working teams - within 3-5 years; Enhancing scientific cooperation between Central Asia countries and other interested parties (including potential cooperation in GEF project) on joint scientific research and data sharing;
- Facilitating cooperation of regional experts with Regional Glaciological Centre under the auspices of UNESCO;
- Intergovernmental coordination of the glacier monitoring program and glacier induced natural hazards between countries;
- Advancing of the regional programme for glaciological monitoring and transboundary water resources – March 2015;
- New proposal development for permafrost, rock glacier and buried ice long-term monitoring - March 2015;
- Adaptation of the existing glacier induced natural hazard early warning systems (EWS) as well as testing and implementation of new technologies for EWS and installing EWS in critical sites – after 2016;

- Establishing of portal communication tool for regional glaciological data and risk assessment containing existing data, reports, maps, contacts etc. - December 2015;
- Development of the catalogue of surge type glaciers in the Pamir and Tien-Shan and glacier induced natural hazards in two years - end of 2016);
- Disseminating information to the general public and stakeholders.

OUTPUTS:

- Annual monitoring data submitted to the common data bases;
- Annual update on regional mass balance;
- Annual updates on glacier hydrology monitoring data;
- Improved and developed Hydrological models for mountainous catchments;
- Downscaled and customized climate scenarios for selected basins and relevant sub basins;
- Awareness-raising programme for policy-makers at the national and regional level on the predictions and risks related to melting glaciers;
- Catalog of surge type glaciers in Pamir and Tien-Shan;
- Inventory of critical glacial lakes available to stakeholders;
- Assessment of glacial lakes outburst risk available to the stakeholders, scientists and general public;
- A Draft Action Plan to mitigate the impact of glacier induced natural disasters in the pilot sites developed;
- Developing a list of recommendations for the safe location of infrastructures (such as schools) in pilot sites;
- Awareness-raising programme for policy-makers at the national and regional level on the predictions and risks related to melting glaciers.

PERFORMANCE INDICATORS:

- Regional action Plan to establish glacier monitoring agreed upon;
- Key glacier monitoring regions established and monitoring resumed on number of glaciers;
- A glacier monitoring working team established in each country, containing at least one scientist with a PhD degree in glaciology;
- Advanced regional glaciological monitoring programme discussed with stakeholders and submitted for coordination to the appropriate authorities of the Central Asia states;
- Technical document and conference proceedings based on scientific papers;
- Policy brief;


Source: Alfred Diebold

- Workshops and training organized at a regular basis;
- A proposal submitted on permafrost, rock glacier and buried ice monitoring;
- A catalogue on surge type glaciers produced;
- A list of mitigation measures drawn up;
- Recommendations on the safe locations and reinforcement of infrastructures, including schools (UNESCO VISUS project) in pilot areas developed;
- A feasibility study for glacier-induced mud flow protection structures at pilot sites undertaken;
- Established database on glacial lakes and is available to all stakeholders;
- Early warning action plan established by responsible stakeholders for GLOF in endangered areas.

OUTCOMES:

- Improved capacity of the scientists and institutions to apply advanced methods and technologies in assessing the status of snow and ice, and the impact of climate variability on water resources in the region;
- Local authorities capacities strengthened to cope with the impact of glacier-induced natural hazards, disaster risks mitigated.

Source: Alfred Diebold

B. IMPROVEMENT OF FORMAL EDUCATION WITH FOCUS ON CLIMATE CHANGE AND IWRM

DEVELOPMENT OBJECTIVE:

The project is aimed at assisting Central Asian countries in their efforts to improve the effectiveness and quality of education in nursery schools, schools and universities. UNESCO´s Education for Sustainable Development principles will be applied.

BACKGROUND:

Education seeks to achieve profound, long-term changes in understanding all aspects of sustainable development, particularly among the young. Developing educational curricula and materials can be expensive and difficult. However, the results of a successful programme can be enormous: a population whose deep-seated appreciation of the environment/geography/IWRM will show a greater commitment to national and international adaptation and mitigation actions.

Development strategies of Central Asian countries include the improvement of education systems and recently the funding of public education systems has significantly increased. However, a lack of proper attention to this sector, particularly during the early 90's, is reflected in the ineffectiveness of education systems in general. The main hindrances to effective teaching and learning are a lack of teachers with the necessary level of professional training and competence, inadequate equipment, training materials and devices in educational institutions, especially schools in rural areas and an inefficient use of available information technologies. On top of this, there is uneven distribution of teachers and resources between urban and rural schools. Schools located far from district and provincial centers often receive much less resources that city schools receive.

It is also proposed to improve the university education in the field of natural resources management, IWRM and geography. This will include distance learing/E-learning. One good example is the Masters course of the German-Kazakh University in Almaty, where students from all countries of Central Asia are given the opportunity to study IWRM.

BENEFICIARIES:

Ministries of Education, rural populations, students, school administrators, teachers.

PARTNER ORGANIZATIONS: Ministries of Education, UNESCO, schools and universities in the region.

OUTCOMES:

- Education system improved at pre-school, school, hi-school and university level;
- Academic progress of schoolchildren improved.

OUTPUTS:

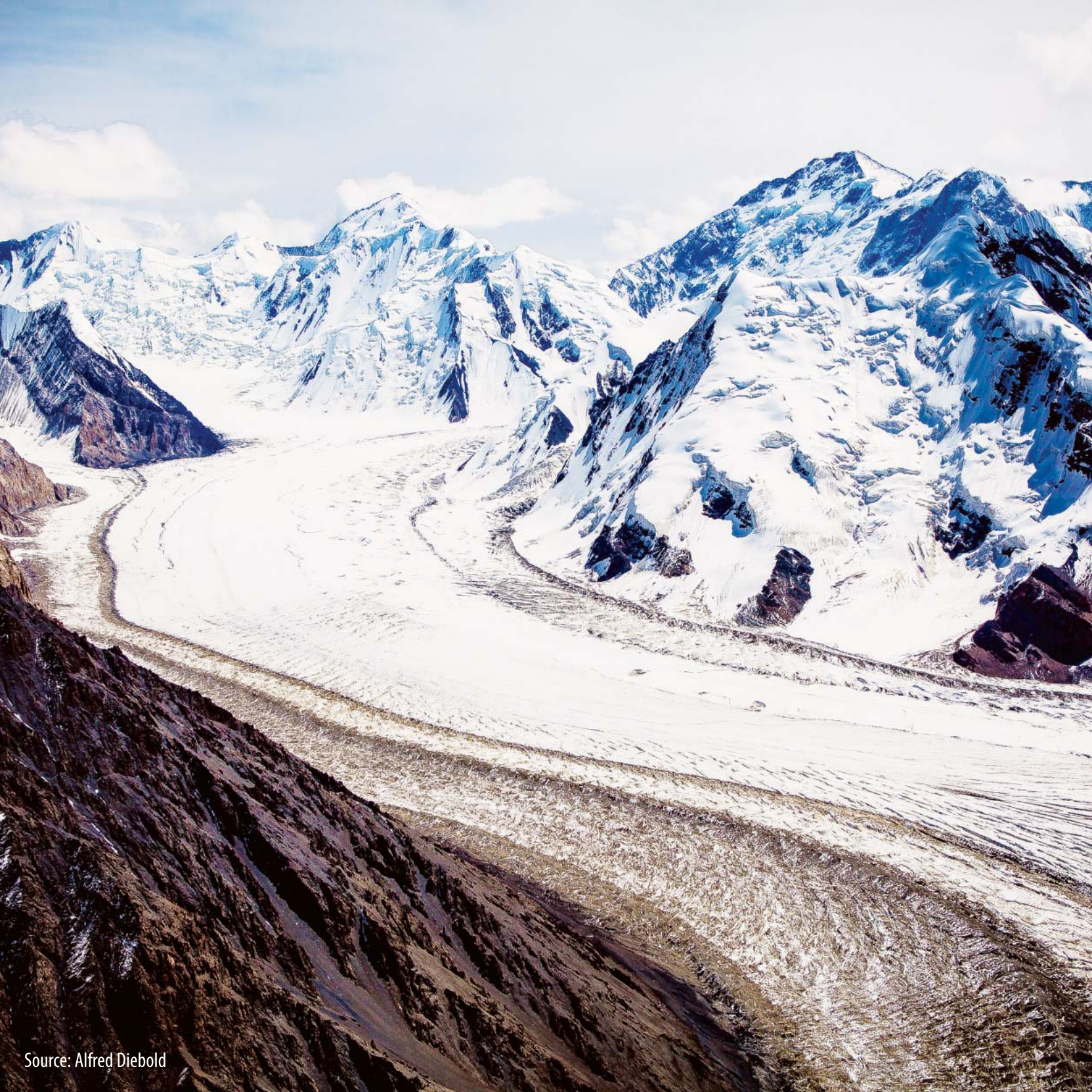
- Quality of education of school children improved;
- Access to finance for rural schools improved;
- School equipment in rural areas improved;
- Access to teacher training in rural areas improved;
- New university programs are established.

ACTIVITIES:

- Identifying schools in rural areas as pilots for project implementation ;
- Improving access to appropriate educational materials;
- Assisting in the procurement of equipment for pilot schools;
- Upgrading the qualifications of primary school teachers in pilot schools;
- Training primary school teachers on interactive approaches to teaching in pilot schools;
- Study tour for decision makers;
- Exchange programmes for students;
- Start new university programmes on the subjects IWRM, climate change, sustainable development;
- Use of latest technology in schools and universities.

PERFORMANCE INDICATORS:

- Academic progress of schoolchildren in pilot schools increased by 15% in comparison to other schools;
- The teachers at pilot schools have received special training in the use of interactive teaching methods;
- Teacher training materials have been developed and are being used in the training process;
- The necessary equipment is procured and installed in schools and is used in the training process;
- New university programs are in place and new curricula are developed.



Source: Alfred Diebold

C. AWARENESS RAISING – PUBLIC PARTICIPATION – PUBLIC ACCESS TO INFORMATION

DEVELOPMENT OBJECTIVE:

The project is aimed at getting decision makers, journalists and the interested public familiarized with all aspects of climate change, glaciers melting and its effects on surface and groundwater in Central Asia. It also aims to educate the public to get involved in public decision-making in the context of climate change and encourage the Central Asia countries to work together to mitigate and adapt to climate change. The public has access to information.

BACKGROUND:

- Public Awareness

Many governments and non-governmental organizations (NGOs) have already launched major public awareness programmes. But there are so many people to reach, and so many behaviors and decisions to influence, that there remains an enormous unmet need for more outreach. Creating a successful outreach programmes that truly changes behavior is not easy to do. Effective programmes and strategies are needed.

- Public Participation

Governments can better mobilize the energies of the general public by ensuring that people can participate actively in climate change decision-making. This will sometimes require profound changes in how political leaders and civil servants are accustomed to working.

- Public Access to Information

Programmes to engage citizens and non-governmental organizations in addressing climate change can be improved by ensuring that information is more freely available. Information must be easily accessible to anyone who seeks it out in libraries, on the internet or from government offices.

More specifically: The Central Asian countries want to participate more actively in international cooperation opportunities to address the challenges of mitigating climate change and adapting to the impact of climate change. The concept of creating a public awareness for the necessity of Nationally Appropriate Mitigation Actions (NAMAs) is proposed. It foresees developing NAMAs for Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Kazakhstan.

Changing public attitudes towards treating water as a scarce resource is also crucial. In this context it is of vital importance that the public and the leaders of all countries commit to the understanding that water is a common pool resources, which means that there should be private property

rights associated with ground and surface water and that the water consumption will be organized in such a way that it will be used to the best of the societies. Water is recognized as a human right.

Involving the general public in saving water activities, keeping water sources clean and mitigating the consequences of the environmental crisis in the Aral Sea region would greatly help improve the situation. Assistance in the development and implementation of public awareness would substantially contribute to expanding the scope of ongoing activities and to a more efficient use of water resources in general.

BENEFICIARIES:

General public, decision makers, NGOs, media, agencies responsible for water resources and infrastructure management, environment.

PARTNER ORGANIZATIONS:

Media companies, radio and TV stations, newspapers, SIC ICSD, EC IFAS, Eco Forum (Uzbekistan), CAREC, Ministries of Environmental Protection, Agriculture and Water.

OUTCOMES:

- Public awareness about climate change/glacier melting/scarcity of water increased;
- Water scarcity reduced;
- Adaptation to environmental hazards;
- Access to information;
- Public decision making.

OUTPUTS:

- Awareness of civil society and decision makers increased;
- Greater public awareness of policies, programs, climate change, glacier melting and water issues;
- Target groups identified;
- The demand for water decreased;
- Water quality in major sources maintained.

ACTIVITIES:

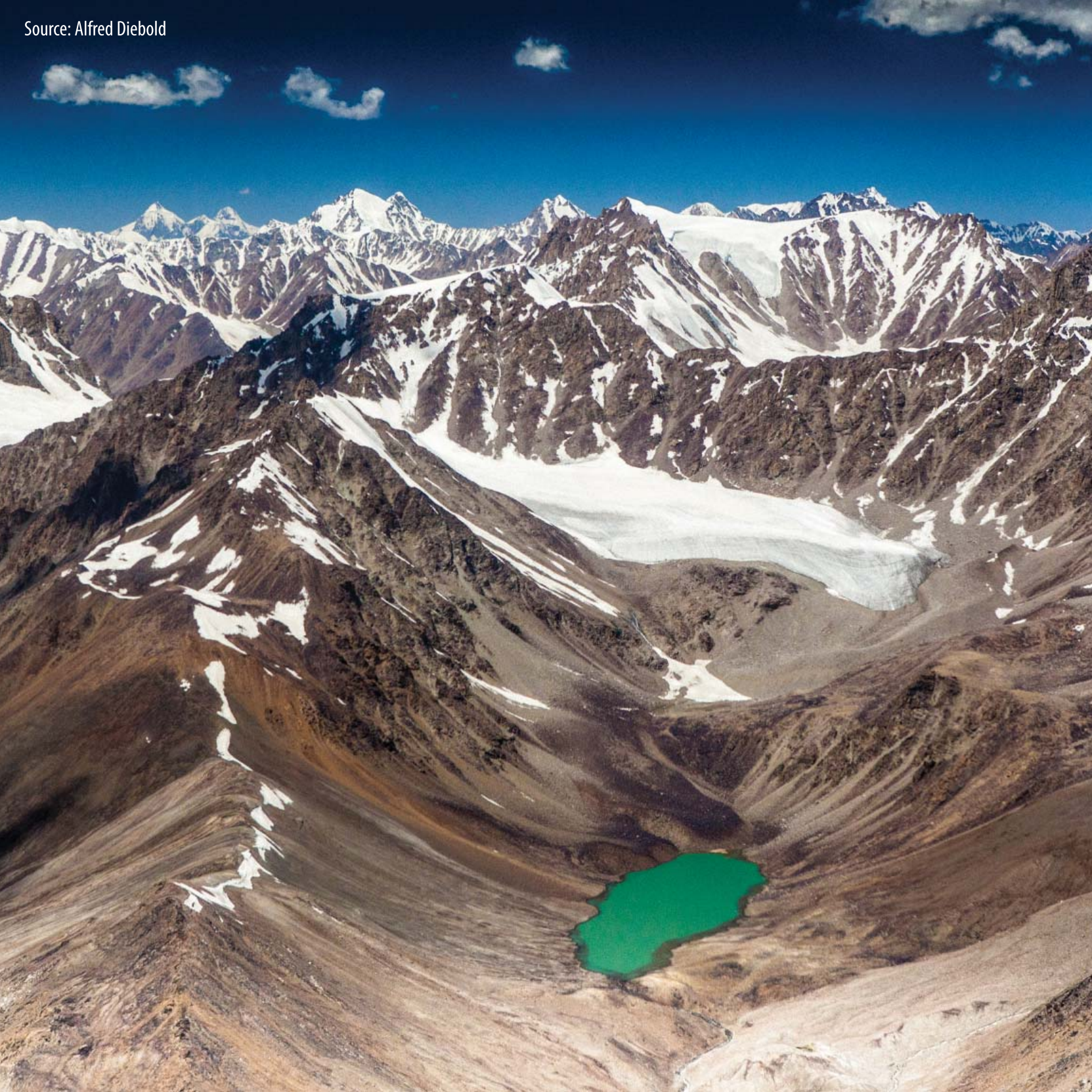
- Development of a social marketing campaign;
- Identifying target groups;
- Development of messages, products for the successful implementation of the campaign;

- Conducting sociological surveys of target groups prior to awareness campaigns, during implementation and after the project completion;
- Establishing the effectiveness of information delivery channels;
- Developing the Regional and National Strategies for public and stakeholder awareness;
- Implementing Regional and National Strategies for public and stakeholder awareness;
- Disseminating information to the general public and stakeholders;
- Production of TV and radio programs, websites, articles;
- Acitivities of Social marketing: develop and integrate marketing concepts with other approaches to influence behaviors that benefit individuals and communities for the greater social good. It seeks to integrate research, best practice, theory, audience and partnership insight, to inform the delivery of competition sensitive and segmented social change programs that are effective, efficient, equitable and sustainable.

PERFORMANCE INDICATORS:

- Policies, strategies, and work programs developed, discussed, agreed;
- Awareness of civil society and decision-makers increased.

Source: Alfred Diebold


Source: Alfred Diebold

APPENDIX I: ENABLING REGIONAL COOPERATION IN ASSESSMENT AND SUSTAINABLE MANAGEMENT OF CENTRAL ASIA HIGH ALTITUDE GLACIER SYSTEMS

GEF PROJECT

Project objective: ***Increase the Resilience and Flow of Ecosystem Services in the Central Asia High Altitude Glaciers.***

Component 1: TDA of the present state of CA's high altitude glacier systems including climate scenario analyses to inform adaptive integrated management of the glaciers and impacted downstream mountain and lowland ecosystems.

- (i) Science-based consensus among the countries on major transboundary problems, future state and dynamics of the CA glacier systems and permafrost;
- (ii) Understanding of the current and future transboundary implications of the degradation of glaciers on the shared water resources and downstream mountain and lowland ecosystems;
- (iii) An improved knowledge of the extected negative implications of climate change on glacier systems and permafrost in CA and inter-linkages with neighbouring regions (e.g. Tien Shan).

Component 2: Building the foundation for regional cooperation to protect the high altitude glacier systems of CA.

- (i) Regional agreement on Climate Resilient Glaciers Vision and agreement on priorities for action (regional SAP);
- (ii) Strengthened collaborative mechanism for regional cooperation in the field of understanding of current and future role of glaciers and impacts on economy, population, water and ecosystems;
- (iii) Full involvement of stakeholders in the decision making process;
- (iv) strengthened governance institutions at regional, national, and local levels;
- (v) Capacitated local stakeholders ready to minimize negative consequences for economic sectors and livelihoods as well as the environment in the glacier systems;
- (vi) Adaptive management measures for economy and population in mountain areas likely to be affected by the intensified glacier retreat and permafrost degradation identified and agreed.

Component 3: Strengthening capacity of glacier and water resources monitoring in CA.

- (i) Capacitated regional glacier and water resources monitoring institution;
- (ii) Consensus on joint glacier and water resource monitoring activities between the countries;
- iii) Countries capacities built for improved coordinated monitoring.

Component 4: Learning and Knowledge Management.

- (i) South-south knowledge exchanges and scientific cooperation among high altitude glacier basins facing comparable challenges to advance regional knowledge and action;
- (ii) Project experiences and lessons disseminated regionally and globally.

Component 5: Demo projects.

- (i) Innovative and replicable glacier and water resource management demonstrations that will introduce resilience-enhancing measures at the local level;
- (ii) Adaptive management and risk mitigation measures tested.

APPENDIX II: PROGRAM OF THE SEMINAR

INTERNATIONAL SEMINAR "GLACIERS MELTING IN CENTRAL ASIA: TIME FOR ACTION"

Co-organized by the UN regional Centre for Preventive Diplomacy for Central Asia (UNRCCA), the Regional Office of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Executive Committee of the International Fund for Saving the Aral Sea (EC IFAS) and the World Bank

Dushanbe, TAJIKISTAN

11-12 November 2014

PROGRAM OF THE SEMINAR

Day 1: November 11, 2014

08.30-09.00 **Registration**

09.00-9.30 **Opening Remarks**

- **Government of Tajikistan**: Mr. Sulton Rahimzoda, First Deputy Minister of Energy and Water Resources of the Republic of Tajikistan
- **UNRCCA:** Mr. Fedor Klimchuk, Deputy Head
- **UNESCO:** Mr. Sergey Lazarev, Director of Almaty Cluster Office and UNESCO Representative to Kazakhstan, Kyrgyzstan and Tajikistan
- **World Bank:** Mr. Rustam Arstanov, Environmental Specialist, World Bank Central Asia Office
- **EC IFAS:** Mr. Vokhidjon Akhmadjonov, Head of Information and Analytical Department

9:30-13:00 **Plenary Session 1: Glaciers melting in Central Asia: Time for Action - the perspectives of the Central Asian countries, World Bank experts and UNRCCA**

Moderator: Mr. Sergey Lazarev, Director of UNESCO Almaty Cluster Office

Objective: *Find common ground for the understanding of the problems the Central Asian countries are facing with regards to glaciers melting and the consequences that come with it.*

9.30-10.00 **"Glaciers melting in Central Asia: Time for action – the crucial questions and a proposal on how to proceed"**

Key-note: Mr. Fedor Klimchuk, UNRCCA, Deputy Head

10.00-10.45 *Mr. Don Alford and Mr. Ulrich Kamp* (via skype) – Experts World Bank

10.45-11.30 **Coffee break and Group photo**

11.30-13.00 **Country statements**

Moderator: Mr. Fedor Klimchuk, Deputy Head, UNRCCA

- **Afghanistan**
- **Kazakhstan**
- **Kyrgyzstan**
- **Tajikistan**
- **Turkmenistan**
- **Uzbekistan**

Q&A

13.00 -14.00 **Lunch**

14:00-16:00 **Plenary Session 2: The state of glaciers and snow-ice resources of high mountains in Central Asia and prevailing trends**

Moderator: Ms. Kristine Tovmasyan, Program Specialist UNESCO

Objective: *The discussion will bring forward the latest scientific studies in the field of climate change/glaciers melting in Central Asia. The result of the discussion will enable to understand better, where we stand at the moment as far as scientific research is concerned and how regional cooperation works at the moment.*

14.00-16.00 **Presentations:**

14.00-14.20 **"Current and projected changes in glaciation in Central Asia and their probable impact on water resources"**

Mr. Igor Severskiy, Academician, Institute of Geography, Kazakhstan

14.20-14.40 **"UNESCO studies on climate change impact to glaciers and the hydrogeological regime"**

Ms. Alice Aureli, Chief of Section, Groundwater Systems, Division of Water Sciences, UNESCO Paris

14.40 -15.00	**"Total and glacier runoff in the Vakhsh and Panj river basins (Pamir region) in normal and extreme years"** *Mr. Vladimir Konovalov, Leading Scientific Researcher, Department of Glaciology, Institute of Geography, Russia*
15.00-15.20	**"CATCOS: Re-establishing of long-term glacier monitoring in Kyrgyzstan, Central Asia and Global Terrestrial Network on Glaciers (GTN-G)"** *Mr. Tomas Saks, Senior Researcher, Fribourg University, Switzerland*
15.20-15.40	**"Glaciation of the mountains of Kyrgyzstan, its response to climate change and impact on hydrology and geohazards"** *Mr. Ryskul Usubaliev, Senior Researcher, CAIAG, Kyrgyzstan*
15.40-16.00	**"Modeling of flowing and surging glaciers in the Pamirs and related environmental risk assessment"** *Mr. Yunus Mamadjonov and Mr. Farshed Karimov, Institute of Geol*ogy, Earthquake Engineering and Seismology, Tajikistan
16.00 -16.30	**Coffee break**
16:30-18:00	**Plenary Session 3: Partner, donor, regional organization and non-governmental stakeholder statements in the context of "Glaciers Melting in Central Asia – Time for Action"** *Moderator: Mr. Alfred Diebold, Independant Consultant* **Objective**: *Have an understanding, who the stakeholders are in the context of glaciers melting/climate change in CA, which interests they have and which means are available to them. Find common ground, understanding for the present situation and potential next steps.*
16.30-17.15	Round-table/podium discussion with presentations of all partner organizations and stakeholders
17.15-18.00	Wrap-up of the day 1
19.00	**Reception**

Day 2: November 12, 2014

9:30-10.30	**Plenary Session 4: Education and public outreach in the context of climate change, glacier melting, environmental protection and transboundary water management** *Moderator: Mr. Alfred Diebol, Independant Consultant* **Objective:** *Education is an effective way to change the behavior and to adapt to new challenges. Knowledge has to be made available to the public in order to find a better understanding of the problems and to implement policies, which are accepted and supported by the public.*
9.30-10.30	Round-table/podium discussion with participation from each country, UNESCO and partners Q&A
10.30 -11.00	**Coffee break**
11.00 – 13.00	**Work in four groups on the draft of Plan of Action** 1. *Enhancing scientific cooperation – led by UNESCO (K. Tovmasyan)* 2. *Education and Public Outreach – led by UNRCCA (A. Diebold)* 3. *Regional cooperation – led by UNRCCA and EC IFAS (F. Klimtchouk and Representative of EC IFAS)* 4. *Climate change – led by World bank (R. Arstanov)* **Objective:** *of an action Time for Action – Where do we stand, where do we want to be in 5 years from now? What is our vision? What is our strategy? Develop a draft plan with involvement of all stakeholders.*
13.00 -14.00	**Lunch**
14.00 -15.00	**Continuation of action plan development in working groups** **Objective:** *Have a first draft of the action plan ready for review in Central Asian capitals*.
15.00 -15.45	**Coffee Break**
15.45-17.00	**Plenary Session: Presentation of the group work** *Moderator: Mr Fedor Klimchuk, Deputy Head, UNRCCA* Discussion Q&A
17.00-18.00	**Recommendations, Conclusions and Next steps**

APPENDIX III: LIST OF PARTICIPANTS

INTERNATIONAL SEMINAR "GLACIERS MELTING IN CENTRAL ASIA: TIME FOR ACTION"

Co-organized by the UN regional Centre for Preventive Diplomacy for Central Asia (UNRCCA), the Regional Office of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Executive Committee of the International Fund for Saving the Aral Sea (EC IFAS) and the World Bank

Dushanbe, TAJIKISTAN

11-12 November 2014

LIST OF PARTICIPANTS

REPRESENTATIVES OF CENTRAL ASIAN STATES	
Tajikistan	***Mr. Sulton Rahimzoda –*** First Deputy Minister of Energy and Water Resources
Tajikistan	***Mr. Daler Kholmatov –*** Senior Specialist of the Department of Water Energy Policy, Science and Technology Development, Minsitry of Energy &Water Recources
Tajikistan	***Mr. Homidjon Rasulov*** - Director of the State Organization for Hydrometeorology of the Republic of Tajikistan and the Permanent Representative of Tajikistan with the World Meteorological Organization
Tajikistan	***Mr. Naim Sulaymonov***- Head, Department of Water and Energy policy, Science and Technology Development, Ministry of Energy and Water Resources
Tajikistan	***Mr. Akmal Akhmedov –*** Chief, Hydrological and Engineering Geology Section, Department of Geology
Tajikistan	***Mr. Maruf Mulloev*** – Specialist, Management of Water Energy Policy, Science and Technology Development, Ministry of Energy and Water Resources
Tajikistan	***Mr. Anvar Homidov –*** Leading Specialist of the Centre of Standardization and Ecologic Norms
Tajikistan	***Mr. Nazir Nazirov –*** Specialist, of Informational Ecologic Centre
Tajikistan	***Mr. Rakhmonali Makhmadaliev*** – Leading Specialist, Department of Hydro-meteorology

Tajikistan	***Ms. Shirin Sharipova*** - Attaché, Department of International Organizations, Ministry of Foreign Affairs
Tajikistan	***Mr. Kiyomuddin Norov*** - Deputy Director, Agency on Statistics under the President of the Republic of Tajikistan, Dushanbe
Kazakhstan	***Mr. Serik Bekmaganbetov*** – Adviser, SCO and Transboundary Rivers Division, Asian Cooperation Department, Ministry of Foreign Affairs
Kazakhstan	***Ms. Gulmira Imasheva*** – Head of Department, Water Resources Committee, Ministry of Agriculture
Kazakhstan	***Mr. Aitmurat Isayev –*** Head, Committee of Geology and Subsoil Use, Ministry of Industry and New Technologies
Kazakhstan	***Mr. Kaysar Karbozin*** –Second Secretary, SCO and Transboundary Rivers Division, Asian Cooperation Department, Ministry of Foreign Affairs
Kazakhstan	***Mr. Payizhan Kojahmetov*** – Director, Department of Climate and Water Issues, RSE Kazgidromet, Ministry of Energy
Kazakhstan	***Mr. Aleksandr Kokarev*** – Chief Researcher, Glaciology Laboratory, Institute of the Geography of the Ministry of Education and Science
Kyrgyzstan	***Mr. Abdrahman Azhikeyev*** – Head of Avalanche Safety Department, Agency for Hydrometeorology under the Ministry of Emergency Situations
Kyrgyzstan	***Mr. Chyngyz Eshimbekov*** – Director, Department of Analysis, Planning and Foreign Policy Coordination, Ministry of Foreign Affairs
Kyrgyzstan	***Ms. Asel Raimkulova*** - Senior Specialist, Department of State Ecological Expertise, State Agency for Nature Protection and Forestry
Kyrgyzstan	***Ms. Ekaterina Sahvayeva*** – Head of Information and Analytical Department, Department of Water Resources and Melioration under the Ministry of Agriculture and Water Resources
Turkmenistan	***Mr. Baygeldy Bayjanov –*** Representative, Ministry of Water Resources
Turkmenistan	***Mr. Serdar Eyeberenov –*** Representative, Ministry of Nature Protection
Turkmenistan	***Mr. Gurbanmuhammet Kasymov*** – Ambassador at Large, Ministry of Foreign Affairs
Turkmenistan	***Mr. Babahan Saparov*** – Department of Information and Public Relations, Ministry of Defense
Uzbekistan	***Mr. Mahamatmuso Babahodjaev –*** Head of the Main Department of the Land and Water Resources Protection, State Committee for Nature Protection
Uzbekistan	***Mr. Ilhom Mahmudov -*** First Deputy Director of the Scientific Research Institute of Irrigation and Water Problems under the Tashkent Institute for Melioration and Irrigation
Uzbekistan	***Mr. Mumin Turaev –*** 3rd Secretary, Department for Cooperation with CIS and SCO, Ministry of Foreign Affairs
Uzbekistan	***Ms. Natalya Vislova –*** Head, Department of Hydrological calculations and projections of the Hydro-meteorological Support Desk, Centre of Hydro-meteorological Service at Cabinet of Ministers

OTHER COUNTRIES	
Afghanistan	***Mr. Ruhollah Beigi*** - Senior Manager of the Flood and Drought Forecast, Water Resources Department of the Ministry of Energy and Water
Afghanistan	***Mr. Sayed Nader Pajohesh*** – In-Charge of Trans-Boundaries Water Desk Directorate General of Border Affairs and Security Cooperation, Desk of Trans-boundary Water Issues, Ministry of Foreign Affairs
INTERNATIONAL ORGANIZATIONS	
CAREC	***Mr. Abdulhamid Kayumov*** – Director of Regional Environmental Center for Central Asia in Tajikistan
EC IFAS	***Mr. Vokhidjon Akhmadjonov –*** Head, Information and Analytical Department
Branch of the EC IFAS office in Tajikistan	***Mr. Botur Kodirov*** – Technical Advisor
Centre for Climate Change and Disaster Reduction (CCCDR), Tajikistan	***Ms. Svetlana Djumaeva –*** Head of the Centre
Embassy of Federal Republic of Germany in Tajikistan	***Mr. Holger Green*** - Ambassador Extraordinary and Plenipotentiary
Embassy of the United States of America in Tajikistan	***Mr. Almaz Sayfutdinov*** - Economic/Commercial Specialist
Embassy of the Russian Federation in Tajikistan	***Mr. Pavel Achev –*** First Secretary
Focus Humanitarian Assistance in Tajikistan	***Ms. Rukhshona Broimshoeva***- Program Officer
Focus Humanitarian Assistance in Tajikistan	***Mr. Rajabali Zaripov***- Senior Geologist
Swiss Agency for Development and Cooperation in Tajikistan	***Mr. Anvar Sabzaliev***- National Program Oofficer, Disaster Risk Reduction Department
Foreign Federal Office of the Federal Republic of Germany	***Ms. Daniela Scheetz*** – Desk Officer for Water Issues

GIZ	***Ms. Anne-Christine Elsner –*** GIZ Advisor on Climate Change
GIZ	***Mr. Jens Elsner*** – GIZ-Acting Country Director
GIZ	***Ms. Zarina Mirzoboeva*** - Transboundary Water Management Programme Advisor
LLC Tajeco Consulting	***Mr. Jörg Dinkelaker*** - Consultant
OCHA	***Mr. Valijon Ranoyev*** - National Disaster Response Adviser for Tajikistan
SIC ICWC	***Mr. Ikrom Ergashev -*** Water Distribution Adviser
UNDP Istanbul office	***Mr. Vladimir Mamaev -*** Regional Technical Advisor
UNECE	***Mr. Peep Mardiste*** - Regional Coordinator / EU Water Initiative National Policy Dialogues / Environment Division
UNESCO	***Mr. Sergey Lazarev*** –Director, UNESCO Almaty Cluster Office
UNESCO	***Ms. Alice Aureli –*** Chief, Groundwater Systems and Settlements Section, Division of Water Sciences
UNESCO	***Ms. Andrea Merla -*** Groundwater Systems and Settlements Section, Division of Water Sciences
UNESCO	***Mr. Vefa Moustafaev -*** Groundwater Systems and Settlements Section, Division of Water Sciences
UNESCO	***Ms. Kristine Tovmasyan*** – Programme Specialist, UNESCO Almaty Cluster Office
UNESCO	***Ms. Natalia Kim*** – Programme Assistant, UNESCO Almaty Cluster Office
UNESCO National Commission of Tajikistan	***Mr. Sarvar Bakhti -*** Secretary General
Radio Ozodi in Tajikistan	***Mr. Abdullo Ashurov -*** Journalist
Project Implementation Sustaining the Panj River to climate change, Tajikistan (Tajikistan	***Mr. Zaynudin Orifi –*** Chief specialist for evaluation and monitoring
UNHQ / DPA / MEWAD	***Mr. Brian Pozun*** - Political Affairs Officer, Middle East and West Asia Division
World Bank	***Mr. Rustam Arstanov –*** Environmental Specialist
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Fribourg University in Switzerland	***Mr. Tomas Saks –*** Senior Researcher
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Institute of Geology of the Kyrgyz Republic	***Mr. Ryskul Usubaliev –*** Senior Researcher

Institute of Geography of the Russian Federation	***Mr. Vladimir Konovalov*** - Leading Scientific Researcher, Department of Glaciology
Institute of Geology, Earthquake Engineering and Seismology of Tajikistan	***Mr. Yunus Mamadjanov-*** Director ***Mr. Farshed Karimov -*** Researcher ***Mr. Jafar Nyazov -*** Researcher
Regional Mountain Centre of Central Asia	***Mr. Ysmaiyl Dairov -*** Executive Director
State Agency of Environmental Protection and Forestry of Kyrgyz Republic	***Mr. Bekbolot Mamatairov –*** Head, Department of State Ecological Expertise
World Bank	***Mr. Don Alford (via skype) –*** Expert
	Mr. Alfred Diebold – International Consultant
UNRCCA	
UNRCCA	***Mr. Fedor Klimchuk*** – Deputy Head of UNRCCA, Senior Political Affairs Officer
UNRCCA	***Mr. Anatoly Petrenko***- Administrative Officer
UNRCCA	***Ms. Bahar Amangeldyeva***- Public Information Coordinator
UNRCCA	***Ms. Guncha Muhiyeva*** – Water Project Assistant
UNRCCA	***Ms. Bakhit Abdildina*** – Representative in Kazakhstan
UNRCCA	***Mr. Jomart Ormonbekov*** – Representative in Kyrgyzstan
UNRCCA	***Mr. Nodir Khudayberganov*** – Representative in Uzbekistan
UNRCCA	***Ms. Sanoat Jumaeva*** – Representative in Tajikistan

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