

Workshop Report

Central Asia - GFCS Observation Workshop

Observations for the Global Framework for Climate Services GFCS

8 - 11 September 2015, Bishkek, Kyrgyz Republic



Impressum

Citation: MeteoSwiss, WMO, 2015. Workshop Report, Central Asia - GFCS Observation Workshop, Observations for the Global Framework for Climate Services, p.16.

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Accronyms

CAREC	The Regional Environmental Center for Central Asia
CATCOS	Capacity building and Twinning for Climate Observing Systems
COP	Conference of the Parties
DRR	Disaster Risk Reduction
GCOS	Global Climate Observing System
GDP	Gross Domestic Product
GFCS	Global Framework for Climate Services
GNP	Gross National Product
GSM	Global System for Mobile Communications
GWP	Global Water Partnership
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
NHMS	National Hydrometeorological Services
SDC	Swiss Agency for Development and Cooperation
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	The United Nations Office for Disaster Risk Reduction
USD	US Dollars
UV	Ultraviolet (radiation)
WHO	World Health Organization
WIGOS	WMO Integrated Global Observing System
WMO	World Meteorological Organization

Introduction

All Central Asian countries are vulnerable to weather- and climate-related disasters including floods and mudflows, droughts, frosts, avalanches, hailstorms, and high-velocity winds, which constitute the major part of all economic losses associated with natural hazards. For instance, with almost 50% of the Kyrgyz GNP being weather and climate dependent, estimated losses from high-impact weather events is estimated 1-1.5% of annual GNP (basis 2006), probably significantly larger given the incomplete data on losses.

Climate change is a major source of uncertainty and is likely to accentuate challenges coming from high-impact weather and climate events. Improved services associated with weather, climate, and water throughout Central Asia are, therefore, essential for stable social and economic development. Throughout the region, better quality weather, water, and climate information is needed, in particular for early warning systems, disaster reduction strategy support, improved disaster operations, and climate adaptation strategies in agriculture and food security, transport, water resources management, hydropower generation and public health.

Since the mid-1980s, the Central Asia NHMSs capacity has been in decline due to overall spending reductions for public services. Similar problems exist in each country and prevent the NHMSs from providing adequate weather, water and climate services—obsolete and broken equipment, poor telecommunications, inadequate training, and problems retaining qualified staff, all factors leading to information quality which is inadequate by WMO standards. Lack of access to timely and accurate weather, climate, and water information impedes civil society and economic performance. Among key sectors, e.g. agriculture, economic assessments reveal potential for a measurable gains with even a modest investment in improving NHMS capacity.

Swiss engagement in the region dates back to the early 1990-ies and is described in the SDC Cooperation Strategy for the period 2012-15. Areas of intervention, directly related to or benefitting from climate services and observations, focus on

health, integrated water resource management, drinking water supply, sanitation, and disaster risk reduction (DRR).

The importance of climate services in the numerous climate-sensitive sectors for socio-economic development has been well acknowledged by the international community. In response to the inevitable climate change impacts, the relatively recent WMO-led Global Framework for Climate Services GFCS has been established to tackle the numerous challenges of the adaptation process, especially for the most vulnerable countries and regions of the world. Hereby, climate services bear potential for facilitating science-based decision making at the national and regional level, thus increasing safety and security for the communities, their livelihoods and assets by enhancing their resilience to climate change and climate variability.

Systematic observations of essential climate variables are starting point for providing climate services. Owing to the cross-border nature of weather and climate, this entails issues of standardization, data quality management, and data exchange, all tied to international coordination. In fact national approaches are not considered optimal when compared to the more promising regional or sub-regional approaches. To fully embrace the problem, high-quality observations are needed of all components of the climate system, plus systematic information on ecosystems and human societies.

The goals of the three-day GFCS Observation Workshop is to convene regional stakeholders in the priority areas health, water and disaster risk reduction, engage in a user-expert dialogue to review the current status, and explore needs and opportunities for identifying needs for observations to design, develop and implement sector-specific climate services. Particular attention is given to innovative measurement approaches, as they bear potential for circumventing obstacles created by financial and technical limitations. In addition the workshop is intended to contribute to the national and regional policy dialogue and awareness raising in matter related to climate change adaptation.

Climate change is a major source of uncertainty and is likely to accentuate challenges coming from high-impact weather and climate events in Central Asia.

Climate services bear potential for facilitating science-based decision making thus enhancing resilience of communities to climate change and climate variability.

Observations: a Fundamental Pillar of Climate Services

Observations of the Earth's climate system are fundamental for understanding the nature and the causes of climate variability and change, and constitute the starting point for developing and providing any type of climate services. Varying on different time scales, the climate system roughly can be subdivided in an atmospheric, oceanic and terrestrial component, for which dozens of essential climate variables are systematically observed. There is a large variety of observing systems covering surface and near-surface parameters, vertical profiles and composition of the atmosphere, as well as oceanic and terrestrial climate variables. High demands are placed on geographically and temporally comprehensive data coverage and quality. Long-term high-quality observations are especially important for detecting climate trends as are comprehensive meta-data descriptions of the measuring stations (e.g. history of the station, surrounding obstacles, etc.) and the instruments (e.g. type, maintenance, etc.).

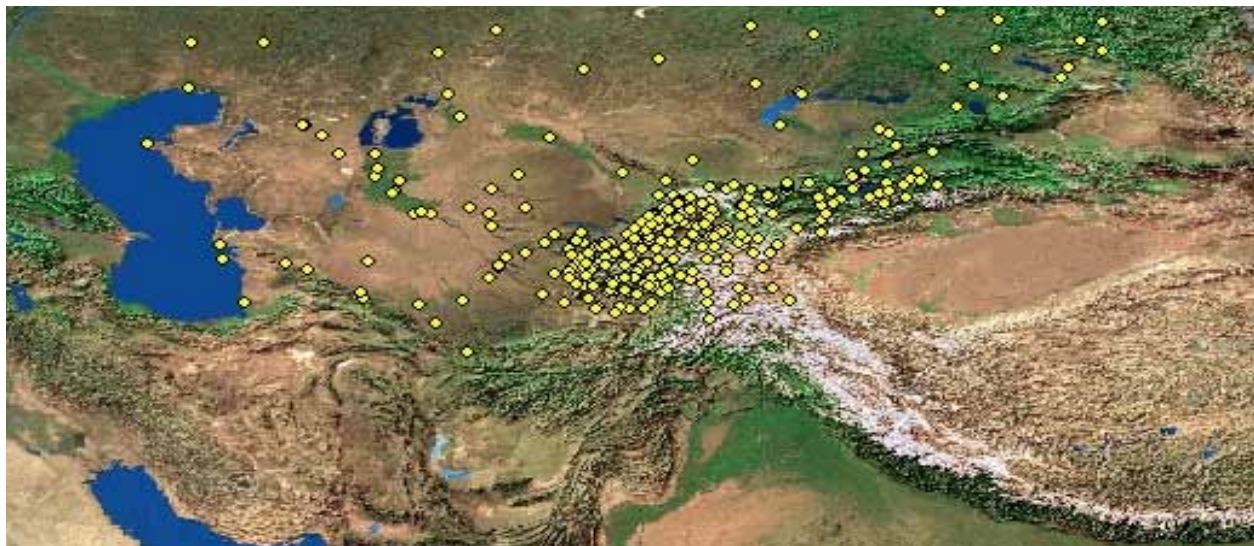
Ranging from local to regional to global, the scales of application of climate services entail numerous demanding issues concerning observations such as standardization, quality management, data transmission and exchange, sustained performance, aspects which all significantly benefit from effective international coordination. In particular, climate data are measured, collected and made available through the Global Climate Observing System (GCOS), which is based on existing atmospheric, oceanic and terrestrial observing networks and is designed to ensure that the observations and information needed to address

climate-related issues are obtained and made available to all potential users. GCOS is a joint undertaking of the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU).

An important issue in various regions of the world, in particular in developing and emerging countries, are observing stations going 'silent'. These stations stop delivering measurements due the often limited funding available for building technical, human and institutional capacities needed for sustainable network operation. In addition, these regions are often characterized by extreme climatic conditions (e.g. hot and dry, high mountain environment), where "standard" equipment might not be reliable. International efforts in the framework of the GCOS Cooperation Mechanism aim to fill the resulting gaps in the GCOS and to build capacity in these countries to sustainably operate climate observation networks. Indeed, sustained performance of a network is a key element for providing long term high quality data. When planning the modernization of a network, long-term resources to ensure the operation and local needs should be taken into account likewise to the WMO observing system requirements. The RRR (Rolling Review of Requirements) mechanism promoted by WMO shall then be used to consider all basic requirements from the different stakeholders.

During the Observation Session, the need for

High-quality climate observations are fundamental for reliable climate services of any kind.





environmental data exchange between the Central Asia countries has been expressed by several stakeholders. This call for enhanced central data base and standardized data chain solutions. This is particularly true for hydrological measurements, since water management has transboundary implications. The lack of observation infrastructure, in particular of automatic observing stations, for all environmental parameters has also been mentioned and identified as a high potential gain for the local population.

The circumstances as encountered in many developing and emerging countries including in Central Asia call for creative, innovative measurement approaches.

There is a clear need for innovation in the development of rugged infrastructure, ranging from the instrument up to the data transfer unit, including easy to maintain systems. The situation provides a unique entry point for the application and deployment of innovative technologies, such as e.g. those implemented within the iMoMo initiative. These technologies focus on low-cost, high-tech monitoring, including crowd-sensing, the automatic and secure transmission of data using GSM and the digital management, analysis and exchange of data using open-source and secure web technologies.

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Re-establishing and expanding observation networks in Central Asia bear great potential for benefitting people and the economy.

Role of Observations for Health

Human health is strongly affected by weather and climate condition and there is a growing awareness of the link between the three. According to the most recent WHO data, climate change is already causing tens of thousands of deaths every year from direct effects such as extreme weather events, heat-waves, droughts and floods, and from indirect effects such as shifting patterns of communicable diseases, degradation of water supplies, sanitation, and impacts on agriculture. 250,000 deaths per year are expected in the mid of this century. These effects manifest in the most pronounced way among the poor and rural populations.

In response to this climate-health linkage the 61st World Health Assembly, issues a resolution where Member States in particular urge for the development of adaptation measures. WHO was also requested to develop and implement a work plan to support member states in the protection of human health from climate change. A corresponding work plan was endorsed in the year after. This workplan was renewed in 2015. WMO and WHO started also to cooperate more intensively together, and WMO in cooperation with its partners developed a range of climate services examples are early warning systems for heat waves, and air quality forecasts. While health-related climate services on their own cannot solve public health

problems, they increase the efficient use of limited resources by advancing potential threats and targeting populations most at risk in vulnerable areas. Therefore, climate-informed health systems and services are strategic tools for 'climate-proofing' health care and protect hard-won development gains.

The situation regarding health care in the Central Asian countries is a complex combination of exposures to weather and climate events, a huge land-locked territory with large portions of mountainous terrain and challenged public health care systems. Frequent high-impact weather events such as storms and droughts along with disasters such as flash floods, mud flows, or storms are additional strains on the health care system. A large assessment of the health effects of climate change was carried out as the follow up of the IPCC 4th Assessment Report in Central Asian Republics. This confirmed that climate change is likely to exacerbate these conditions in Central Asia both in intensity and frequency, as well as can lead to increased frequency of cardio vascular and respiratory diseases as well as some further risks from infectious diseases water stress and food security. This particularly due to the arid nature of the region, with rising temperatures, limited water supplies, land degradation and desertification playing a major role.

Human health is strongly affected by weather and climate.

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Long-term, continuous climate monitoring as well as early warning systems, are useful elements for public health response. These include retrospective analyses for detecting relationships between weather parameters and health aiming at an informed policy making, a balanced adaptation financing, and effective early warning systems. Short and medium-range forecasts along with prospective decadal and scenario-based analyses serve UNFCCC purposes and adaptation financing, as well as early warning systems. From an operational perspective, the latter is the most important and raise key questions such as which parameters and/or products to use (temperature, precipitation, UV and/or thresholds), which addressees to reach (health specialists, authorities, general public), what time scales to cover (days, weeks, months). In addition, it is to be established what health professionals and the general public need to know about the services, and which messages need to be delivered. From these questions it becomes evident that multi-sectoral cooperation is pivotal and very likely needs both enhancement and improvement.

As far as observation requirements are concerned, they differ for different forecast and intervention strategies, e.g. for short-lived storms versus heat waves or long lasting drought conditions. In any case, high-quality climate, weather, and air pollution-related observations are sparse in the Central Asian region.

There was a large debate at the Workshop concerning funding of the provision of services, the application of WMO resolution 40 and 25 on the exchange of meteorological and hydrological data and products, and national legislation. The World Bank investment was acknowledged to scale up and improve the quality of the services. Opportunities for further progress exist through integrating an objective on joint cooperation between health and meteorology into the national adaptation strategy development, the national development strategies, or the national SDG implementation. This would require clear assignments of responsibilities, timelines, and resources as well as joint cooperative agreements. The WHO cooperative mechanisms at the level of the Health Ministers could be an alternative point of entry. As further steps, participants suggested measures, such as cost-effectiveness analyses of health-tailored climate services, improving health statistics by providing easy access to daily health indicators, mutual training to improve the dialogue between the health and meteorological communities, or the harmonization of legal framework on information exchanges.

In conclusion, there is the vision to set up a pilot project in Central Asia which includes elements of region-wide information sharing, education and capacity development, and pilot testing - with technical support coming through WHO and WMO.

Long-term climate monitoring and early warning systems are useful elements for public health response.

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Recommendations

- H1** Develop national emergency and climate change preparedness and response plans – encourage multi-stakeholder action anchored in national overarching planning instruments (e.g. national adaptation processes, etc.)
- H2** Develop mechanisms to ensure provision of and mutually beneficial exchange of data. Improve the monitoring information system of health indicators on a daily, weekly, and monthly time scale and other factors.
- H3** Emergency agencies to provide emergency information to the IHR national focal point; establish and/or strengthen [operational] collaboration between Health Sector and Emergency Agencies (e.g. DRR, water)
- H4** Develop a strategy of green procurement and technology for the health sector
- H5** Raise awareness on climate change, disaster risk and health, their impacts and adaptation needs

Role of Observations for Water

Water management in Central Asia is extremely complex, but the needs are clear.

Water is a key resource in Central Asia and vital for the region's future economic and social development and stability. During Soviet times a water energy management arrangement existed in which upstream countries received fossil fuel in winter in exchange for releasing stored water to downstream countries for irrigation in summer. Since independence a severe competition established between upstream hydropower production and agricultural use downstream as this scheme proved no longer practical outside of the planned Soviet economy. In addition, water infrastructure is deteriorating following years of under-investment, insufficient maintenance and recurrent water-related disasters. Inefficient water usage constrains the region's agricultural potential and has already caused major environmental damage.

In a long-term effort the Swiss Agency for Development and Cooperation (SDC) is contributing over the past two decades to establishing and fostering a constructive policy dialogue, increase water usage efficiency and land productivity, and establish a knowledge base to better understand options and trade-offs. They implemented an integrated water resource management approach in pilot areas on the farm level resulting in improved agricultural productivity. Hereby water user associations have been established along hydrographic rather than administrative borders, which function in a transparent and participatory way. One of the five strategic outcomes of the Swiss engagement in Central Asia for the period 2012-15 aims at establishing exchange mechanisms for water-related data and a decision support system at national level with coordination at regional level.

Maintain the present observation network and increase its coverage in a targeted and robust way, especially in the remote mountain places.

In addition, the Soviet legacy has left over a heavily structured and highly sophisticated top-down approach to water resources management, including irrigation and hydropower. However, after the demise of the Soviet Union, the water use schemes did only very partially get modernized, hindering the effective flow, exchange and management of information between stakeholders, including Water User Associations (WUA), Central Water Authorities and Basin Organizations as well as International Water Coordination Bodies.

Lessons learnt and steps forward, resulting from of a recent Global Water Partnership (GWP) analysis to improve integrated water management, include installing water measuring devices for all water users, as well as organizing meteorological data services for water management departments, water user associations and farmers in form of ten-day and daily information on changing weather conditions and climatic parameters. This will assist in properly assessing evapotranspiration

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for a given locality and making decisions about times for and rates of irrigation. Unfortunately, the project only installed two automatic meteorological stations because of limited finances.

Water management in Central Asia is extremely complex due to different uses and users both upstream and downstream, including glaciers, upstream tributary water courses, main rivers, hydropower dams, agricultural irrigation as well as water usage by the population. Complex dynamics of the runoff formation processes in the region adds to the difficulties and challenges involved in water management. It has to seek big tradeoffs in the main sectors of each of the countries with competing needs, such as hydropower production and irrigation in agriculture for instance. It was one task

of the Workshop to identify the main areas in need of water-related information for which observations are a key ingredient. Despite the intricacies of the water issues in the region, the needs are clear. First, there is urgent need to maintain the present observation network and increase its coverage in a coherent, targeted and coordinated fashion in a cost-effective and technically robust way, especially in the remote mountain places. Second and for operational management in the irrigation sector, existing data collection procedures in the countries and data exchange between them need to be modernized building on the existing workflows. Third, the abundant historic data on climate and water resources in the region need to be digitized, archived and made accessible in a comprehensive and quality-controlled way.

Modernize data collection in and exchange between the countries building on the existing workflows.

WMO offered the Central Asian countries to use the capabilities of the WIGOS system for improving data management.

Recommendations

- W1** Increasing the capacities of hydro meteorological and other relevant services responsible for water observations in application for State financial support to strengthen observation networks and technical and institutional capabilities.
- W2** Increase collaboration through increase of frequency of joint observations between hydro meteorological services of all Central Asian states.
- W3** Assure the exchange of hydro meteorological and other relevant data between the different water related authorities within at the national and international level.
- W4** Assure availability and access to relevant data and coach the data users for better data interpretation and application.
- W5** Assure continuous training of data management for staff of basin organizations

Role of Observations for Disaster Risk Reduction

Climate information and early warning systems are key in identifying and reducing disaster risks.

Over the last 30 years, natural disasters claimed the lives of over 2 million people and led to widespread economic damages amounting to over 1.5 trillion USD. Almost 90% of the recorded disasters are associated with weather and climate factors, such as strong winds, flooding from heavy rains, droughts, heat and cold waves. Climate information plays a key role in identifying climate-related disaster risks and helps reducing the underlying risk factors. While the reduction of natural hazards is desired but often not feasible, the vulnerability can be reduced and better managed through early warning systems, which can improve disaster preparedness and allow for suitable preventive measures, therefore enhancing the resilience of the affected people. Such systems also increase the public knowledge and awareness of natural risks and may foster improved policy and decision-making at various levels.

National capacities for managing natural disasters are often hindered by a lack of data concerning the country's past, present, and future climate.

The countries in Central Asia are vulnerable to floods and mudflows, droughts, frosts, avalanches, hailstorms, and high-velocity winds. In the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan, it is estimated that economic losses average or exceed 1% of the annual GDP. The Central Asian mountain chains further increase the risk for disasters, as mountainous regions are particularly exposed to high-impact events, and

beyond that pose significant forecasting challenges. Since monitoring infrastructure in these mountainous areas is lacking, weather-dependent sectors are vulnerable. Rapidly melting glaciers can cause glacial lake outburst floods and debris flows. Erosion and landslides are omnipresent and strongly linked to unsustainable use of soil and water. While the exact changes in precipitation patterns and amounts in Central Asia are still unclear, it is very likely that higher evaporation rates and shifts in peak discharge away from the vegetation period where water is mostly needed for irrigation may lead to a pronounced seasonal decrease of water availability. This will certainly have drastic consequences for the agriculture in Central Asia, which almost entirely depends on irrigation water from the mountain ranges.

In Central Asia, there is an untapped potential regarding the integration of workflows, inter-institutional collaboration as well as information and data sharing. Data collection, analysis and presentation/visualization capacities need to be strengthened. In a recent analysis, the World Bank reports that improved weather, climate and water-related services throughout Central Asia are essential for stable social and economic development. Better quality of weather, water, and climate information is needed, in particular for early warning systems,

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disaster reduction strategy support, improved disaster operations, and climate adaptation strategies in agriculture and food security, transport, water resources management, hydropower generation and public health sectors. It is expected that improved short- and medium-term weather prediction will mostly benefit the agriculture, transportation and energy sectors. National capacities for managing natural disasters and resources are developing only slowly, and are often hindered by a lack of data concerning the country's past climate, as well as by uncertainties about changes that may occur in local climatic extremes. The need for high quality data and information has also been recognized and acknowledged by the Sendai Framework for Disaster Risk Reduction (SFDRR). The nature of hydrogeological hazards calls for multidisciplinary approaches, especially for the development of early warning systems involving meteorology, hydrology, geology as well as land use planning.

The monitoring network needs to be modernized and extended, especially in mountainous areas, where complex orography places high demands on spatial coverage of rain gauge networks in order to monitor heavy rains at the valley scale. High-resolution numerical weather prediction, ideally assimilating local data, have the potential to assess quantitatively the rain input into specific watersheds, for which runoff modelling can forecast river levels as well as predict the flood peak.

At the Workshop the importance of the Sendai framework was highlighted in terms of stressing the need to engage also the private sector, and creating opportunities for investments. The challenges and hindering factors were found to be similar to those influencing the water sector, as for instance a general lack of incentives. Other issues comprise illegal construction in danger zones, weak law enforcement in terms of prohibiting construction activities in such zones as in the example of debris flow mentioned happening in Almaty July 2015. The potential role of insurance companies was discussed for triggering the development of business opportunities as well as positive enforcement mechanisms, e.g. illegal dwellers should be forced to get insurance coverage.

The need and wish was expressed for a continued collaboration with Switzerland and learn from Swiss experience when it comes to integrating DRR in mountainous regions. The need for local level risk and hazard mapping incl. periodic update was stressed. An offer was made to Central Asian countries to use the possibilities of WIGOS system for improving data management. National platform for DRR reported progress regarding the implementation of the state strategy for safety of the population in Kyrgyzstan. GLOFs were discussed as paradigmatic example how to start monitoring activities, use of two stage approach – first level monitoring by remote sensing, second level – in case of anomalies – ground based investigations.

There is the need to also engage the private sector, and creating opportunities for investments, as stressed by the Sendai Framework for DRR.

National governments of the Central Asian are encouraged to include environmental change information in the national DRR strategies in accordance with the Sendai Framework.

Recommendations

- D1** The cooperation between DRR actors and climate service providers should be improved by increasing the quality of the provided weather and climate information as well as strengthening the capacity of DRR actors in terms of integrating and mainstreaming climate information into DRR activities.
- D2** Effective DRR activities require high quality data and reliable forecasting systems; these in turn depend critically on the setup of an well-designed user-driven network of climate observation points predominantly in mountainous areas of Central Asia, calling for investments into distributed monitoring infrastructure.
- D3** Improve disaster risk governance in order to manage disaster risks through strengthening of institutional and sectoral cooperation and partnerships, implementing mechanisms and instruments relevant to DRR and sustainable development.
- D4** The national governments of the Central Asian countries, recognizing the risk of that climate variability and change poses on the glaciers in the regions, should include environmental change information (e.g. weather, water, climate, glaciers, etc.) in the national strategies of disaster reduction in accordance with the Sendai Framework for Disaster Risk Reduction and the national commitments on implementation of the Sendai Framework, climate adaptation strategies, and programs of sustainable development (add national adaptation plans etc.)
- D5** International assistance programs, in particular the UN country programs for assistance and partnership in the countries of Central Asia, should explicitly include the area of climate and weather information systems in the list of priorities.

The active participation of representatives of the government, national and international institutions, and operational services documents both the importance and urgent need for reliable climate services.

It is of utmost importance that operational services be institutionally, scientifically as well as technically strengthened.

Twinning and Capacity building projects like CATCOS can serve as blueprint for further progress.

The first GFCS Observation Workshop for the region of Central Asia was organized in Bishkek, Kyrgyz Republic and took place 8-10 September 2015. The Workshop addressed all Central Asian Countries and was supported by selected international experts in the field, thus promoting and strengthening regional and international cooperation, particularly critical in this mountainous region so vulnerable to climate variability and change.

The importance and timeliness of promoting climate services in areas like Central Asia was strongly supported by the high-level participation at the opening of the Workshop. The Swiss Ambassador in Bishkek René Holenstein, WMO Assistant Secretary-General Elena Manaenkova, Director, State Agency on Environment Protection and Forestry, Kyrgyz Republic Sabir Atadzhanov, and Deputy Minister of Emergency Situations, Kyrgyz Republic Sabir Atadjanov advocated the importance of and the socio-economic benefits resulting from user-tailored climate services, thereby underscoring the key role of systematic climate and weather observations. The willingness of the user communities to include and account for climate information in their activities was manifested by the active contributions of WHO, UNISDR, and CAREC. The readiness to tackle the climate challenge at the operational level was witnessed by the committed participation of 54 experts in the field of provision of weather and climate data and expert users in the sectors health, water and disaster risk reduction.

Also, the workshop was designed to ensure that

the event was user driven, stimulating the novel combination of foci on services and observations that proved to be an effective vehicle to promote the dialogue of users and providers. The motto „You can't manage what you don't observe“ was applied as the overarching theme of the Workshop. In order to be able to act climate-smart in numerous climate-sensitive user sectors, systematic observations need to be provided on a whole range of relevant parameters. This cue was taken up in the closing session by SDC, who set the workshop in perspective of the upcoming UNFCCC COP21, to be held in Paris in December 2015.

A large part of climate observations are performed within the institutional duties of national institutes, such as national hydrometeorological services, for instance. As such, it is of utmost importance that such services be institutionally, scientifically as well as technically strengthened. On a practical level, successful capacity building and twinning activities are already ongoing in the Kyrgyz Republic, as for example in the framework of the SDC-funded project CATCOS (Capacity building and Twinning for Climate Observing Systems). Activities such as these can serve as a blueprint for further progress.

Finally, the main outcome of the Workshop is synthesized in the three sets of recommendations for the user sectors health, water and disaster risk reduction, providing targeted scientific and technical perspectives, which in turn cater directly to the observation pillar of the GFCS.

Conclusions



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