GAP ANALYSIS ON ADAPTATION TO CLIMATE CHANGE IN CENTRAL ASIA

Prepared by Regional Environmental Center for Central Asia (CAREC) for Asia Pacific Adaptation Network

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Gap Analysis on Adaptation to Climate Change in Central Asia

IGES is an international research institute conducting practical and innovative research for realizing sustainable development in the Asia-Pacific region.

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Executive summary

Due to its already precarious climatic situation, which is characterized by scant precipitation, widespread aridity, highly continental conditions, and unevenly distributed resources, the Central Asian region is particularly threatened by climate change, which will exacerbate the already difficult situation. Adaptation is defined as responses (preventative/preparatory/reactive) to the climate change risks, which moderate harm or exploit beneficial opportunities. All the five Central Asian states have programmes and legislation for environmental protection in place. However, multilevel gaps still remain, and implementation is not guaranteed due to the fact that the five republics are developing and emerging countries, whose demand for resources like energy and water are growing. One example gap is that the countries' strategic development and economic growth plans are not coordinated with environmental considerations and adaptation plans. . This results in diverging and contradictory objectives and policies. In addition, the policy discussion on climate change mitigation prevails, while little attention is given to adaptation, eventhough it should be an essential instrument in Central Asia. This situation is due to several factors, including capacity and awareness gaps, the high cost of adaptation measures (competing with the other development priorities), limited funding, lack of local experience on climate change modeling, and the use of diverging models and predictions, which are difficult to compare. The uncertainty inherent in climate change forecasts generally also plays a role.

This regional desk study "Gap Analysis on Adaptation to Climate Change in Central Asia" was conducted by the Regional Environmental Centre for Central Asia (CAREC) within the Asia-Pacific Adaptation Network (APAN) (March 2011). The report systematically examines all the major relevant adaptation sectors, including water and agriculture, forests and biodiversity, public health, disasters and extreme events, urban areas, energy, industry, transport, and oil and gas. In spite of the differences between the five republics, two overriding priority areas for adaptation are identified, which are key to the entire region. These are water and agriculture. In the water-energy nexus, the interdependence of the five Central Asian republics becomes apparent, since the cooperative trade-off of unequally distributed resources, which was in place during the Soviet era, is no longer a contributor. This affects the energy security of the upstream countries, and the agriculture of the three down-stream republics, all of which are forced to import the bulk of their water demand, which is growing in inverse proportion to supply, while agriculture remains a major economic sector with intense water use.

The impacts of climate change and vulnerability on the water and agriculture sectors are identified to include: water deficits and deterioration of water quality, reduced access to drinking water, changed hydrographic regimes, glacial melting and reduced snow reserves, desertification, land degradation, salinisation, increased deforestation, loss of biodiversity, endangered ecosystems, displacement of climatic zones/of land use/ and of the habitats of flora and fauna, negative repercussions on the economy and employment rates, especially for the agriculture and energy sectors, insufficient water supply for irrigation, decreased crop yields (up to 50%),

reduced pasture productivity/feed capacity/animal production, threats to food security, increased regional/transboundary tensions and potential conflicts (due to the water-energy nexus), and increased natural disasters (temperature extremes, torrential rainfall, hailstorm, mudflow, landslides, avalanche, flood, drought and earthquake).

The report concludes that over the last few years there has been a significant progress made on adaptation in the region – vulnerability areas identified, adaptation measures proposed, concepts of national adaptation plans drafted, and a certain pool of "good" adaptation practices formed. However, it is proposed to focus the further activities on 1) Improving the quality of the proposed measures (eliminating the gap between the needed and proposed measures). 2) Enhancing the adaptation enforcement (eliminating the gap between the proposed measures and activities on the ground). In addition to water and agriculture, the sectors that require further research and policy action are public health, and forests and biodiversity.

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List of Abbreviations

ADB	Asian Development Bank
AIT	Asian Institute of Technology
IFAS	International Fund for Saving the Aral Sea
ICSD	Interstate Commission for Sustainable Development
ICWC	Interstate Coordination of Water Commission
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
CAC DRMI	Central Asia and Caucasus Disaster Risk Management Initiative
CACILM	Central Asian Countries Initiative for Land Management
CAREC	Regional Environmental Centre for Central Asia
CDM	Clean Development Mechanism
CEP	Caspian Environment Programme
CIS	Commonwealth of Independent States
CRM	Climate Risk Management
CRTC	Caspian Regional Thematic Centre
CSO	Civil Society Organization
DIPECHO	Disaster Preparedness Program funded by the European Commission
EBRD	European Bank for Reconstruction and Development
EPIC	Environmental Policy Integrated Climate
FOEN	Federal Office for the Environment
GEF	Global Environmental Facility
GIZ	German Agency for International Cooperation
GFDRR	Global Facility for Disaster Risk Reduction
HFA	Hyogo Framework for Action
IFAS	International Fund for saving the Aral Sea
IGES	Institute for Global Environmental Strategies
IMAC	Information Management Analysis Centres
INC	Initial National Communication
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resource Management
Kazhydromet	Centre of Hydrometeorology the Republic of Kazakhstan
LC	Least Concern
LLP	Limited Liability Partnership
MCED-6	6th Ministerial Conference on Environment and Development in Asia and the Pacific
MDGs	Millennium Development Goals
MEP	Ministry of Environmental Protection
MOC	Models of general atmospheric and oceanic circulation
NAPA	National Adaptation Program of Action
NEAP	National Environmental Action Plan
NHMS	National Hydro-Meteorological services
NHS	National Health Service (health care system)
OECD	Organization for Economic Co-operation and Development
PES	Payment for Ecosystem Services
RBC	River Basin Council

REAP	Regional Action Plan for Environmental Protection
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RIOD	International NGOs Network on Desertification
RRC.AP	Regional Resource Centre for Asia and the Pacific
SDC	Swiss Development Cooperation
SGP GEF	Global Environmental Facility' Small Grants Program
SIC ICSD	Scientific and Information Centre Interstate Commission on Sustainable Development
SLM	Sustainable land management
SNC	Second National Communication
SRES	Special Report on Emission Scenarios
TA	Technical Assessment
UNDP	United Nations Development Programme
UNEC	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
Uzhydromet	Centre of Hydrometeorology under the Cabinet of Ministers of the Republic of Uzbekistan
WHO	World Health Organization
WUA	Water User Association
WWF	World Wildlife Fund

1. Introduction

Thee climate is changing; and the Central Asian region is vulnerable to the consequences. The region is already facing warmer temperatures, changing hydrology and more extremes—droughts, mudflows, floods, heat waves, windstorms and forest fires. Rapid economic development and population growth are further increasing the pressure on the crucial natural resources worldwide (Nimah, 2006).

The Central Asian vulnerability is being driven to a greater extent by its existing sensitivity more than by the severity of the climate impacts (World Bank, 2009). The region is in fact already suffering from the lack of adaptation actions to its current climate. For instance, the irrigated agriculture sector, which is crucial for the Central Asian countries, causes many problems, such as soil erosion, rising groundwater tables resulting in water logging, secondary salinisation and lower crop yields (Cai et al., 2001; Jalling, 2003; Micklin, 2006; Zimina, 2002; UNDP, 2004). These problems increase the number of water-borne diseases, disrupt ecosystem functions, exacerbate desertification and may potentially lead to transboundary water conflicts. The causes of these issues originate from the combination of socioeconomic factors and the Soviet legacy of unsustainable environmental management.

Therefore, the consequences of environmental mismanagement from the past intensify the severity of the climate change impacts even further and weaken the capacity of the population to adapt to the change. For instance, the expected decrease in the level of the Caspian Sea means that the population will come into contact with a range of dangerous substances (pesticides and arsenic) presently locked in coastal sediments. Rising temperatures and reduced precipitation in Central Asia will exacerbate the environmental catastrophe of the disappearing Aral Sea (World Bank, 2009).

Two of the most vulnerable sectors to climate change in Central Asia are water and agriculture, which are also the key sectors of the country's economic stability and food security. At the same time, the country assessments show that 70% of the potential damages from unfavorable weather and climate conditions will affect agriculture.

Population health is also a key vulnerable sector because it is directly linked to natural climatic and weather conditions. According to the Second National Communications (SNC), increase of infectious diseases, circulatory system diseases, malignant tumors and diseases of the cardiovascular system shall be increased due to the impact of climate change. The example of Kyrgyzstan shows that for 2006, damage from death and disability due to cardiovascular diseases accounted for expenditures of more than 14 billion som (the national GDP in 2006 amounted to 113 billion som).

According to the prognosis of the experts of the Intergovernmental Panel on Climate Change (IPCC)[)], Kazakhstan as well as the entire territory of Central Asia have been strongly affected by climate change, with a number of the most serious

risks already in evidence. Average temperatures across CA have already increased by around 1%. This is affecting hydrology, with rapid melting of the region's glaciers and a decrease in winter snows. Forecasts show that by 2050, the water runoff in the basins of the Amu Darya and the Syr Darya (in the two main Central Asian regions) will dry up by 10 to 15% and by 6 to 10%, respectively.

Reduction of water associated with melting of glaciers and increase in air temperature, especially in the summer season, is expected by the year 2050. All this may entail:

- increased aridity across the country - the northern regions of Kazakhstan will be in the semi-arid zone, and the rest of the territory will be included in the arid zone;
- reduced grain yield by more than 25%;
- decrease in productivity of natural grasslands by 30-90%;
- increased droughts, dry winds, and spring and autumn frosts;
- drastic reduction in precipitation during the warm period, which may lead to decreased crop yield from 50 to 70% in rain-fed farming areas.

According to expert estimations, about 70% of the potential damages from weather and climatic conditions will affect the agricultural production.

The predicted impacts will aggravate an already serious situation where the regional resources suffer due to aridity of the region, growing population and insufficient integration of efficient water management practices in the region.

The goal of this report is to review, identify and analyse the gaps in adaptation to climate change in Central Asia

Objectives

2. Overview the climate change impact and vulnerability projections in Central Asia.
3. Analyse the contents, effectiveness and scopes of the proposed and undertaken adaptation measures in the institutional, political and economic contexts of the region.
4. Provide specific recommendations on further policies, actions and investments in adaptation to climate change in Central Asia.

The methodology of this report is primarily a desktop study, which includes a review of the existing official policy documents, First and Second National Communications, international reports, current research and thesis papers, national and regional project descriptions and other relevant credible literatures.

This report is produced by the Regional Environmental Centre for Central Asia (CAREC) within the framework of an MoU with AIT/UNEP Regional Resource Centre for Asia and the Pacific (RRC.AP) and the Institute for Global Environmental Strategies (IGES). This activity is aimed to ensure effective realization of the *Implementation Plan of the Asia Pacific Climate Change Adaptation Network 2010-2011* in Central Asia, established in October 2009 as a part of the Global Adaptation Network.

The current version is the result of a series of consultations with the five national experts in each country and discussion at the Consultation Meeting on 29 September 2010 with the donors and governmental officials from Central Asia. The event was carried out within the 6th Ministerial Conference on Environment and Development in Asia and the Pacific (MCED-6). At the meeting the participants shared their understanding on the issues of climate change impacts, vulnerability and adaptation, and provided their comments and suggestions on the improvement of the analysis. This report is completely based on the literature review and will be further sent to the governments for further comments and suggestions.

This report starts by presenting the general context and climatic conditions of the five Central Asian countries (Chapter 2). Chapter 3 continues with the presentation of climate change scenarios and impacts on the key sectors of economy. Chapters 4 provides an overview and a short analysis of the adaptation priorities and actions taken, based on the SNC as well as national and regional programmes and projects. Chapter 5 presents the analysis and observations of the general gaps by comparing the planned and actual adaptation projects. In the last Chapter 6 recommendations on adaptation to climate change are summarized.

2. Legislative and institutional context of climate change in Central Asia

This section provides information on the existing legal and institutional framework for the prevention of and adaptation to climate change in Central Asia. This information was taken from the report "Analysis of opportunities for activities of CAREC in climate change and energy efficiency in Central Asia" prepared by CAREC in 2009.

All five countries have a relevant national legislative and institutional framework for further improvements in the area of climate change. All countries are active participants in the two main international treaties – the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan have ratified the Kyoto Protocol, but as countries not listed in Annex B, they do not have mandatory quantitative commitments to reduce greenhouse gas (GHG) emissions and can only participate in projects under the Clean Development Mechanism (CDM). In the Republic of Kazakhstan, the Kyoto Protocol was ratified on 26 March 2009. The Law of the Republic of Kazakhstan "On Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change" was adopted by the Decree of the President of the Republic of Kazakhstan # 144 - IV dated March 26, 2009. Despite the fact that the existing legislative and institutional framework quite allows to use the Kyoto mechanisms, it is necessary to enhance the capacity of participants - government officials, NGO representatives and the public.

On adaptation, all of the countries are in the process of developing their National Adaptation Programmes of Action (NAPAs); however, there are none that are officially adopted at this moment.

2.1 Kazakhstan

2.1.1 General information

Kazakhstan is located on two continents – Europe and Asia. With a total area of 2,724,900 square kilometres (km^2), the country stretches from the Caspian Sea and the Volga valley in the west to the mountainous Altai in the east, and from the foot of the Tien Shan mountains in the south and south-east to the West-Siberian lowlands in the north. As per data available on the 1 January 2006, the population of Kazakhstan is 15.2 million people. Given the enormous territory, Kazakhstan is one of the most underpopulated countries of the world with a population density of 5.6 people per km^2.

The vast territory and remoteness from the oceans determine peculiar climatic conditions in the country: the climate is continental with cold winters and hot summers, and desert and semi-desert with uneven distribution of precipitation. The internal water resources cover only about 35% of the total country's needs, and about 66% of the lands are exposed to desertification.

Kazakhstan is rich in natural resources. The country is ranked 6th in the world for mineral reserves, it is estimated that the explored reserves are worth 10 billion US dollar. These mainly consist of large reserves of strategic raw materials, in particular oil and gas. The opening of the Caspian consortium pipeline in 2001 that links the Tengiz deposits in the west to the Black sea coast significantly increased the export capacity of the country. To reduce its dependence on the oil sector, the government of the Republic of Kazakhstan adopted an industrial policy aimed at diversification of the country's economy through the development of light industry.

2.1.2 Legislative and institutional framework

Since gaining its independence, the Republic of Kazakhstan took an active part in addressing global environmental issues, including the international climate change prevention process. Kazakhstan became a Party to UNFCCC in 1995 and signed the Kyoto Protocol on 12 April 1999, which was consequently ratified on 26 March 2009.

From 1994, Kazakhstan started fulfilling its commitments under UNFCCC with the support of international donors.

By signing the Law of the Republic of Kazakhstan "On Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change" based on the Presidential Decree of the Republic of Kazakhstan # 144 - IV dated 26 March 2009, Kazakhstan has joined the worldwide movement to prevent global warming.
The First National Communication was prepared and presented on the Fourth Conference of the UNFCCC parties in Buenos Aires (Argentina) in 1998. The SNC was published in 2009 under the financial support of United Nations Development Programme (UNDP)/ Global Environmental Facility (GEF) which includes a chapter on climate change adaptation. A preparatory work for the Third National Communication was launched in 2010.

The experts of the Working Group on preparation of Kazakhstan's NAPA believe that adaptation should be integrated into the sustainable and economic development programmes of each state.

Proactive adaptation to climate change must become an integral part of the long-term programme on sustainable development. In particular, the consequences due to the risks of damage caused by climate change shall be incorporated into the Master Plan of the area and spatial development of the country for the respective period. The factor of vulnerability to climate change in Kazakhstan shall be considered by preparing state, industrial, sectoral and regional development programmes to ensure the integration of policy on adaptation to climate change in the system of the national strategic planning.

The major legislative documents:

- The development strategy of Kazakhstan 2030;
- Concept of transition of the Republic of Kazakhstan to Sustainable Development 2006-2024;

- Strategy of Industrial and Innovation Development of Kazakhstan 2003-2015;
- Strategy of entering of Kazakhstan in the 50 most competitive countries of the world;
- The concept of ecological safety of the Republic of Kazakhstan for 2004-2015;
- Amended "Indicative plan of socio-economic development of the Republic of Kazakhstan 2002-2005" with perspective for 2010-2015;
- Government Programme of Republic of Kazakhstan 2006-2010;
- The Programme on Combating Desertification in the Republic of Kazakhstan 2005-2015;
- Program "Zhasyl El" 2004-2006;
- Transport Strategy of the Republic of Kazakhstan 2015 (April 2006);
- State Programme on "Efficient use of energy and renewable resources of the Republic of Kazakhstan for sustainable development till 2024";
- Environmental Code of the Republic of Kazakhstan (adopted in January 2007);
- Law "On Ratification of the Kyoto Protocol to the UN Framework Convention on Climate Change". (February 2009);
- Master Plan of the area and spatial development of the country (2009);
- Programme of forced industrial-innovative development (2010-2014); and
- "Zhasyl Damu" Programme (2010).

A number of institutional structures in Kazakhstan implement UNFCCC provisions. Overall coordination at the governmental level is carried out by the Ministry of Environmental Protection (MEP), which is a central executive body responsible for governance and cross-sectoral coordination in implementing government policies on environmental protection and management and ensuring the environmentally sustainable development of the society. In particular, the Department of Kyoto Protocol has been established under the MEP which is responsible for promoting the activity of the country in implementation of its international commitments. On the other hand, expert and technical assistance is also provided by MEP institutional structures, such as JSC Kazakh Research Institute of Environment and Climate (on prevention of climate change) and Kazgidromet (adaptation). The expert assessment is also provided by a non-governmental organization, the Climate Change Coordination Centre. A number of international, non-governmental organizations are also involved in the climate change issues, conducting expert work and working to improve the capacity of the civil society

2.2 Kyrgyzstan

2.2.1 General information

The Kyrgyz Republic is situated in the North-East of Central Asia, bordering Tajikistan, Uzbekistan, Kazakhstan and China, and has a population of 5.2 million people.

The territory of Kyrgyzstan is 199.9 thousand km^2, out of which 3.3% is covered with forests, 4.4% with water, 53.5% with agricultural lands. The Pamiro-Altai

mountain range, on the South-West of the country, is separated by high-altitude valleys and hollows - Chu and Talas in the North, Ferghana in South-West, Alai in the South. The average temperature in July is 27°C. In winter the temperature in the mountains and mountain valleys is low, with average reaching 30-40°C below zero, and 8-10°C in Chu valley and Issyk-kul oblast.

Kyrgyzstan's energy resources constitute 2% of the total primary energy resources of Central Asia and 30% of all hydropower potential of the region, of which only 10% is currently being utilised. The electric power sector contributes 5% of the GDP, 16% of the industrial output and 10% of the budget revenues. Today, 100% of the population has access to the electric power system and per-capita power consumption amounts to 2,400 kilowatt thermal (kWth). The hydropower potential of 252 large and medium-size rivers of the republic is estimated to be 18.5 million kWth , while the potential for output is 160 billion kWth. The largest hydropower potential is found in the basin of the Naryn and Sary-Djaz rivers (annual river flow 30-40 cubic kilometres (km^3) per annum). The hydroelectric potential of small rivers and drains (with average long-term flow of 3 to 50 cubic metres per second), is about 5-8 billion kWth annually of which only 3% is being used.

2.2.2 Legislative and institutional framework

Major legislative acts directly or indirectly related to climate change include:

International level

- UNFCCC (Law on joining # 11, dated 14 January 2000)
- Kyoto Protocol (Law on ratification # 9 dated 15 January 2003)
- First National Communication presented to the Conference Parties (2003)
- Memorandum of understanding with Denmark (2005)
- SNC presented to the Conference of Parties (2008)

National level

- Constitution of Kyrgyz Republic (1993)
- Law «On environmental protection» (1999)
- Law «On air pollution» (1999)
- Law «On industrial and municipal wastes» (2001)
- Kyrgyz Republic Government Resolution «On implementation of the UNFCC» (2001)
- Law «On environmental assessment» (2003)
- Decree of the President of KR «On establishment of National committee for climate change impacts» (2005)
- Law «On state regulation and policy towards GHG emission and capture», (2007)
- Concept of environmental security of Kyrgyzstan (2007);
- State programme on utilisation of industrial and municipal wastes (2005)

- National Forests Programme for the period 2005-2015, Action plan of the National Forests Programme 2005-2015 approved by the Governmental Decree of the Kyrgyz republic #858 dated 25 November 2004
- National development strategy for the period 2007-2010, approved by the Presidential Decree #UP249 dated 16 Ma, 2007
- National Energy Programme of Kyrgyzstan (2006-2010)
- Law "General Technical Regulation on Environmental safety" (2009)

In general, the State Agency for Environmental Protection and Forestry is responsible for actions on climate change prevention and adaptation in the Kyrgyz Republic. It is also the responsible authority for the implementation of the Kyoto Protocol (the basis for the designated national authority), its secretariat and expert council. The Expert Council is composed of representatives of ministries, other government agencies and NGOs. Main organizations engaged in the process are the Ministry of Industry and Energy, Ministry of Economic Development, Ministry of Agriculture and Water Management, Ministry of Natural Recourses, self-governance bodies and private enterprises.

The Kyrgyz Republic has ratified the Kyoto Protocol to UNFCCC in January 2003. The country is not included in Annex 1, has no commitments to reduce GHG emissions, and consequently the can only use CDM. Moreover, as the non-Annex 1 country Kyrgyzstan is obliged to develop NAPA, which is in the process of development.

2.3 Tajikistan

2.3.1 General information

The Republic of Tajikistan is situated in the South-East of Central Asia, bordering Kyrgyzstan in the North, Afghanistan in the South, China in the East and Uzbekistan in the West. Its total area is 143 100 km^2 The population of the country is around 7,000,000.

The climate is mainly continental, subtropical and semi-arid, with several desert areas. However, the climatic peculiarities sharply change with elevation. The subtropical South-West part of Tajikistan experiences high temperature variation, with an average of 35-42°C above zero in summer time. The average temperature in low altitudes varies from 25-30°C in July and from –1 to +3°C in January. Rains isnot frequent and the 1999-2001 droughts showed that the precipitation occurs mainly in winter-spring period.

Agriculture is the major sector of the country's economy, with cotton being in the first place among the exported goods. Tajikistan's economy had drastically suffered from the civil war, but is being gradually restored at the moment. Yet, the GDP per capita is still low compared to other Commonwealth of Independent States (CIS) countries. Besides agriculture, the economy is supported by the Tajik aluminum plant, hydropower units and small textile and food enterprises. One of the major assets of the country is water resources and the country possesses significant hydro energy potential.

2.3.2 Legislative and institutional framework

Environmental policy of Tajikistan is aimed at implementation of the environmental priorities of the republic taking into account needs for environmentally friendly approaches to economic development. The republic understands the need for wide and effective international co-operation in order to preserve nature and maintain environmental security at the national and global levels.

The function of the environmental legislation is to regulate the society's activity for preservation of the natural resources and human habitats, prevention of the negative impacts caused by the economic or other type of activity. The legislation of Tajikistan in the area of environmental protection is based on the Constitution of the Republic of Tajikistan, the country's regulatory acts and international legislative acts recognized by the country.

Article 89 of the law "On Environmental Protection" defines the principles of international co-operation in the area of environmental protection. It specifies, in particular, that Tajikistan builds its environmental policy based on the need to maintain environmental security and contribute to the international environmental co-operation for the sake of present and future generations. The environmental policy of the country is guided by the following principles:

- Establishment of effective control over natural resources and environmental changes based on internationally-recognized criteria and parameters at the regional and national levels; and
- Ensuring free and uninterrupted international exchange of scientific and technical information on environmental issues and environmental technologies.

Recognizing the importance of the global environmental issues and their close relevance to Tajikistan, the country has joined and ratified a number of important international agreements:

- Convention on Biological Diversity (1997)
- UN Convention to Combat Desertification (1997)
- UN Framework Convention on Climate Change (1998)
- Vienna Convention for the Protection of the Ozone Layer (1998)
- Montreal Protocol on Substances that Deplete the Ozone Layer (1998)
- London and Copenhagen Amendments to Montreal Protocol on Substances that Deplete the Ozone Layer (1998)
- Convention on Conservation of the Migratory Species of Wild Animals (2000)
- Ramsar Convention on Wetlands (2000)
- Aarhus Convention (2002)
- Stockholm Convention on Persistent Organic Pollutants (2002)
- Kyoto Protocol to the UN Framework Convention on Climate Change (2008)

The country developed a National Action Plan (NAP) on mitigation of climate change consequences, adopted by the government in 2003, (TajikGlavgidromet, 2003). The NAP includes **a strategy on climate change adaptation and a strategy on GHG emissions reduction**. The First and Second National Communications of Tajikistan on climate change were also prepared.
In addition, the relevant national legislation includes:

- Law "On Air Protection" (1986);
- Law "On Environmental Expertise" (2002)

Following these national legislative acts, The State of Environment Report in the Republic of Tajikistan (2003), and Environmental Information bulletin of the Ministry of Agriculture and Environmental protection (2006) were prepared.

Tajikistan ratified UNFCCC in 1998 as a Party not enlisted in Annex 1. The Committee for Environment under the Government of the Republic of Tajikistan, the State Hydro Meteorological Department and Scientific and Information Centre Interstate Commission on Sustainable Development (SIC ICSD) are engaged in the activity related to the climate change issues.

2.4 Turkmenistan

2.4.1 General Information

Turkmenistan is situated in southern part of Central Asia, to the north of Kopetdaga mountains, between Caspian Sea in the West and the Amu Darya river in the East. Turkmenistan borders Kazakhstan in the North, Uzbekistan in the North-East and the East, Afghanistan in the South-East, Iran in the South, and Azerbaijan and Russia on the Caspian sea. The total area is 491.2 thousand km^2, with approximately 80% desert. The longest river is the Amu Darya (with total length of 1,437 kilometres, its canal on the territory of Turkmenistan stretches for over 1200 kilometres). The largest mountain range is Kopetdag. The highest mountain peak is the peak of Great Saparmurat Turkmenbashy (with 3139 metres in height). The capital of the country is Ashgabat.

According to national statistics, the population of the country was over 7 million people by the beginning of 2008, with rural population constituting 52% of the total population.

Excluding the coastal area of the Caspian Sea and the mountains, the climate across the country is continental. Annual average air temperature across the territory is positive with fluctuations in plain areas from 12-17°C in the North to 15-18°C in South-East. The coldest month is January, with the average temperature varying from -6°C in the north-east to 4°C in South-East and 5°C in the extreme west. The average temperature in the hottest month, July, is 27-30°C. The absolute peak of 48-50°C can be traced in the Central and South-East Karakums, with a slight decrease to the north of Turkmenistan, Caspian Sea coast and mountainous areas. The largest amount of precipitation is observed in mountains and foothills – up to 398 mm in average (Koine-Kessir), with the lowest level in the Kara-Bogaz-Gol

Bay (95 mm) and in the North-East of Turkmenistan (105 mm). Development of agriculture in arid zones is based solely on artificial irrigation.

The deserts constitute up to 80% of the territory of Turkmenistan. The Karakum desert is one of the biggest deserts in the world. It occupies the central part of the country and stretches to Kazakhstan. In the topographic view, four fifth of the territory is plain. Mountains and hills are mainly located in the southern part of the country.

The main natural wealth of Turkmenistan is in natural gas. Exploration and further export of oil and gas play an important role in the economy of the country. The leading economic sector is light industry, specifically textiles. Agriculture is also the key sector in the national economy.

2.4.2 Legislative and institutional framework

Economic development of Turkmenistan is coordinated under the national Programme "Strategy of Economic, Political and Cultural Development of Turkmenistan until 2020". The country possesses a solid basis for developing all sectors of the economy. High growth rates of production and socially-oriented government policy are focused on improving structural and qualitative parameters of economic development. High economic growth of Turkmenistan is ensured by rich natural resources, a reform orientation to attract foreign investment, the adoption of the latest technologies, and structural reforms aimed at rapid renovation of capital assets.

Because of intensive economic activities and environmental security being an important development factor for the country, the availability of adequate environmental policy (a set of actions aimed at environmental protection) became a requirement. Priority directions of the environmental policy include nature conservation and improvement of environmental conditions, which is possible under coherence and co-operation between major agencies.

Major principles and provisions of the environmental policy of Turkmenistan are defined in the National Environmental Action Plan (NEAP). The NEAP defines a strategy to maintain a balance in nature and sustainable development of Turkmenistan for the long-term period; it contains long-term integral priorities of the national economic development and use of natural resources. The NEAP addresses issues related to the problems of air pollution, water contamination, land salinisation, water logging and land deflation, degradation of environmental components in the Turkmen part of the Aral Sea region, environmental pollution caused by the operation of the oil, gas and energy companies, loss of biological diversity, the issues related to nature monuments and culture. To address these issues the NEAP provides for measures aimed at creating optimal conditions for efficient use of natural resources, which is balanced with the needs of the country's economy, society, and ensures the necessary level of reproduction and protection of natural resources potential. Addressing climate change adaptation issues, the NEAP proposes a set of measures on improvement of the quality of land resources, rational use of water resources, introduction of less moisture-consuming crops in

the agricultural production practice, careful preservation of biological diversity, and combating the consequences of the drying up of the Aral Sea, etc.

The adaptation of coastal zones of the Caspian Sea is implemented by the Caspian Environment Programme (CEP), which identifies priority issues and action programmes (National Caspian Action Programme and the Strategic Action Programme), as well as considers transboundary environmental issues in Phase I. At present, the Framework Convention and the Action Plan for the Protection of the Environment of the Caspian Sea have been drawn up and are under implementation in Phase II (2004-2007). Caspian Regional Thematic Centres (CRTC) were established in all Caspian countries.

To address the issues in agriculture and land and water resources management, the Central Asian Countries Initiative for Land Management (CACILM) funded by GEF and ADB has been launched. This project will develop a programme for research, information systems and public awareness in the field of sustainable land resources management.

Being a Central Asia country Turkmenistan is actively participating in the work of the Interstate Commission for Sustainable Development (ICSD) and the International Fund for Saving the Aral Sea (IFAS). The Ashgabat Framework Convention on Protection of Environment for Sustainable Development in Central Asia signed in Ashgabat on 22 November 2006 has become a benchmark event in the region. The Convention facilitates integration of the legislative framework and mechanisms of already existing agreements between the countries of the region and generation of additional priorities, as well as determination of prospects for further regional co-operation.

In 2007 Turkmenistan addressed the ICSD with the initiative to join the effort of Central Asia and Caucasus (CAC) in assessing the problems of climate change in the region. In the ICSD resolutions of June 2007 and November 2008 made in Bishkek, Turkmenistan was entrusted with coordination of activities aimed at climate change capacity assessment. In accordance with the relevant decisions Turkmenistan is now actively coordinating the regional efforts in assessing the climate change capacity of the countries. In August 2008 with the support of UNEP Asia-Pacific, the Ministry of Nature Protection of Turkmenistan held a Regional ICSD Seminar "Capacity-building in regional co-operation to address the REAP priorities with account of climate change". During the seminar the international experts presented approaches and methods of climate change vulnerability and adaptation assessments as well as the relationship between climate, environment and social and economic indices of the economy. The CAC experts made a preliminary assessment, discussed the current climate change problems in CAC, and defined priority spheres in climate change vulnerability and adaptation in the region. An important outcome of the regional seminar was development of a Draft Regional Strategy on climate change vulnerability and adaptation issues, and a recommendation for the ICSD to consider the development of such Regional strategy. The recommendation was seconded by the relevant CAC resolution at the regular ICSD session in Bishkek on 25 November 2008.

In 2010-2011 stage 1 of the UNEP regional project "Enabling climate change mitigation and carbon market development in the Central Asia region" was implemented. The primary goal of the project is to reduce barriers and enable distribution and use of clean technologies and their promotion in the local market through facilitating the creation of framework policies, legislation, development of national plans as well as energy standards. In accordance with the ICSD resolutions creation of an ad-hoc regional expert network was also discussed within the framework of the project. In September 2011 Ashgabat hosted a Regional CAC Meeting on Climate Change where the outcomes of the first stage of the project were reviewed and the format of the ad-hoc regional climate change expert network discussed.

The SNC of Turkmenistan to UNFCCC provides the latest research and assessment of adaptation to climate change. It proposed adaptation measures on various vulnerable sectors of the country:

- Water economy of Turkmenistan
- Agriculture;
- Human health
- Caspian Sea basin in Turkmenistan

The Ministry of Environmental protection of Turkmenistan is the state body authorized for implementing state policy on environmental protection and efficient management of natural resources. It consists of five regional departments for nature conservation, including a Caspian Ecological Service “Caspecocontrol”, the National Institute of Deserts, Flora and Fauna, Service for Forest Seed Farming and Natural Parks Protection, and eight state nature reserves and 14 sanctuaries.

The environmental activity in Turkmenistan actively involves participation of international organizations and donors, such as UNEP, UNDP, GEF, ICSD, WB, ADB, TACIS, etc.

Turkmenistan signed UNFCCC on 1 May 1995, and ratified it on 5 June 1995. The First and SecondNational Communications were prepared and submitted to the UNFCCC Secretariat. For successful implementation of the commitments, provisions and tasks under the mentioned documents, a State Commission on the implementation of commitments under the UN environmental conventions and programmes was established. The State Commission serves as an efficient tool for implementation of Turkmenistan’s commitments and obligations under international environmental agreements and programmes. It is the only national cross-sectoral and inter-agency body responsible for coordination, management, information dissemination, and reporting on the implementation of environmental commitments. Its annual sessions cover discussions on current problems related to nature conservation and the efficient use of natural resources. There are currently seven

active working groups specializing in the respective international environmental agreements, programmes and action plans.

The following fundamental documents were developed and published:

- National Environmental Action Plan of the President of Turkmenistan Saparmurat Turkmenbashy (2002)
- Turkmenistan: Initial National Communication on UNFCCC (1999)
- National report "State of Environment of Turkmenistan" (1999)
- Second edition of "Red Book of Turkmenistan" (1999);
- Review "Turkmenistan: The State of Biodiversity" (2002)
- Biodiversity Strategy and Action Plan for Turkmenistan (2002)
- National Report "Sustainable Development of Turkmenistan, Rio+10" (2002)
- Environmental Dictionary (2002)
- Collection of International Environmental Legal and Regulatory Acts of Turkmenistan (2002);
- NEAP Guide (2004)
- "Turkmenistan: Country Capacity Self-Assessment to implement the UN Global Environmental Conventions: Thematic Reviews (2006)

In addition to the above, a guidebook for teachers has been published in the Turkmen language. It was the first published book in Turkmenistan which supported teachers in environmental issues.

2.5 Uzbekistan

2.5.1 General information

The Republic of Uzbekistan is located in Central Asia and shares borders with Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Afghanistan. The climate of the country is arid continental, relatively dry with a low amount of precipitation, long hot summers and relatively mild winters. The country is located in a valley between two rivers – the Amu Darya, which starts in Tajikistan and serves as a border between Uzbekistan and Afghanistan, and Turkmenistan, and the Syrdarya, which flows through Kazakhstan. Uzbekistan is the most densely populated country among the five republics of Central Asia, with a population of over 27 million people in 2008. Agriculture is a very important sector of the national economy - the country is one of the world's largest cotton producers.

Uzbekistan is rich in natural resources, including considerable deposits of gold, copper, lead, zinc, uranium, natural gas and oil. The country is among the ten largest world producers of gas and has a developed energy sector. Up to 50% of the generation capacity of Central Asia's integrated energy system is located in Uzbekistan, and its production of primary energy exceeds 55 million tons of oil equivalence. The major source of primary energy in the country is natural gas, accounting for 85% of the total energy output. The share of oil and gas condensate is approximately 13% of the primary energy output. The rest falls to power generated by hydro power and two thermal power units operating on coal.

2.5.2 Legislative and institutional framework

In the field of environmental protection, the legislation of the Republic of Uzbekistan meets the goals and objectives of implementation of UNFCCC. The legislation of the Republic of Uzbekistan contains more than 100 legal documents related to environmental protection. The laws and regulations of the Government reflect the main directions of state policy on the protection of natural resources, the establishment of systems for the effective management of natural resources, and the development of integrated environmental protection activities. The law *"On international treaties of the Republic of Uzbekistan"* (1995) regulates the conclusion, performance, termination, suspension or denunciation of international treaties in Uzbekistan. International treaties are implemented in accordance with the *Constitution of the Republic of Uzbekistan* (8 December 1992) and the generally recognized principles and norms of international law. Uzbekistan is an active participant in two major international agreements related to climate change: UNFCCC (from 20 June 1993) and the *Kyoto Protocol*, ratified by the Republic of Uzbekistan on 12 October 1998. As the country was not included in Annex B to the Kyoto Protocol, Uzbekistan has no quantitative mitigation commitments under the Kyoto Protocol, and can only participate in projects under the CDM. Normative legal acts, including the system of state environmental monitoring, provide the basis for the implementation of UNFCCC in Uzbekistan. Thus, the current *Law on Air Protection*, aimed at developing an inventory of anthropogenic emissions by sources, including greenhouse gases. The following table lists the main legal documents pertaining to climate change.

List of the main legal acts regulating the implementation of Uzbekistan's commitments under UNFCCC:

- Law “On Environmental Protection” (1992)
- Law “On Air Protection” (1996)
- The Law “On Rational Use of Energy” (1997)
- Decree of the Cabinet of the Republic of Uzbekistan “On the Programme of Action for Environmental Protection for 1999-2005”
- Law “On Ecological Expertise” (2000)
- Decree of the Cabinet of Ministers of the Republic of Uzbekistan “On issues of implementation of the Programme of Action for the Protection of the Environment of the Republic of Uzbekistan for 1999-2005”;
- Decree of the Cabinet of Ministers of the Republic of Uzbekistan “On Approval of the Programme of environmental monitoring in the Republic of Uzbekistan for 2003 – 2005”
- Decree of the Cabinet of Ministers of the Republic of Uzbekistan “On Approval of the preparation and implementation of investment projects under the CDMof the Kyoto Protocol (2007)”

Monitoring of the implementation of international treaty commitments is governed by legislation. Pursuant to the Programme of Action for the implementation of Presidential Decree # UP-2612 (dated 2 June 2 2000) "On measures to implement programmes of liberalization and the deepening of reforms in the political, economic and spiritual spheres of society, and the country's security" a Regulation "On preparation of draft international treaties of the Republic of Uzbekistan and

monitoring implementation of the obligations of the Republic of Uzbekistan on treaties" has been introduced.

In accordance with these documents, the Cabinet of Ministers shall coordinate and monitor the execution of the actions of th eexecutive agencies to comply with the international commitments. The function on monitoring compliance of the Republic of Uzbekistan with the international treaties commitments was assigned to the Ministry of Foreign Affairs.

Responsibility for Uzbekistan's implementation of international commitments under UNFCCC have been assigned to the Centre of Hydrometeorology under the Cabinet of Ministers of the Republic of Uzbekistan (Uzhydromet). The Director-General of Uzgidromet plays the role of the UNFCCC National Coordinator in Uzbekistan.

Uzbekistan has prepared the its First and Second National Communications to UNFCCC, including a greenhouse gas inventory, vulnerability assessment, identification of priority strategic directions and measures for adaptation.

In 1995, Uzbekistan has established a National Commission of the Republic of Uzbekistan on climate change, which coordinates activities related to the implementation of the commitments under UNFCCC. In 2004, the Commission's functions were transferred to Uzhydromet (the Decree Cabinet of Ministers # 359 dated 19 September 2000). To implement the Convention, a secretariat was established under Uzhydromet. Its main activities include:

- coordination of the development of measures aimed at reduction of GHG emissions in the sectors that have direct impacts on the climate, such as energy, industry, transportation, utilities and agriculture; and
- coordination of development of measures aimed at adaptation for sectors that are most vulnerable to climate change, such as agriculture and water resources.

3. Impact and vulnerability

3.1 Climate change scenarios

3.1.1 IPCC policy/emission scenarios

With the goal of connecting scientific predictions on climate change with policy actions, the IPCC team developed 40 emission scenarios in its Special Report on Emission Scenarios (SRES) in 2000 (IPCC, 2007).

Table 1. Brief description of four SRES storylines and emission scenarios by 2100[1]

SRES Storylines			
A1	A2	B1	B2
- Rapid economic growth; - Peak of global population in the mid-century and decline afterwards; - Introduction of rapid, more efficient technologies; - Capacity building, regional convergence, and increased cultural and social interactions; - This scenario family is further divided into A1B (balance across all energy sources); A1T1 (non-fossil energy sources); and A1F1 (fossil-intensive).	- Regionally-oriented economic development; - Fragmented and slow technological change; - Continually increasing global population; - Heterogeneous world, self reliance; and - Preservation of local identities.	- Peak of global population in the mid-century and decline afterwards; - Rapid change toward a service and information economy; - Introduction of clean and resource-efficient technologies; - Global solutions to economic, social, and environmental sustainability; and - Regional convergence.	- Local solutions to economic, social, and environmental sustainability; - Continually increasing global population at slower rate than in A2; - Intermediate level of economic development; - Less rapid and more diverse technological change than in B1 and A1; and - Local and regional environmental protection and social equity.

All of those scenarios were organised into four storylines: A1, A2, B1 and B2, estimating the changes a hundred years ahead, combined according to similar future characteristics on economic development, technological change and demographic change. Table 1 shows individual characteristics of four storylines and six corresponding emissions scenarios.

The report was prepared by fifty experts from eighteen countries, including scientists, policy makers and members of non-governmental organizations.

[1] It is important to note that the SRES scenarios assume that no further climate initiatives will be created and only the existing UNFCCC or the Kyoto Protocol targets will be implemented.

In this review, these profiles will be used as a basis to evaluate the impacts of climate change on natural-resource potential. The results of the vulnerability assessments in line with the chosen scenarios were obtained in the process of preparing the SNCs in Central Asia within UNFCCC.

3.1.2 Climate change and scenarios in Central Asia

3.1.2.1 Current climate change

The climatic conditions of Central Asia vary from region to region, eventhough they have one thing in common: the climate is highly continental with extremely varying temperatures, and scant precipitation throughout the area.

Three basic types of climate zones occur in the region:
1) Moderate temperate climate zone in the North of 41-42 degrees latitude
2) Arid subtropical climate zone in the South of 41-42 degrees latitude
3) Mountain climate zones in the Tien Shan, Pamir-Alay and Kopetdag mountains

According to climate observations from the last hundred-year period, a rapid increase in air temperature has been observed in desert areas, whereas in mountainous areas the growth was slower, and even a decrease in temperature was reported in some periods. Using the data in Ibatullin et al. (2009:13) the average temperature increase in the Central Asian region over the last 100 years accounted for 0.18°C.

The data on past to present climate change varies by country. In Kyrgyzstan, where the entire territory is classified as mountain land, the average pace of warming has been the slowest in all of Central Asia. However, the average annual temperature in Kyrgyzstan has increased by 0.78°C during the last hundred years. In high mountain zones in Tajikistan, at heights exceeding 2500 metres, temperature has risen only in April, November and December. Cooling was also observed in some lowland districts, such as the valley of lake Bulinkul, in Tajikistan, where the average temperature between 1940 and 2005 dropped by 1.1°C, which can be explained by the special climatic conditions in the eastern Pamir (Ibatullin et al., 2009:13).

Kazakhstan has also experienced significant changes in air temperature over the period from 1936 to 2005. The average annual temperature increased by 0.31°C for every 10 years (SNC of Kazakhstan, 2009). Uzbekistan has recorded a significant warming as well. According to the SNC, in Uzbekistan in the period since 1951, the rate of warming $(\Delta T/10 years)$ on average amounted to 0.29°C.

With regard to rainfall, an increasing tendency of intra-annual and inter-annual variability has been observed in many parts of Central Asia. For instance, in Kazakhstan, an increase in the number of extreme warm and hot days, the frequency of rain showers, and the intensity of precipitation has been recorded. In the deserts, aridity has increased, as has humidity in the northern parts of the country (SNC of Kazakhstan, 2009).

In conclusion, it should be noted that significant warming, even in combination with a small increase in precipitation, leads to the expansion of aridity zones within arid

and semi-arid regions of Central Asia. These trends were confirmed by 60% of the monitoring stations in Kazakhstan. In addition, the observed trends of climate change lead to a reduction in ice cover.

It is also important to note that the comparison and compilation of data on changes in temperature and precipitation for the entire Central Asian region is extremely difficult due to the fact that the estimates of thechanges have been made by different methods.

3.1.2.2 Climate change scenarios

A number of models of general atmospheric and oceanic circulation (MOC) may be applied to assess regional climate change. Various types of models or their combinations are typically employed to construct climate change scenarios. In Uzbekistan, for example, the data of six models were applied and then averaged: CGCM1-TR, CSIRO-TR, ECHAM4, HadCM3, CCSR-RV, GFDL-TR. The Software MAGICC / SCENGEN 4,1 was used for analysis.

In Table 2 below, the estimated data on climate change scenarios for the Central Asian countries is shown, using the indicators for temperature and precipitation. These scenarios characterize the possible climate change of Central Asia up to 2030, 2050 and 2085, as related to the baseline period of 1961-1990. For some countries, the data takes into consideration and averages all four SRES policy and emissions scenarios (P-50 – medium scenario); for some – the scenarios A2 (pessimistic) and B2 (optimistic). This part of the report is fully based on the data given in the National Communications of the five Central Asian countries.

Table 2. Temperature and precipitation change scenarios in Central Asia

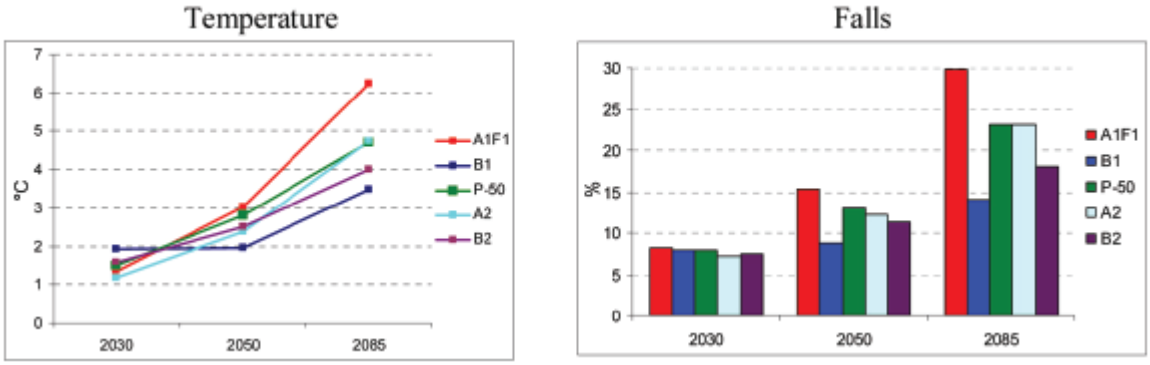
County	2030	2050	2085
Kazakhstan	T: +1.4 ˚C P: +2%	+2.7 ˚C + 4%	+4.6 ˚C +5%
Kyrgyzstan (A2; B2)	T: -/- P:	-/-	6.1˚C; 4.6˚C -2.2%; +8.3%
Tajikistan	T: + 0.2-0.4 ˚C P: +2%	-/-	-/-
Turkmenistan	T: -/- P:	-/-	+ 4,6 – 5,5 ˚C - 17-56%
Uzbekistan (B2)	T:1.2˚C P: 2.0%	2.2˚C;4.0%	3.3˚C 3.5%
Average for Central Asia	**T: 1.02˚C P: 2.0%**	**3.1˚C 4.0%**	**4.7 ˚C -2%**

T – Temperature
P – Precipitation
-/- - No data found

Kazakhstan: In accordance with the scenario P-50, on average the expected mean annual temperature in the territory of Kazakhstan will account for: +1.4˚C up to 2030; +2.7˚C to 2050; and +4.6˚C to 2085. The annual quantity of the rainfall will somewhat increase: by 2% to 2030, by 4% to 2050 and by 5% to 2085.

The intra-annual distribution of rainfall has an important practical meaning. In winter according to the P-50 scenario, the increase of rainfall is expected to be 8% by 2030, 13% by 2050, and 24% by 2085. In accordance to the P-50 scenario to 2030, rainfall in the summer period will be by 5% more, but since the present mid-century, only two models have predicted an increase of precipitation (Figure 1.), and on the average, models to 2050 quantify precipitation at the present level. Some estimations show that by 2085 there would be an opposite tendency with an average decrease of precipitation by 11 %.

Figure 1. The changes in ground air temperature (°C) and the sum of atmospheric precipitation (%) in Kazakhstan under the four scenarios of GHG concentration and the fifth medium scenario (P-50). (SNC, p. 97)



Kyrgyzstan: The data is presented mostly in a graphic form and calculated for two emission scenarios (A2 and B2) for three sample areas of the country. In summary, the change of temperature for all three areas is more or less identical, and in any case, a growth of average annual temperature should be expected. In comparison to the B2-MESSAGE scenario, A2-ASF emission scenarios predict a larger temperature increase. For 2100, this difference amounts to approximately 1.6°C.

An example for one of the areas – the central part of Kyrgyzstan, is presented below in Figure 2.

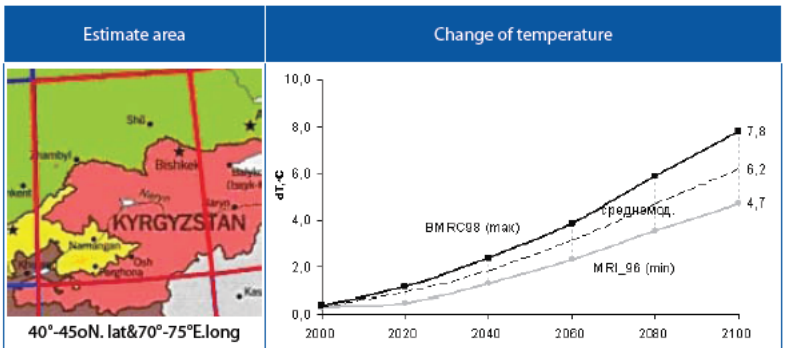
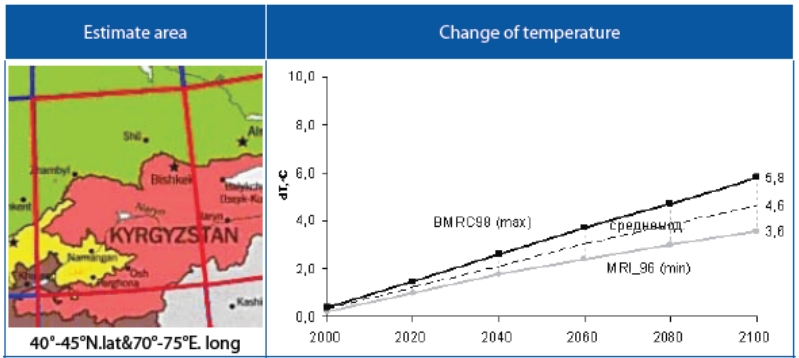


Figure 2. Averaged annual changes of temperature in relation to the baseline period of 1961-1990. (SNC, pp.112-113)

a) A2-ASF emissions scenario

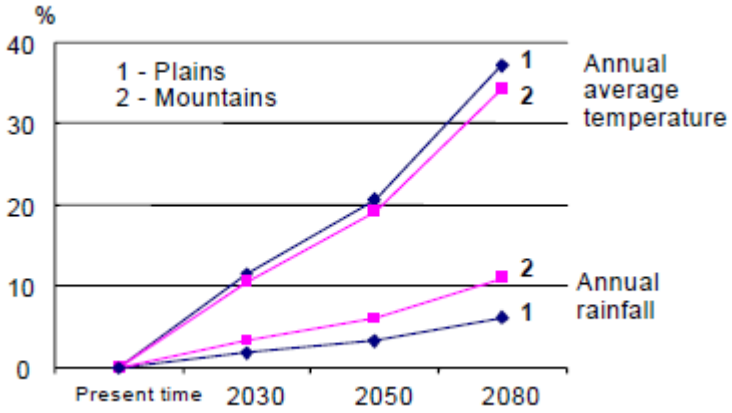


b) Emissions scenario of B2-MESSAGE

Uzbekistan: Calculated changes in annual average temperature and rainfall by region are from A2 and B2 emission scenarios. These scenarios show the essential increase of temperature on the territory of Uzbekistan, especially in winter. According to the calculations, the minimum temperature increase will be more intense than the maximum ones.

As for precipitation, some insignificant increase in precipitation during the winter season (December - February) may be expected. The number of days with heavy precipitation may also increase. Such scenario increase the risk of mudflow.

Figure 3. Assessment of standard deviation changes in perspective, average for scenario A2 and B2 for mountains and plain territories of Uzbekistan (SNC, p. 70)



Tajikistan: According to ECHAM4/OPYC3 statistical estimates, in comparison with the baseline period of 1961-1990, an increase in the mean annual temperature by 0.2-0.4°C is expected in most areas of Tajikistan by 2030. The significant spatial fluctuation of atmospheric precipitation and the impact of topography cause more uncertainty in precipitation forecasts and results in different data for various regions of Tajikistan, e.g. reduction in the eastern and an increase in the western Pamirs. Figure 4 below demonstrates the past and the expected variations in mountain area temperatures by 2030.

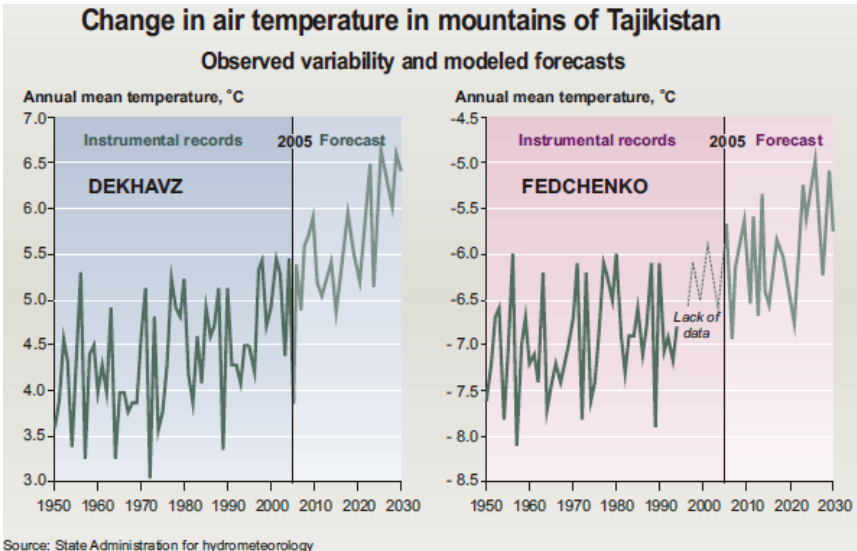


Figure 4. Change in air temperature in mountains of Tajikistan

Turkmenistan: In Turkmenistan the data on climate change scenarios is based only on the Initial National Communication (INC). Also the time frame of the forecasts is not specified; therefore, for this study, it is assumed that the estimations were calculated for the medium-term – until 2050.

According to the INC, maximum warming is observed by the CCC scenario model. This scenario foresees an increase of mean annual air temperature in Turkmenistan of 6.10°C, a doubling of CO_2, as a result, and precipitation decrease of 15%. Maximal warming is predicted to take place in the winter period, with a considerable precipitation increase in spring. The minimal warming scenario is predicted by the GDFL model. According to this, the increase in annual average temperature will be limited to 4.2°, with annual precipitation remaining constant (0.0%);

3.1.2.3 Impacts of and vulnerability to climate change

Vulnerability is defined as the degree to which any system can be harmed or damaged as a result of hazardous exposure (Turner et al., 2003). It is a function of exposure, sensitivity, and adaptation or the ability to adapt. In other words, a vulnerability assessment should assess the impact of climate change on a particular sector, the sensitivity of this sector to such changes, and finally, the ability to adapt to the expected changes.

Adaptive capacity is defined as "properties of a system to adapt its characteristics or behavior in order to expand its capacity to cope with the impacts caused by existing climate change or future climate conditions" (Brooks et al., 2005).

The above mentioned study framework has been employed in this chapter. Data on vulnerability to climate change in the Central Asian countries is presented below in Table 3. The Table describes the impacts, vulnerability and adaptation potential of Central Asian the countries to overcome the consequences caused by climate change. The data is derived from several sources: Ibatullin et al. (2009); SNC of the Central Asian countries, and the Gap Analysis, CAREC (2009).

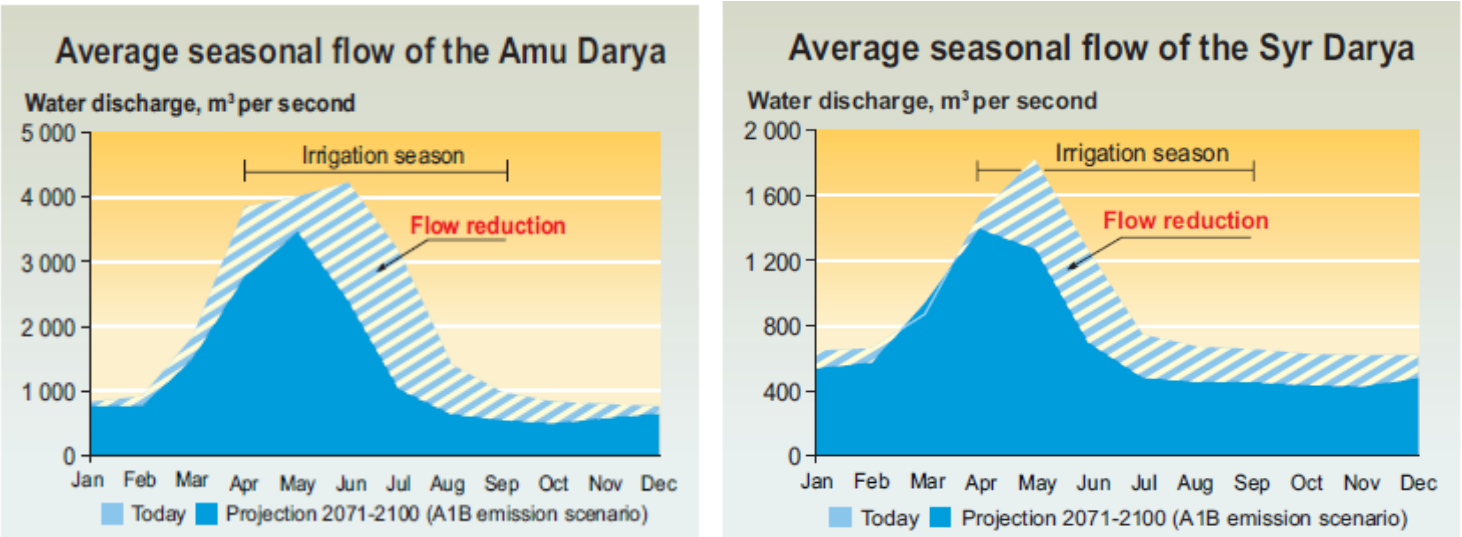
The long-term assessment of the vulnerability of water resources shows that the probable reduction of water resources in Central Asia will be due mainly to glacier melting (IPCC, 1997). According to the interim report of country studies on climate change, it is expected that the runoff of the rivers in the Aral Sea basin will be

diminished by 10 - 20%. At the same time, levels of water consumption will increase due to the current growth in the number of population and economic development.

> "46 glaciers are already shrinking, which may eventually decrease water flows. From the 1950s to the 1990s, the Pamir-Alai glaciers lost 19 percent of their ice, with the process now gaining in intensity. For several decades, the area of glaciers in different regions of Tien Shan, Gissaro-Alai, Pamirs and Dzhungarskiy and Zailiyskiy Alatau has decreased at the average rate of about 1 percent per year. According to some model predictions, the availability of water in Syrdarya may decrease by up to 30 per cent and in Amu Darya by up to 40 per cent. Some other models do not predict such dramatic declines, but no scenario shows an increase in water flow; in all models, the demand for water grows faster than the natural supply." Perelet (2007: 9-10)

The Figure 5 below demonstrates graphically the projections.

Figure 5. Projections of average seasonal flow of the Amu Darya and Syr Darya



Source: Shiklomanov (2009) cited in Federal Office for the Environment (FOEN) (2009)

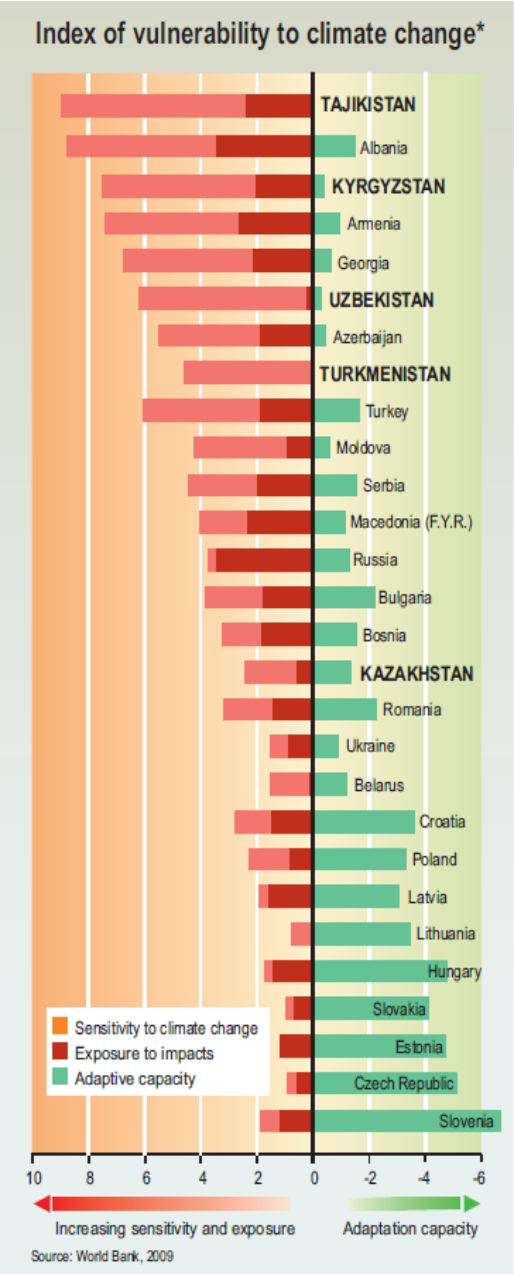
In terms of agriculture and ecosystems, almost all climate changes observed have a multifaceted effect on ecosystems. For example, the rise of minimum temperatures, and subsequent reduction of cold days, may lead to reducing damage to some crops and to increasing damage to other crops, to expanding and intensifying activity of some pests and carriers of diseases. The increased inequality of precipitation can have a negative effect in terms of time when rain showers are succeeded by droughts. It may have an effect on increasing soil erosion. Other than in summer, such falls do not bring the necessary soil moistening, as the soil cannot quickly absorb the moisture, along with surface runoff and high air temperatures contributing to evaporation (SNC of Kazakhstan, 2009: 91).

Table 3. Regional Impacts and Vulnerabilities to Climate Change in Central Asia

Impacts (T and P)	Vulnerability by sector	Adaptive Capacity
Temperature • Under scenario A2 (pessimistic), by the end of the 21st century the increase in average annual air temperature as compared with the base period (1960-1990) will vary from 4.7˚C in Kyrgyzstan to 5.5˚C in Turkmenistan. (Table 2). • Under B2 (optimistic), the expected rise in annual air temperature will be around 1-1.5% lower than under A2. E.g. in Uzbekistan in the long-run the average temperature increase is expected to be 4˚C for A2 and 3.3˚C for B2 scenario. **Precipitation** • Scenarios of changes in precipitation are ambiguous. An increase in precipitation during the winter period is expected to be until the end of this century; however,a decrease in the summer season may be expected in some areas. **Extreme Events** · Increasing probability of dangerous and extreme climate events, such as hailstorm, drought, extreme high or low temperature, etc., which will cause increased frequency of emergency situations, including storm	**Water** • In Kazakhstan, for instance, by 2030 the water resources in the mountain areas are to temporarily increase within a range between 0.8 – 4.5% to one between 14-22.5% due to rapid glacier melt, while the water resources in the lowlands will decrease by 7-10.3%. • In the short term (by 2030) water resources in the Amu Darya basin could decrease by 5-8% as compared to the current level, while deviations of Syrdarya will be minimal. • By 2050 the water runoff in the basins of the Amu Darya and Syrdarya will dry up by 10 -15 and by 6-10% respectively of their original level. • The water in the northern plains of Central Asia are set to decrease by 6-10% by 2030 and by 4-8% as of 2050. **Agriculture and Ecosystems** • Major stress on water resources in Central Asia will come for irrigation, resulting in an overall decrease in productivity in the range of 15-50%. • The livestock productivity will drop due to dwindling areas of pasture land and a 30% decrease in fertility of the existing pastures. • Water resource scarcity and drought will have a major impact on water availability of natural resources in general, resulting in a loss of biodiversity, deterioration of water quality, increase in risk of wild fire and loss of soil fertility. **Hydropower** • Under the most unfavorable climate scenario, the total hydropower potential of the rivers flowing into Issyk Kul may drop to more than half of its previous level by 2100. **Health** • Increase in incidences of infection epidemic, including malaria; • Acceleration of blood-circulation diseases,	**Resources** • Insufficient financing and absence of economic assessment of adaptation measures; and • Underdeveloped financial system for environmental protection. **Institutions and Regulations** • Lack of coordination among ministries and institutions **Economics** • Weak incentives for natural resource users to adopt new technologies; and • No incentives for industries to follow high standards. **Human resource capacity** • Limited knowledge of and skills to attract funding, investments and grants; • Few specialists with expertise in sophisticated model analysis methods and tools; and • Lack or limited number of climate change topics covered by university curricula.

Impacts (T and P)	Vulnerability by sector	Adaptive Capacity
rainfall, mudflow, landslide, avalanche, flood and drought and earthquake.	cancers and diseases of the cardiovascular system; • Increased risk of heat and cold stress among the population; and • Increase in the gastro-intestinal diseases in areas of insufficient water supply, especially in rural areas. **Glacier** • Between 1957 and 1980, glaciers in the Aral Sea basin have lost 115.5 km^3 of ice, or in order of 104 km^3 of water, which was nearly 20% of all ice reserves as of 1957. • e.g. in Tajikistan, the area of the country's snow cover could decrease by 20% and the glacier cover – by 25-30% during this century. **Mudflow** • Mudflow may occur frequently.If the climate warms by 2-3°C, the upper boundaries of watersheds will rise above 4,000 metres, and the watershed surfaces will increase by several times, meaning that these surfaces will become potential sources of mudflows.	**Social capital** • Weak accountability and lack of dialogue between implementing authorities and population. **Information management** • Absence or limited availability of monitoring data and information on vulnerability to climate change. • Lack of climate change materials in the national languages limits raising of public awareness and dissemination of updated climate information in the rural remote areas; and • High level of uncertainty in the climate change forecasts and vulnerability estimates.

Figure 6. Index of vulnerability *Source: FOEN (2009)*



3.2 Summary of climate change impacts on Central Asia

To summarize according to the table above and a report prepared by CAREC ("Gap Analysis in the area of Climate Change and Energy Efficiency in Central Asia: Defining opportunities for CAREC", 2009) and the research of national and international organizations using various climate models, it can be concluded that climate change will have a drastic impact on all countries of Central Asia. These climate change impacts can be summarized as follows:

- **Increasing deficit of water resources and deterioration of water quality,** including rapid glacier melting and reduction of snow cover, a change of the hydrographic

regime of surface waters, reduced access of the population to clean drinking water, increasing desertification processes, land degradation and salinisation, loss of biodiversity, increased deforestation as well as negative impacts on major economic sectors such as agriculture and energy:

- A threat to irrigated lands, projected decrease in crop yields, reduced pasture productivity, feed capacity and animal production, changes in the employment structure of the rural population, threats to the food security of the countries concerned;
- A source of tension between the neighboring countries in coordinating and regulating irrigation, energy regimes and the shared use of water resources; negative effects on hydropower capacity, resulting in a threat to the energy security of the countries.

- **Increasing probability of dangerous and extreme climate events**, such as hailstorm, drought, extreme high or low temperature, etc., which will cause increased frequency of emergency situations, including torrential rainfall, mudflow, landslide, avalanche, flood, drought and earthquake.

- **Increased risk of occurrence of human disease and stress** associated with climate change, such as infectious diseases, diseases of the blood circulatory system, malignant tumor, cardiovascular ailment, the risks of heat and cold stress andgastro-intestinal diseases.

- **Increasing danger for the existing ecosystems and a threat to biodiversity**, including displacement of climatic zones and changes in the habitats of flora and fauna, and in land use and land cover.

4. Gap Analysis of Adaptation by Sector

4.1 Definition and types

Politicians around the world consider adaptation and mitigation as the two key strategic directions for addressing climate change. In Central Asia, more attention is given to mitigation actions – reduction of GHG emissions, however due to high vulnerability of the region's economies to the already changing climate, the adaptation strategy becomes extremely timely.

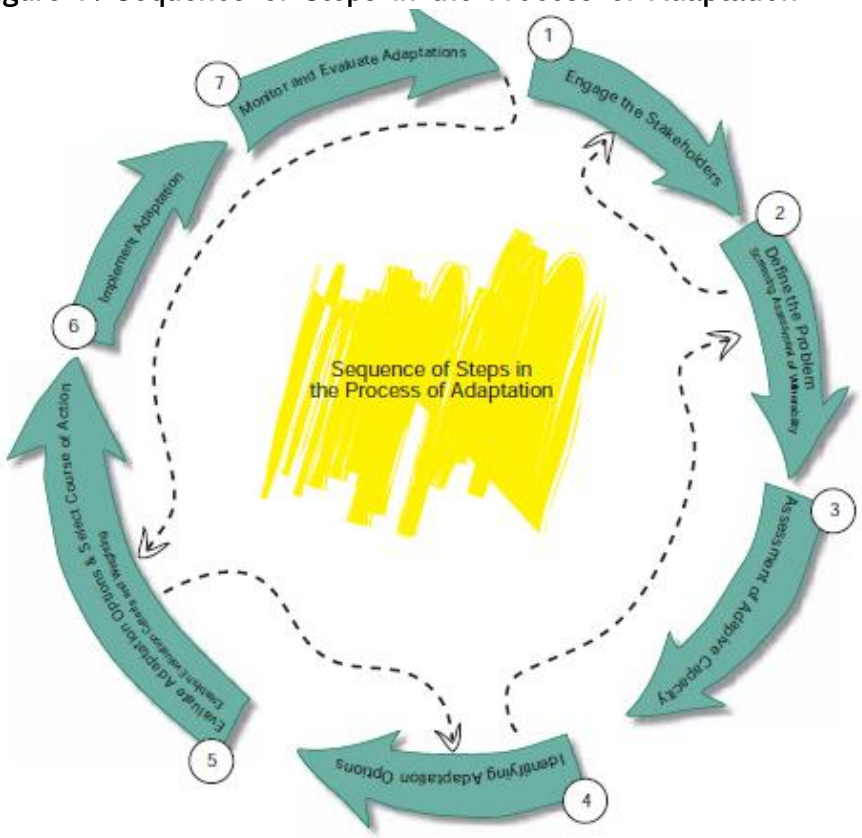
Adaptation to climate change can be defined in various ways. Perelet (2007:20) defines adaptation to climate change as the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities." At the same time, UNDP (2004) defines adaptation as a process by which strategies aiming to moderate, cope with and take advantage of the consequences of climate events are enhanced, developed and implemented. In short, adaptation should be a long-term flexible process based on constantlyupdated vulnerability data aimed at moderating and/or taking advantage of climate change impacts.

Therefore, when designing adaptation policies, once should take into account that adaptation is not simply a matter of designing projects or putting together lists of measures to reduce the impacts of climate change. According to Global Leadership on Climate Action (2009) a national policy response should be anticipatory for the most part, not reactive, and should be anchored in a country's framework for economic growth and sustainable development, and integrated into its poverty reduction strategies. National governments bear the responsibility of developing and implementing integrated policies and programmes that build the resilience and reduce the vulnerability of their populations, emphasising preventive local actions, to manage the risks associated with the impacts of climate change.

There is no single correct methodology to design climate change adaptation strategies. At the same time, for the purpose of this assessment the lessons and recommendations of the previous reports have been systematized to structure the review and analysis. This review mainly uses a typology of adaptation measures proposed by the United Nations Economic Commission for Europe (UNECE_(2009) "Guidance on Water and Adaptation to Climate Change" with some ideas and concepts also taken from World Bank (2009) report "Adapting to Climate Change in Europe and Central Asia" and "Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools" by Simpson et al. (2008).

Before moving towards an analysis of adaptation measures, it is important to bear in mind the sequence of steps in the process of adaptation to climate change, presented in Figure 7. This process represents an iterative cycle of problem definition, adaptation implementation and evaluation of outcomes. This report aims mainly to provide a review of the first four steps and targets to examine the fifth step of evaluating the adaptation options, identifying the gaps and recommending the most feasible and relevant course of actions.

Figure 7. Sequence of Steps in the Process of Adaptation



1. Engaging stakeholders
2. Defining the problem (*Vulnerability assessment*)
3. Assessing the capacity of adaptation
4. Identify options for adaptation
5. Assessment of adaptation options and the choice of measures
6. Implementation of adaptation
7. Monitoring and evaluation of adaptation

For an adaptation strategy to be successful and comprehensive, it should cover all of the following aspects of measures: prevention, improving resilience, preparation, reaction, and recovery (UNECE, 2009). Prevention and improving resilience measures are often connected to the gradual and long-term effects of climate change, whereas the preparation, response, and recovery measures are linked to extreme events, such as drought and mudflow. It is important to note though that it is not always possible to strictly categorize all the measures. Adaptation measures can also be classified on the basis of time: short, medium (within one or two decades) and long-term (50-100 years ahead).

In this chapter we classify the measures by: 1) Prevention/improving resilience - prevent negative effects of climate change and enhance the adaptive capacity of the key vulnerable sectors (based on medium- and long-term forecasts). 2) Preparation - reduce the negative effects of extreme events on vulnerable sectors (based on short-term climate forecasts). 3) Response measures – alleviating the direct effects of extreme events.

The next parts of this chapter provide an overview of the adaptation measures proclaimed as priorities in the latest national communications by sector. After that there is description of each of the sectors on adaptation measures already taken at local, national and regional levels. Further on, the final chapter analyses the gaps between the planned and actually implemented projects, providing observations and recommendations to be used later on for further adaptation planning.

4.2 Adaptation measures by sector

The officially proposed adaptation measures and options for the five countries of Central Asia are described in the SNCs, which were produced by national experts and scientists in 2006-2009 within the UNFCCC

In this chapter these measures are divided by vulnerable sectors: 1) Water resources and agriculture 2) Forestation, biodiversity and ecosystems 3) Public health 4) Disasters and extreme events 5) Urban area 6) energy, industry, transport, oil and gas. Water resources and agriculture are the two sectors that are given special attention in all five SNCs due to their significant value for regional economy and the highest level of vulnerability to climate change.

In order to better structure the analysis of adaptation measures six major categories of measures were identified within each of the chosen direction: a) policies, institutions and governance, b) technologies, methodologies, practices c) technology and infrastructure d) economics and finance e) science and information e) education and capacity building.

All the tables that summarize the planned adaptation measures by sector are presented in Annex 1. Short descriptions of actual adaptation projects and programmes in Central Asia are available in Annex 2. The good adaptation projects are highlighted with separate color. This chapter presents the analysis of compliance and gaps in the planned and actual adaptation measures by sector in Central Asia. At the end of each part a list of general observations and recommendations is given for each of the sectors.

4.2.1 Water resources and agriculture

4.2.1.1 Issues for this sector

The importance of water and agriculture in Central Asia is impossible to overestimate. Water is life in this region. Agriculture and water resource sectors are considered together since in the Central Asian region they are closely interlinked – more than 90% of water in the region goes to irrigated agriculture, which produces about 30% of the regional GDP and provides employment for more than 60% of the region's population (Rakhimov, 2009).

The country assessments show that 70% of potential damage from unfavorable weather and climate conditions affects agriculture. One of the examples on how drought, induced by climate change, may impact people's livelihood, is the drought of 2008 in Tajikistan. Because of it the grain harvest totals were down by 30-40% during the whole year. As a

result many farmers lost their wheat harvest and had to sell their livestock (Oxfam, 2010:11).

Agriculture in the region is dominated by cotton production with an increasing shift towards cereals. Uzbekistan, for instance, is currently the second largest exporter of cotton in the world, selling over 800,000 metric tons every year (Granit et al., 2010). In Tajikistan, two thirds of the population depends on agriculture for their livelihood. Around 2/3 of agricultural production in Tajikistan is irrigated but many farmers still have to make a living from rain-fed land – which is even more vulnerable to drought and climate change (Oxfam, 2010:9). The Table 4 below shows the statistics on the level of importance of agriculture in each country of the region.

Table 4. Importance of agriculture in Central Asia (employment and GDP)[2]

	Employment in Agriculture	Agriculture as % of GDP	Major Exports (agriculture)
Afghanistan[95]	67%	53%	Wheat
Kazakhstan	<10%	<10%	Grains
Kyrgyzstan	55%[96]	35%	Cotton, Horticulture
Tajikistan	n/a	25%	Cotton
Turkmenistan	n/a	30%	Cotton
Uzbekistan	40%	20%	Cotton, grain[97]

Country	Area ('000 hectares)		Production ('000 tonnes)	
	Irrigation*	Cotton**	Cotton	Horticulture***
Afghanistan	1,5	<20 (1%)	<15	n/a
Kazakhstan	3450 (16%)	200 (6%)	180	5,3
Kyrgyzstan	1050 (77%)	<30 (3%)	48	2,45
Tajikistan	630 (68%)	220 (35%)	172	1,6
Turkmenistan	1750 (94%)	540 (31%)	219	1,2
Uzbekistan	3990 (89%)	1450 (36%)	1,17	5,75

* Brackets = percentage of arable land irrigated
** Brackets = percentage of irrigated land dedicated to cotton (2003 figures)
*** Fruits, vegetables, roots and tubers

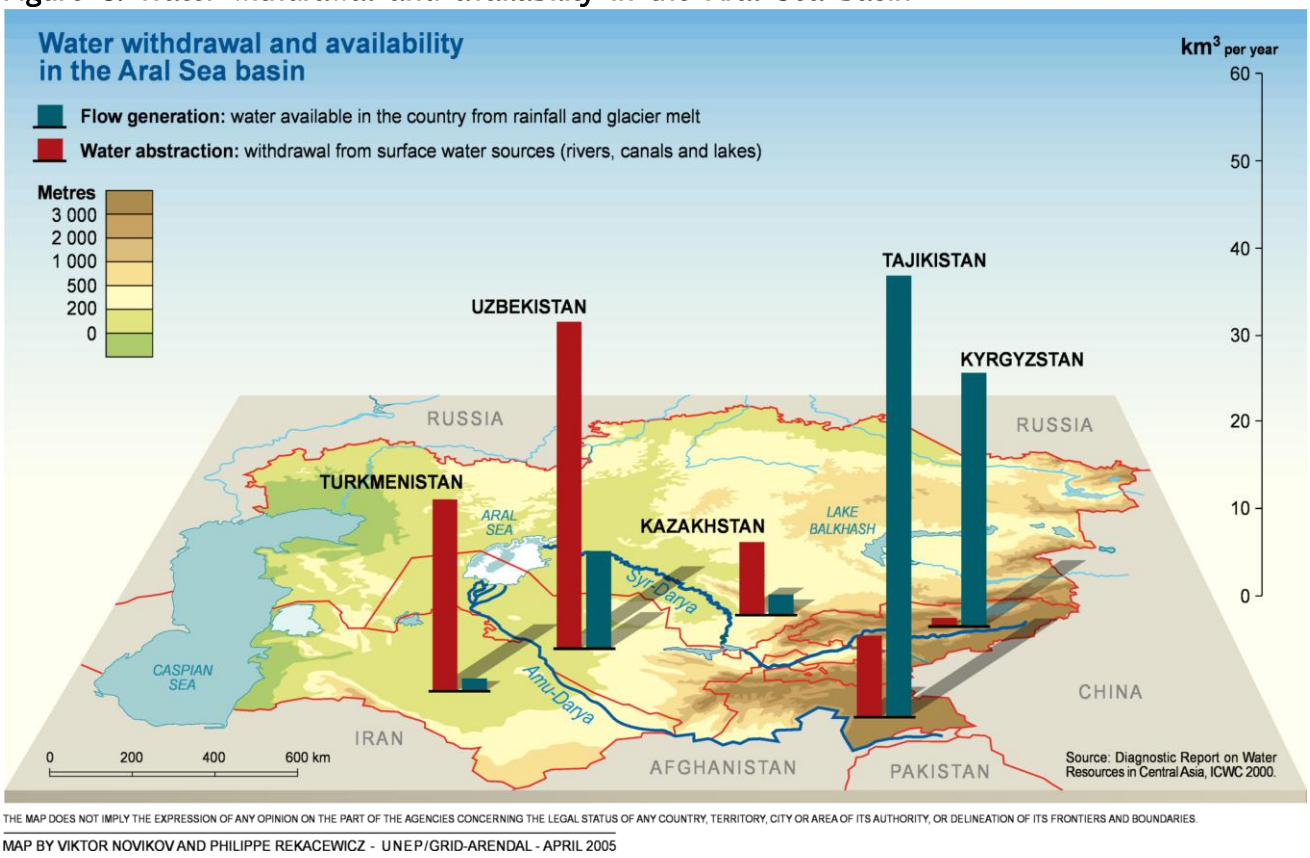
Taking into account the climate risks and importance of irrigated agriculture in the region, there is a growing need to modernize the irrigation system and increase the efficiency of water use. The agricultural production system should be prepared to incorporate new crops that are more suitable to new climatic conditions and different soil composition and moisture. One effect of a failing agricultural sector is the increasing difficulty of earning a livelihood in rural areas, driving migration to urban centres. In Kazakhstan urban, and peri-urban slums have developed rapidly. This not only creates new problems in urban areas, but also removes labor from the agriculture sector (Granit et al., 2010:27).

In the water sector, according to Timmerman & Bernardini (2010) the impacts of climate change may hit water resources hardest in transboundary water management situations,

[2] Granit, J. et al (2010). *Regional Water Intelligence Report Central Asia: Baseline Report.* Stockholm, p.22.

given the differences in assessments between countries and the increased difficulty for countries to jointly manage their shared waters. Water in the Central Asian region represents a highly political issue due to its un-uniformed allocation among countries. The table below demonstrates this situation, which results in challenging regional water negotiations. The level of trust in those shared water negotiations is quite low. According to the International Crisis Group cited in Granit et al. (2010:8), there are several reasons for these conflicts: "1) Regional water systems were designed during the Soviet Union period and now they are managed by five different states. 2) Central Asian economies are dominated by irrigated agriculture practices, the output of which maintains the ruling elites' grip on power. 3) Central Asian states have increasingly adopted "zero-sum" positions on water resources and at the same time increased consumption to unsustainable levels. 4) downstream countries are militarily and economically stronger than upstream countries, which has produced a power-asymmetrical relationship that becomes evident in water conflicts."

Figure 8. Water withdrawal and availability in the Aral Sea basin



From the Figure 8 above it can be observed that there are significant upstream-downstream issues, also summarized well in general terms by Granit et al. (2010) Regional Water Intelligence Report for Central Asia: 1) A configuration of wealthier countries downstream and poorer countries upstream 2) Hydropower potential upstream and irrigation and environmental demands downstream 3) Different water governance structures, e.g. Kazakhstan pursues a market-oriented approach while Turkmenistan is based on full-state property of water resources.

In addition to the transboundary issues related to water distribution, such trends as growth in domestic demand on water resources due to population growth and economic development as well as the lack of a satisfactory agreement on transboundary water management and the expected increase in air temperature shall significantly exacerbate the shortage of water resources in the Aral sea basin.

4.2.1.2 Priorities of planned adaptation

Based on Table 1 in Annex 1, the priority adaptation measures proposed in the sectors of water resource and agriculture in Central Asia are mainly centred around the preventive measures to reduce the impacts and scope of vulnerability to climate change, such as the improvement in water resource management at the national and transboundary levels, improvement of the water use efficiency, particularly in irrigated agriculture, diversification of agricultural crops, and the rational pasture use. In addition, it is stated that the reservoirs at the mountain rivers and protective hydraulic engineering structures should be

designed as a response to deglaciation threats (CAREC, 2009; Ibatullin et al., 2009; SNCs in CA).

This focus on preventive measures represents that the current Central Asian governments' priority is in resolving the current issues, which are related mostly to improvement in planning and management as well as intensification of technical, technological and scientific aspects. Table 5 below shows the focus of the planned adaptation measures, stated in the SNCs of each of the countries in the region.

Country	Table 5: Focus of planned adaptation measures in water and agriculture
Kazakhstan	• Sustainable management of irrigated (southern region) and rain-fed (northern region) agriculture (alternative crops, water efficiency, irrigation infrastructure); • Improve transboundary water resources management, since almost half of the annual runoff of the country comes from neighboring states (water standards, bilateral and multilateral agreements, Integrated Water Resource Management (IWRM)); • Adapt the coastal areas of the Aral and Caspian Seas and Lake Balkhash; • Implement IWRM at both national and regional levels; and • Diversify and improve the sustainability of grazing methods.
Kyrgyzstan	• Improve management of surface river flow; • Improve Irrigation efficiency (e.g. minimize water losses); and • Introduce economic incentives for better water management.
Tajikistan	• Improve water use efficiency in irrigation – sprinkling and drip irrigation; • Plan and introduce water efficiency activities; • Cultivate agricultural crops resistant to drought and salinity (SNC of Tajikistan, referred to in Oxfam, 2010). • Introduce IWRM at all levels; • Construct new dams and water reservoirs; • Improve the management of rangelands that have a substantial impact on the environment; • Develop agroforestry as an element to regulate environmental conditions in the mountain slopes and highlands; and • Assessment of mountain glaciers and snow reserves for the sustainable management and planning of water resources.
Turkmenistan	• Improve the co-efficiency of irrigation efficiency; • Involve additional water sources, such as slightly saline drainage water, groundwater and treated industrial and municipal wastewater; and • Enhance water storage capacity (build new water dams).

Uzbekistan	• Improve irrigation efficiency and water conservation; • Increase the productivity of crops and livestock; • Transboundary water management; • Implement IWRM at all levels; • Develop better monitoring systems in the water sector. • Combat land degradation; • Adopt preventive measures in the health sector; and • Create conditions for preserving and maintaining the lake and river ecosystems.

The Second National Communications of each of the Central Asian countries were taken to summarize the priorities of adaptation, since these documents represent the major official source of information on climate change and reflect the most crucial needs of the various sectors. See Table 1.1 in Annex 1 with a summary of adaptation strategies on water and agriculture. The most important points are presented below.

The priority adaptation measures proposed for the the water and agriculture sectors in Central Asia focus on **preventive measures** to reduce the impacts and the scope of vulnerability to climate change. All countries of the region emphasise measures related to improvement in technology and infrastructure. These activities include mainly the reconstruction of existing and the use of more efficient water irrigation systems (sprinklers and drip irrigation) and building multi-annual- regulated water dams (mainly Turkmenistan).

Strengthening science and information is the second focus of preventive measures for Central Asia. All countries stress the importance of enhancing systematic observation networks and environmental monitoring. Other measures include: improving the reliability of hydrological forecasts; creating observation posts on snow and ice resources in mountainous area upstream of the Aral Sea basin; developing water resource use schemes; and scientific development of the agriculture sector (e.g. selection of resistant and productive alternative crops and development of new conservation technologies).

The focus on science is accompanied by the proposal of all countries to further strengthen the organizational, technical and human capacity, and to train farmers on alternative agriculture methods.

In addition to science and infrastructure, institutional and policy changes are emphasised by the downstream countries, especially Kazakhstan and Uzbekistan. These policy recommendations include the development of effective regulatory transboundary water agreements, implementation of IWRM at the national and regional levels, and harmonization of transboundary water standards. For instance, irrigation from the Syrdarya River in southern Kazakhstan is largely dependent on the water policy in Kyrgyzstan, the country upstream.

The quantity of **preparatory measures** planned is around three times smaller than the preventive ones. The reasons for this might include the high level of scientific uncertainty, a limited policy-science dialogue, the lack of economic assessment of climate-induced

losses,and the lack of integration of adaptation targets into existing national sectoral policies. The measures that are included in this category are: reconsideration of hydropower station regimes; prioritization of economic activities in accordance with water availability; regulation of grazing pressure; diversification of agricultural crops, and introduction of more water efficient ones; equipping emergency services; developing early-warning systems; and raising awareness among farmers and key stakeholders. These measures are more short-term and are based on short-term climate change forecasts.

The consequences of climate change are already visible in the Central Asian region and affect water, agriculture, living conditions and the population's health. The **response measures** that have been proposed (mainly by Kazakhstan) include rehabilitation of pastures, sustainable grazing methods and planting dryland trees to prevent desertification.

Despite the fact that the list of necessary adaptation measures in Central Asia is quiet comprehensive in addition to thr existing water management issues, insufficient attention is given to practical methods of implementation. There are no financial and economic tools proposed in the SNCs, although this is the most vital question when it comes to adaptation. In their SNCs, only Kyrgyzstan and Turkmenistan generally mention the need to introduce economic stimuli for rational water use. Kazakhstan also mentions that extra funding is required as a preparatory measure in case of forced migration from acutely affected territories.

To summarize, the priority adaptation measures in the field of water and agriculture in Central Asia are:

- Water conservation and sustainable water use
- Combating land degradation
  - Sustainable irrigated agriculture
  - Sustainable use of rangelands - the diversification of grazing methods
- Increasing the productivity of crop and livestock production
- Preservation and maintenance of lake and river ecosystems

To conclude, in general it can be observed that the planned adaptation measures reflect the actual issues and needs. Such areas include the need for better scientific data, institutional strengthening, integrated resource management and improved infrastructure. The SNCs provide a detailed list of proposed adaptation measures by sector. At the same time these reports have three major limitations: a) They do not give a clear picture on the economic and financial tools to enforce the adaptation b) They lack the socio-economic assessment of potential and actual climate-induced losses. In order to be useful for the policy makers of Central Asia, the next national communications should strive to be (or to have a separate version) better structured, concise and practice-oriented.

4.2.1.3 Activities on the ground

So far, very few programmes and projects have been targeted specifically (explicitly) to adaptation at the regional and national levels. Instead, most of them have been attributed to adaptation indirectly (implicitly). If we use the above suggested typology of adaptation measures, the majority of projects that have been implemented in the region so far will fall into the category of preventive adaptation. In Annex 2, the first parts of each country in the region are devoted to the inventory of water and agriculture projects. Those that are ranked to be the most demonstrative and good are marked with a separate color.

Implicit adaptation

Infrastructure improvement is the first most common adaptation measure prioritized by the SNCs. Historically, the first decade after the fall of the Soviet Union was characterized by a large number of infrastructure projects and programmes in the sectors of water and agriculture. This is due to the drastic and sudden reduction of funding, which led to the weakening of management institutions at all levels, and a severe deterioration of water quality and water infrastructure across the region (ADB, 2005; Jalling, 2003; Mickin, 1991, OECD, 2006). At the same time, the period was characterized by the development of a number of transboundary agreements, the creation of regional institutions (e.g. the Interstate Coordination of Water Commission (ICWC), the International Fund to Save the Aral Sea (IFAS)), growing support from the international community centred around the Aral Sea catastrophe, and the adoption of the national legislation and programmes. Thus, the Central Asian countries have tried to maintain a level of co-operation on water issues, and at the same time rehabilitate the obsolete water infrastructure (Granit et al, 2010).

These efforts to restore the decaying irrigation systems are in fact quite crucial. Until 2002, 50-90% of water diverted for irrigation never reached crops, due to poorly-designed irrigation canals. Furthermore, water users are used to receiving water for free. Consequently, water had mobilized deep salt reserves, raised the water table and waterlogged fields as a result of over-irrigation. In Turkmenistan, 95% of irrigated lands suffer from salinisation. “Approximately 30% of Kazakhstan’s agricultural lands are salinated, waterlogged, or at risk. In Tajikistan, 16% of irrigated lands suffer from some degree of salinisation” (Sievers, 2002, p. 366).

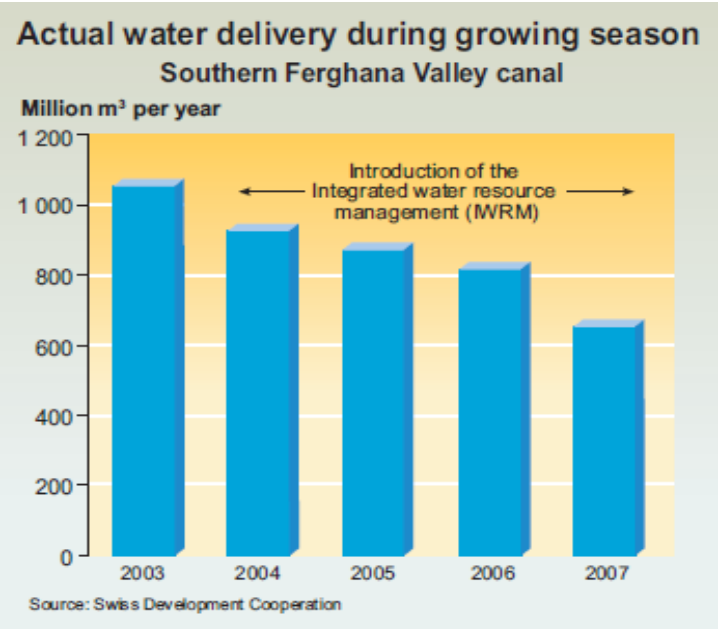
Strengthening institutional, management and policy-making capacity are the next set of adaptation measures that has been prioritized in the SNCs. In the next ten years after independence, in the period of 2000-2010, the focus of investments has gradually moved from solely infrastructure to increasing environmental sustainability, capacity building and participatory management. These more comprehensive approaches are now being incorporated into the new national legislation (e.g Water Code of 2003 in Kazakhstan), programmes on rural development, combating desertification, access to drinking water, environmental security, sustainable development, poverty alleviation, etc. Even though these programmes do not target adaptation to climate change (due to the lack of national adaptation policy frameworks), they still aim to reach different Millennium Development Goals (MDGs), which according to the international experts are the key components of adaptation.

Thus, the countries have started to pay more attention to the complex projects and programmes not only focused on infrastructure improvement, but also on strengthening management, policy planning and scientific capacity (which mainly fall into the category of **preventive adaptation measures**). The international community is recognized as a significant player in the adaptation process. In particular, in Kazakhstan the National IWRM and Water Efficiency plan was developed with support from NORAD, DFID, UNDP and GWP in 2006 and was ordered to be adopted in the government. The river basin councils, as the important element of IWRM, were established in the countries of Kyrgyzstan and Kazakhstan. There has been a number of long-term successful international projects that have resulted in creation and sustainable functioning of Water User Associations, institutions that allow for better level of farmers participation in water management and to effectively implement the best management practices (e.g. drip irrigation, crop rotation and agricultural crops diversification) at the local level. Tajikistan has started a road-mapping exercise as part of developing an IWRM policy. Uzbekistan has implemented a number of IWRM projects. Turkmenistan is the only country that is not active in developing policy towards IWRM, although there is an acknowledged need to do so (Granit et al, 2010)

Apart from the national IWRM projects, this tool has recently been started to be piloted on a scale of pilot watersheds and small transboundary rivers. This approach was promoted by a number of donors such as European Commission and German Agency for International Cooperation (GIZ) in partnership with regional and local NGOs, CAREC being one of them. Examples of such projects are: “Development of IWRM plan in Ile-Balkhash river basin” (2005-2007) and “Inter-sectoral water partnership on transboundary rivers of Central Asia” (2008-2009). of the results of these projects are: a) The models and watershed management plans were developed b) The status, structure and functions of watershed management bodies were reconciled on the national and local levels c) The draft national and transboundary partnership agreements were developed and reconciled with the stakeholders d) Pilot priority small transboundary rivers were identified and project proposals written e) Awareness on the potential benefits and content of IWRM was raised among the wide group of stakeholders.

The effect from the successful IWRM projects can be demonstrated by the outcomes of IWRM project in the Ferghana Valley. This positive experience could be distributed to the other regions. Figure 9 below shows the effect of IWRM on water conservation and efficiency.

Figure 9. Actual water delivery during growing season in the Southern Ferghana Valley canal



In the area of strengthening science and information, the largest long-term project that has been implemented in all Central Asian countries on the sub-regional level was the capacity building project of the Swiss Development Cooperation (SDC) implemented in 2001-2010 to support the National Hydro-Meteorological services (NHMS), the key national scientific bodies on climate change in all five countries of Central Asia. The main goal of this project was to support the HNMSs in improving the quality of hydrological and meteorological data. Although the project has contributed to the improvement of reliability and advancement of hydrological data, it lacked the awareness raising and science-policy dialogue components. Moreover, climate change science covers a broader range of issues than just water flow vulnerability, therefore other scientific institutions, such as institutes of geography, geology and agriculture require similar long-term capacity building projects.

Explicit adaptation

In the region there are a limited number of projects that are explicitly targeted at adaptation. Among these are some recently initiated large-scale projects. For instance, a joint project of the World Bank, European Bank on Reconstruction and Development (EBRD) and Asian Development Bank (ADB), which began in 2011, is aimed at building institutional and climate risk assessment capacity on adaptation to climate change in Tajikistan. Another large project on adaptation capacity development is in the field of water resource management in the Chu-Talas river basin, the transboundary river between Kyrgyzstan and Kazakhstan.

Another project that is specifically aimed at adaptation and capacity development is the UNDP/ Ministry of Environmental Protection (MEP) of Kazakhstan project "Capacity building for sustainable development through the integration of climate change issues into strategic planning in the Republic of Kazakhstan" (2009-2010). The outcome of this project was a concept note on adaptation to climate change in Kazakhstan submitted to MEP in

December 2010, which was developed with the participation of a multi-stakeholder expert group. Based on the outcomes and recommendations of this concept note, Kazakhstan aims to develop its NAPA. It is important to note that if Kazakhstan will develop its NAPA, it will be the voluntary activity, since Kazakhstan is an Annex I country and is not forced by the international conventions to do that. The other four countries of the region, non-Annex I countries, are required by UNFCCC to adopt NAPAs and are in the active process of its development.

What is unique about the UNDP project in Kazakhstan is that adaptation planning was based on vulnerability mapping. The methodology used is Principal component analysis (STRATA.10), which was first utilized for preliminary vulnerability assessment in Central and Eastern Europe by the World Bank in 2010. The strength of this assessment is that it provides a basis for adaptation planning on the national level; however, the weakness is that it does not provide a picture on the sub-regional level within the country due to the lack of such essential input data as projections on water flow rates, hydrometeorological events, etc. The further limitation of this assessment was that it was focused on the rural population, while not covering the urban population at all, which however represents more than half of the country. Therefore, further research is recommended in order to cover the remaining, but essential issues, like public health, urban planning, and extreme hydrometeorological events (Draft Vulnerability assessment report, UNDP, November 2010).

Among the preparatory adaptation measures planned, two can be emphasised for the region: improvement of water use efficiency and agricultural crop diversification. Although these goals are emphasised by the scientific and independent expert community, the national programmes of the countries remain to be dominated by the economic interests of increasing productivity of the conventional agriculture, expanding the fields and further industrialization. Representing priorities for the countries, these activities are actually mainly conducted within the international projects, and therefore carry small-scale and mostly demonstrative character. The key international donor for such projects is GEF Small Grants Programme (SGP GEF) operating in Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan. GEF contributed more than US$25 million of co-financing for demonstration projects in Central Asia. The projects within this programme are short-term, small-scale and are there to demonstrate such tools and solutions as drip and moisture charging irrigation, rehabilitation of degraded soils, sustainable grazing methods, diversification of agricultural crops, reforestation, etc.

The effort to unite the sustainable land management (SLM) activities under one umbrella is partially realized through CACILM - Central Asian Countries Initiative for Land Management (2006-2014). It is a partnership between the Central Asian countries and international donor community to combat land degradation and improve rural livelihoods and adapt to climate change in the five countries of the region. Its objective is to restore, maintain and enhance the productive functions of land in Central Asia, leading to improved economic and social well-being of those who depend on these resources while preserving the ecological functions of the land. The major limitation of this initiative is that it does not provide transparent channels for full civil society involvement in its projects development and implementation.

On the level of civil society involvement, trainings for farmers and raising awareness on traditional knowledge in land management, it is important to mention the project of CAREC "Drynet: A Springboard to Promote Resilience in the Drylands" (2007-2013). The project has managed to mobilize and strengthen the civil society networks through national workshops, meetings and trainings. The project have also raised the awareness among the general public on the issues of desertification through newspaper articles, radio programmes and environmental cinema clubs discussions in the Central Asian countries.

To conclude, given the growing evidence of climate change and increasing necessity for adaptation in the sectors of water and agriculture, the countries of Central Asia with the assistance of the international community have recently started to undertake more serious efforts explicitly on this issue. All countries are in the process of developing NAPAs. High economic and political importance of water and agriculture has led to the largest number of projects on these sectors. Among those projects there are good practices that are implicitly and explicitly contributing to adaptation (e.g. IWRM, Water Users Associations (WUAs), sustainable grazing methods, agricultural diversification, etc.). At the same time, due to lack of comprehensive socio-economic climate change impact assessment and clear science-based policy proposals, the adaptation activities are dispersed in length and scope-wise, and the adaptation issues are largely overlooked in the governmental level. Consequently, the effectiveness of the measures undertaken is difficult to assess.

4.2.1.4 List of gaps and conclusions on water and agriculture

The observation of adaptation needs, plans and actions on water and agriculture led to the following conclusions in terms of gaps and opportunities:

- The official climate change documents of Central Asia, the SNCs, provide an insufficient information on practical ways and possible means of adaptation enforcement, especially the economic and financial tools.
- There is an insufficient scientific basis for assessments on potential economic losses from climate change in Central Asia, and national experts emphasising the need for models and mapping tools.
- On the country level the issues of adaptation to climate change are largely overlooked by the national governments, paying more attention to mitigation efforts, e.g. energy efficiency issues.
- It is difficult to evaluate the overall effectiveness of the adaptation projects and programmes that do exist due to the fact that they are dispersed by time, scope and geography.
- More attention is given to preventive adaptation (preventing negative effects and enhancing capacity), at the expense of the preparatory measures (reducing the negative effects on vulnerable sectors).
- Preparatory and response adaptation measures should be further researched and considered by policy makers since the negative effects from climate-induced extreme events are becoming more and more acute.
- There is a low level of integration of water and agriculture adaptation measures into the other national programmes due to the high level of policy sectorization.

- In water and agriculture the areas that receive enough attention either by state or by international support, and on which the good adaptation practices exist, include:
  - IWRM on transboundary rivers – e.g. Ile-Balkhash IWRM plan in Kazakhstan (EC), Zarafshan River Basin (Uzbekistan, UNDP), IWRM in Ferghana valley;
  - Water Resources Development and Rehabilitation – e.g. capacity building for proper operation of irrigation infrastructure, support of agricultural marketing, and enhanced farm management and technologies (Tajikistan, ADB);
  - Multi-country Partnership Frameworks – e.g. IFAS on water management improvement in the Aral Sea basin, e.g. CACILM on land management and combating desertification;
  - Adaptive agricultural farming practices in response to intensified climate aridization – e.g. drip irrigation in Kazakhstan (SGP GEF);
  - Reforestation - e.g planting the forest protection belts to combat dry hot winds and retain snow and moisture (Kazakhstan, SGP GEF);
  - Adaptive pastoral cattle farming – e.g. seasonal pasture rotation and optimized water management in Lepsy (Kazakhstan, SGP GEF); demonstration of sustainable mountain pasture management in the Suusamyr Valley (Kyrgyzstan); and
  - Flood management - e.g community participatory flood management (Tajikistan, ADB).

- The areas for which the action needs to be expanded:
  - Elevating the institutional capacity of the key water and agriculture governing bodies – e.g. there is a need to raise the status of the Committee for Water Resources in Kazakhstan;
  - Developing economic and policy incentives for water efficiency improvement and livelihood diversification;
  - Provide incentives for farmers to switch to alternative crops, more salt-tolerant and less water consuming, and to open new markets for agricultural products;
  - Developing the financial and economic instruments for effective enforcement of the adaptation measures – e.g. Payment for Ecosystem Services (PES) in watershed management;
  - Enhancing the data communication, educational system and trainings on climate change impacts and adaptation options on various levels – e.g. developing a comprehensive water web-portal for Central Asia;
  - Expanding the scientific research in the following issues: surface and groundwater monitoring, monitoring of climate change impacts on water and agriculture, enhancing the tools of climate change vulnerability assessment with the focus on economic impact assessment and natural disaster risks.;
  - Creation of social assistance services in the emergency situations, such as flood, drought, etc.;

  - Further facilitating and enforcing participatory water management mechanisms, e.g. River Basin Councils, Water and Land User Associations; and
  - Enhancing the effectiveness of bilateral transboundary agreements by improving their enforcement mechanisms and strengthening the water quality sections of agreements.
- The countries still have an insufficient capacity in undertaking a profound vulnerability analysis, economic evaluation of possible climate impacts and cost-benefit analysis of adaptation measures both on the national and regional levels;
- The policy makers of the Central Asian countries need to further develop capacity of strategic planning and knowledge of various implementation tools. The findings of UNDP (2009) state that in Central Asia there is a "l*ack of experience in preparation of strategic documents considering particularities of economic growth and the policy on reduction of emissions, connecting different sectors, and analysis of expected activities impact on them, as well as reflecting the issues on climate change, international commitments and potential benefits from reduction."*

4.2.2 Forests and biodiversity

4.2.2.1 Issues for this sector

Central Asia is a vast and diverse region at the confluence of several biogeographic zones, with elements of typical northern European fauna and flora, including the Siberian boreal forests meeting the northern edge of the Himalayan range, including the Tibetan plateau (Pamir mountains). In the Southwest, the region includes the Mediterranean and near eastern highlands, and the western border is formed by the Caspian Sea. Central Asia also includes unique biogeographic zones, including the Central Asian steppes and deserts and the Tien Shan mountains. Central Asia's temperate forest, steppes, and sandy deserts (including riparian tugai forests) have each been identified by the World Wild Fund for Nature (WWF) as Global 200 ecoregions, based on such selection criteria as species richness, levels of endemism, taxonomic uniqueness, unusual evolutionary phenomena and global rarity of major habitat types (Chemonics International, 2001).

There are many principal threats to biodiversity in the region, which include loss or degradation of habitat both through direct conversion or exploitation of natural ecosystems and through indirect effects of changing land-use patterns. In addition to these threats, according to FOEN (2009) climate change is increasingly becoming a factor defining the future conditions of the region's ecosystems and adds to environmental stress on sensitive flora and fauna species. Vegetation succession can be observed at many alpine sites of Central Asia, which were covered by ice until recently. Mountain species experience ecosystems changes. Drought, more arid climate and reduction of water flow in the rivers strongly affect aquatic and tugai floodplain forest ecosystems.

> In a recent study of the effects of global warming on habitat loss and change, as well as reductions in biodiversity due to shrinking habitat patch size, temperate evergreen and mixed forests and boreal coniferous forests were among the ecosystems most at risk. Two thirds of Kyrgyzstan's and

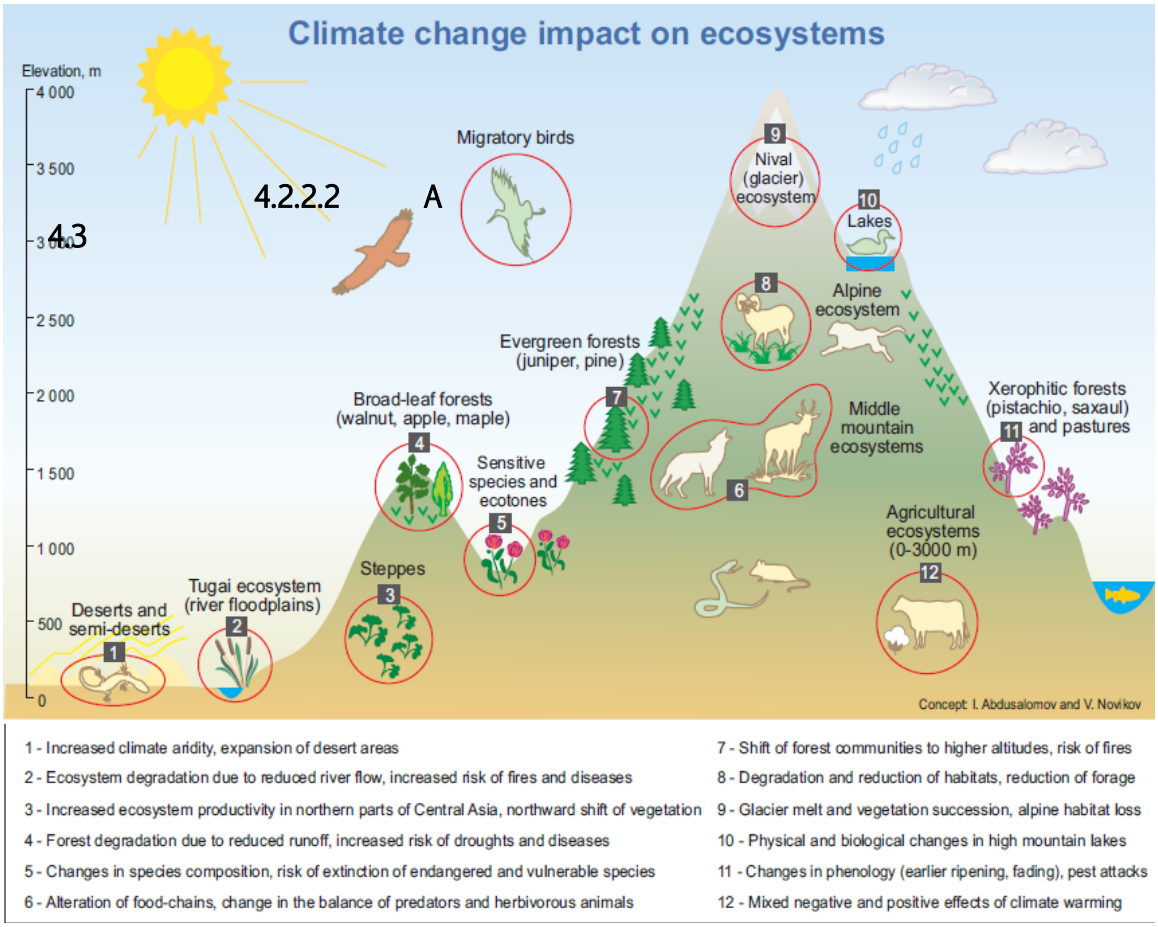
> half of Tajikistan's existing habitats were found to be at risk from global warming, either through outright loss or through change to another habitat type. Many species will be unable to shift their ranges fast enough to keep up with global warming, with rare and isolated populations in fragmented habitats, such as are now found throughout Central Asia particularly at risk. As global climate change research is supported by USAID and others in the region, specific attention to potential effects on ecosystems and biodiversity should be incorporated.
>
> From: Global Warming and Terrestrial Biodiversity Decline: A report for WWF
> Malcolm and Markham, 2000
> Cited in Chemonics International (2001)

In Uzbekistan, for example, the total area of the State Forest Reserve is 19.2% of the national land. The main consequences of climate change on forests in Uzbekistan are: an increase in the fragmentation of arid forest ecosystems, a reduction of juniper populations, the disappearance of Tugai forests, and a reduction of the productivity of desert forests (SNC Uzbekistan).

> The areas annually affected by locust (mainly in southern Central Asia) significantly increased. Pest attacks in southern Tajikistan in 2003-05 halved the cotton harvest in the most hit districts. The risks of forest fires and of spreading forest diseases have amplified. Scientists warn that the southern limits of forest areas in Kazakhstan can experience significant changes due to climate warming.
>
> FOEN (2009:70)

The Figure 10 below visually illustrates the variability and climate change impacts on Central Asian ecosystems, which is also briefly summarized in citations from FOEN (2009).

Figure 10. Climate change impacts on ecosystems in Central Asia



4.2.2.2 Priorities of planned adaptation

The national communications of the Central Asian countries place different degrees of emphasis on adaptation in terms of forestry and biodiversity, depending on the available resources and economic priorities.

In Kazakhstan, adaptation of forestry to climate change can be divided into two directions: to minimize the existing risks related to current climatic conditions for forestry, and to maintain the highest possible contribution of forests in the ecology and economy of the country. Particular attention is paid to the increasing risk of frequent forest fire as a consequence of climate change. Accordingly, the emphasis of the adaptation measures is placed on improving the efficiency of fire fighting. Also, the priority measures address reforestation and afforestation of the dried Aral Sea bed to fix the soil and reduce salt.

In the SNC of Kyrgyzstan, more attention is paid to forests in the context of reducing carbon emissions through forest reservoirs. For example, among the tasks foreseen for the state forestation service is to increase forest cover at the national level to 6% by 2025 - 2030. That means an increase in the forested area by 289,000 hectares compared with 2003. Assuming this goal is achieved, the additional annual carbon captured in the forest pools in 2030 is estimated at 341 Gg CO_2 equivalent.

In Tajikistan, the issue of adaptation in this sector is not paid much attention, though it is noted that one of the most important indicators for forests is their completeness (density). At an average rate of 0.5-0.6 in 1990, the proportion of medium dense plantations was 50%, while in 2007 it decreased to 20-30%. The main anthropomorphic causes of this intense forest reduction are overgrazing, illegal logging and an increase of forest pests. Extreme weather phenomena seriously impact forest planting.

In Uzbekistan, the most important and priority adaptation measures identified in Uzbekistan's forestry sector are: a) Improving forest planning, including legislative initiatives and institutional changes. b) Improving implementation of forest management activities. c) Building human capacity in this area. (SNC Uzbekistan)

According to the assessment carried out under **Turkmenistan's** Second National Communication, biological diversity is one of the most vulnerable sectors to climate change. More than 80% of the country is covered with the world's largest desert – the Karakum, which has no surface water sources. Climate change will exacerbate this situation and lead to a further desertification process. Priority adaptation measures include forestation activities to prevent erosion by long-term vegetation protection, thus promote land conservation and protection of integrated infrastructure and residents. Afforestation has also contributed to absorption of greenhouse gases.

Thus, the priority adaptation measures which have been mentioned for forestry and biodiversity in Central Asia are:

- **Mitigation-related** - Reducing carbon emissions through the forest reservoirs (participation in the mechanisms of Reducing Emissions from Deforestation and Forest Degradation plus (REDD+));
- **Management** - Improving management systems in the field of forestry;
- **Strengthening measures** (both organizational and technical) aimed at improving efficiency of fire and forest pest control;
- **Science** - Applied research on the impacts of climate change on forest vegetation and the forestry sector as a whole;
- **Reforestation and afforestation** on the dried Aral Sea bed, as well as in mountain and desert areas of Turkmenistan;
- **Training**. Strengthening human capacity in the field of forestry; and
- **Awareness and education** - Raising awareness and education of the population in the area of responsibility for the conditions and safety of forest plantation.

4.2.2.3 Activities on the ground

At the national level, the governments of Central Asia have signed many international conventions and agreements, the provisions of which take precedence over national legislation. However, the obligations of these treaties are largely unmet, drawing into questioning abouttheir commitment to the environmental priorities. The countries have developed a number of national environmental action plans, which are intended to be strategic frameworks for policy and investment and which receive multilateral funding for their development. Yet it is not clear how these are going to be implemented, without continued international funding. There is a tendency to develop ever more plans (including

studies, inventories and maps), rather than developing specific on-the-ground initiatives that can move the process forward and demonstrate concrete results (Chemonics International Inc., 2001).

In order to ensure participatory implementation of those demonstrative projects and reduced role of the governments, NGOs can play a critical role as partners and intermediaries with the local governments, communities and community representatives.

According to Chemonics International Inc. (2001), which conducted "Biodiversity Assessment for Central Asia: Regional Overview" with support of USAID, most ***zapovedniks (strictly-protected areas)*** *in the region* are in regular conflict with rayon and oblast governments, or with the local population. Simply re-establishing a national environmental ministry's or committee's jurisdiction over the reserve will not solve the conflict. In order for poaching, logging and grazing to be reduced, local consensus must be built for the existence of the *zapovednik*. In addition to well-developed and locally-implemented environmental curricula in area schools, ministry officials will need to enter into an open dialogue of priorities and concerns with local leaders. Limited recreation, ecotourism partnership and concession, and sustainable harvest of nuts and fruits are simple, and are likely to be mutually beneficial policies that can add to the perceived and actual value of zapovedniks at the local level (Chemonics International Inc, 2001).

There are several internationally-supported projects that directly address the biodiversity issues in Central Asia. The first is the Caspian Environmental Programme, which brings together Kazakhstan, Turkmenistan and other littoral countries in a framework aimed at addressing the **Caspian environmental issues.** A series of regional thematic centres have been set up. That for biodiversity is based in Atyrau, Kazakhstan. Activities so far have mostly been to develop the institutional framework and begin planning exercises. The Central Asia Transboundary Biodiversity project, supported by the World Bank/GEF, aims to protect the threatened ecosystems in the Western Tien Shan mountains, shared by Kazakhstan, Kyrgyzstan, and Uzbekistan. It will also strengthen and coordinate national policies, regulations and institutional arrangements for biodiversity conservation. The UNDP/GEF-supported Integrated Conservation of Priority Globally Important Migratory Bird Wetland Sites project focuses on three demonstration sites in Kazakhstan. Other wetland initiatives include the rehabilitation of Sudoche Lake in Uzbekistan as part of the Integrated Aral Sea programme. USAID should coordinate with these programmes in these areas as there may be significant opportunities to leverage funds and complement ongoing activities (Chemonics International Inc, 2001:).

In terms of specific adaptation measures, a general consensus exists within the governments of Central Asia, that is, **reforestation** efforts are particularly advantageous in the region for numerous reasons. For example, reforestation serves as a barrier to climate-related disasters, such as mudslide and landslide. Reforestation also stabilizes soil, thereby reducing erosion and siltation of dams. Reducing erosion is also beneficial because dust content in the atmosphere (which increases in eroded regions) has the negative effect of increasing snow and glacial melting rates. Additionally, reforestation improves the productivity of the landscape and provides shade for livestock and wood for timber/fuel.

Consequently, reforestation is seen to be a worthwhile climate risk management measure to undertake on a large scale. However, reforestation efforts to date have been undertaken on only a small scale and on an *ad hoc* basis. Additionally, there is little synergy or flow of information between reforestation efforts. The UNDP project on Climate Risk Management will undertake a synthesis of the lessons learned and assist in the development of multi-country and national strategies to guide the future efforts (UNDP project doc, 2010).

In order to integrate the ecosystem protection into the climate change adaptation strategies in addition to the regular reforestation and biodiversity protection measures there is a need for comprehensive analysis of climate change impacts on the Central Asian ecosystems. This kind of research was conducted within WWF project on climate change impacts on ecosystems of the protected natural areas of Russia in 2001.

In addition to scientific assessment, according to the International Union for Conservation of Nature (IUCN), it is important to integrate the ecosystem-based adaptation into the overall adaptation strategy to help people to adapt to the adverse effects of climate change. As one of the possible elements of an overall adaptation strategy, ecosystem-based adaptation uses the sustainable management, conservation and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change. It aims to
maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change (IUCN, 2009).

4.2.2.4 Gaps and recommendations on forests and biodiversity

The conclusions and recommendations for this sector are based on the biodiversity assessment of Chemonics International Inc. (2001):

- Reforestation efforts to date have been undertaken on only a small scale and on an *ad hoc* basis. Additionally, there is little synergy or flow of information between the reforestation efforts.
- Ecosystem-based adaptation activities should be part of a broader portfolio of adaptation measures in Central Asia, thereby using the sustainable management, conservation and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change.
- In addition to the well-developed and locally implemented environmental curricula in area schools, ministry officials need to enter into an open dialogue of priorities and concerns with local leaders. Limited recreation, ecotourism partnerships and concessions and sustainable harvest of nuts and fruits are simple, and are likely to be mutually beneficial policies that can add to the perceived and actual value of zapovedniks at the local level (Sievers et al., 1995, cited in Chemonics International Inc., 2001).
- To ensure greater sustainability and effectiveness of the national strategies and programmes, it is important for the governments to support more incentive-based measures and to develop more on-the-ground initiatives that can demonstrate concrete results (which, in turn, could transfer or reduce the need for government enforcement).

- Support for climate change research in relation to the potential impacts on natural ecosystems and biodiversity distribution and conservation.
- Incorporate fire management concerns as an essential part of the climate risk management strategy.
- Incorporate biodiversity concerns into river basin management and monitoring, including riparian forests, wetlands, and wetland-dependent species, such as bird and fish faunas.
- Incorporate biodiversity into environmental impact policies and legislation, as part of the regulatory framework for investment, e.g. in oil and gas exploration.
- Promote and support partnerships between oil and gas companies, local governments and communities to improve monitoring of ecological conditions and biodiversity in the North Caspian region, including better understanding of the North Caspian ecosystem and collection of baseline data. This activity could be linked to the development of Environmental Impact Assessment (EIA) guidelines for the industry and the region. It should also serve to leverage the efforts of other donors under the Caspian Environmental Programme.

4.2.3 Public health

4.2.3.1 Issues and climate impacts for this sector

FOEN (2009) and UNDP (2010) provide a good summary of climate change's possible impacts on public health in Central Asia, which is used here. The reduced productivity of the agriculture sector as a result of climate variability and climate change is likely to translate into higher rates of malnutrition and increased susceptibility of the population to diseases. Additionally, changing rainfall patterns may result in an increase in frequency of flooding events, thereby exposing people to diseases such as dengue fever and diarrhea diseases. Temperature and heat stress contribute to cardiovascular diseases. Furthermore, extreme weather events are likely to result in post-traumatic stress, increased poverty, compromised nutrition and interrupted livelihoods, with significant consequences for human health. For example, long-term displacement of people and permanent migration due to floods and mudslides is linked to lower living standards and increased vulnerability to diseases.

4.2.3.2 Priorities of planned adaptation

In the Second National Communications, adaptation for health care covers a range of general preventive and preparatory measures. However, no economic and financial measure is suggested, eventhough they are necessary to effectively implement numerous activities, which are summarized below.

Priority adaptation measures in the field of health care in Central Asia are proposed in the SNCs as follows:

- Develop the **National Action Plans (NAPs)** to prevent and reduce the negative impacts of climate change on human health;

- Increase investment in **strengthening the health systems** through the development of infrastructure in vulnerable regions, improving drug supply, expanding the range of free medical services for highly vulnerable populations,
- Expand the **research work** on the problem of assessing the adverse effects of climate change on human health in the region;
- Improve **education and training** for specialists in epidemiological surveillance and public health; and
- Raise **public awareness by** issuing special publications, periodicals and pamphlets on climate change and human health as well as through the media.

4.2.3.3 Activities on the ground

Despite the whole seriousness of the issue, the actual measures needed for the health sector to adapt to the various climate change impacts and scenarios region-wide are currently poorly understood. Consequently, the World Health Organization (WHO), UNDP, German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and USAID have recently started to devote more attention to the climate change impacts on human health.

WHO Europe and BMU in 2008 established a regional project to preserve health from the effects of climate change, covering 4 countries of the Central Asian region - Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan – in addition to the other countries of the WHO European region – Albania, Russian Federation and the former Yugoslav Republic of Macedonia. The major objectives of this project are: a) To develop capacity, assess the risks and develop national or sub-national health adaptation strategies. b) To build institutional capacity on climate change in relation to extreme weather events preparedness and response; infectious disease surveillance and response; respiratory diseases early detection and response; water, food safety and malnutrition. c) To provide intelligence and facilitate the exchange of knowledge and experiences on effective adaptation and mitigation measures (WHO website, 23 March 2011).

In Kyrgyzstan this project supported by WHO has already contributed to the national adaptation planning process through conducting scientific research on the health effects of climate change, with science-based forecasts of possible exacerbation of health problems, including prevention and adaptation measures, and with drafting of a national action plan to prevent the health effects of climate change. In Kazakhstan the project started in November 2010 and is expecting to develop a national climate change health adaptation strategy.

Another international WHO project, along with UNDP, covering seven countries including Uzbekistan started in 2010 and is planned until 2014. Its feature is that its goal in addition to capacity building activities implies pilot adaptation measures in Tashkent and Syrdarya provinces to cope with climate-induced diseases.

USAID is implementing a number of regional projects aimed at public health systems of in Central Asia (2009-2012), however they are focused entirely on health needs of the most vulnerable groups and do not explicitly cover any of climate change adaptation aspects.

4.2.3.4 List of gaps and conclusions on public health

The following general conclusions and recommendations can be made on public health adaptation in Central Asia:

- Public health adaptation plans should be integrated and be essential part of the overall national adaptation plans;
- There is a need to further expand the public health section in the national communications of the region;
- The education and training of specialists of epidemiological surveillance and public health should be further strengthened; and
- Public awareness on climate change impacts on human health should be further raised (through publications, periodicals and mainly mass media).

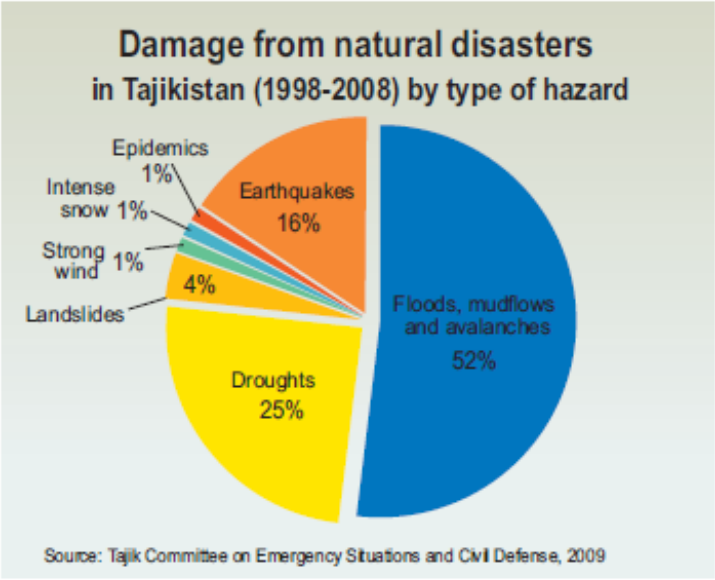
4.2.4 Disasters and extreme events

4.2.4.2 Issues for this sector

Global warming increases the frequency of extreme and hazardous weather events. The countries of Central Asia are prone to earthquake, flood, drought, avalanche and landslide. According to Pollner, J. et al. (World Bank) Draft Report on Disaster Risk Management in Europe and Central Asia (2008), over the past decade, 2,500 people have died and 5.5 million (10% of the total population) were affected by natural disasters in Central Asia.

Tajikistan is one of the most sensitive countries to natural hazards in the region. Extreme poverty (64% of the population lives below the poverty line) and limited emergency management capacity aggravate the magnitude of risk (World Bank, 2005). As the number of days with temperatures equal to or above 40˚C is expected to increase in Tajikistan, this is expected to result in more dust storms. The SNCs of Uzbekistan and Tajikistan particularly emphasise a drought which occurred in 2000-2001, when it impacted lives of 3 million people. According to estimations, it was the most significant natural disaster in the area in the last decade, which inflicted great damage on the economy and the population residing in the area downstream of the Amu Darya River. Due to water shortages and uncontrolled use of water, access to water has been reduced twofold or more in Karakalpakstan, the area already devastated by the Aral Sea catastrophe. The illustration of the distributed damage from the natural disasters in Tajikistan is presented in Figure 11 below.

Figure 11. Damage from natural disasters in Tajikistan (1998-2008) by type of hazard



Source: FOEN (2009)

Similarly, in Turkmenistan more than 80% of the territory is covered with the world's largest desert - Karakum Desert, which has no source of surface water and thus it causes the greatest exposure to drought.

In addition to drought, countries in the region are also extremely vulnerable to increasing risks of landslide and avalanche. The territory of the Kyrgyz Republic, as a mountainous country, is heavily exposed to hazardous processes and phenomena such as landslide, rockfall, mudslide and flood, avalanche, earthquake, flood caused by an increase in ground water level, the outbreak of mountain lakes, thawing of permafrost and other hazards. In the figures, 47% of its country's territory is prone to landslide, and 20% of the population live there (Norwegian Technological Institute cited in Pollner, J., 2008).

Similarly, in Uzbekistan and Kazakhstan, all the rivers within the mountains and foothills are subject to the risk of mudflow. The area with a potential risk of landslide in the territory of Uzbekistan accounts for 12% of the total area and comprises a population of at least 4 million people. Kazakhstan's SNC warns that, by the middle of this century, disastrous mudflows will be formed in each river basin of the Zailisky Alatau range, at an average of one every two years.

The risk of flooding is high in the Ferghana Valley, which Kyrgyzstan shares with Tajikistan and Uzbekistan. In the Ferghana Valley, the majority of the population is poor and lives close to the riverbanks for their agricultural and domestic water needs (Pollner, J., 2008).

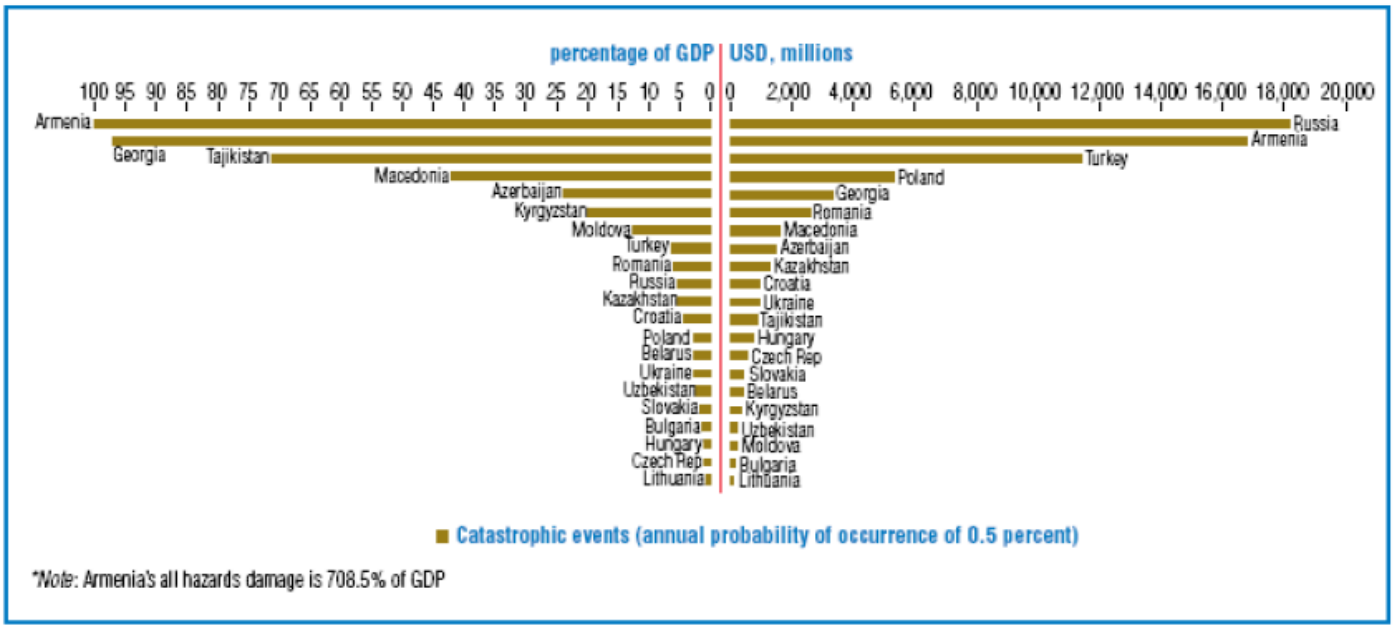
Climate change impact for this sector

The climate change impact on natural disasters and extreme events is very well summarized in Pollner, J. (2008:21):

- Increase in temperature and decrease in mean precipitation will lead to an increase in the frequency and severity of drought and heat wave;
- Severe drought will lead to an increase in forest fire; and
- Greater intensity of wind and rain will cause severe floods and landslides.

The significance of economic impact of climate change is illustrated by the fact that for Europe and Central Asia, over the past 30 years, disasters have caused US$70 billion in economic losses. The Figure 12 below shows the variability of natural disasters impacts on GDPs of Europe and Central Asia (ECA) countries.

Figure 12. Economic loss potential



**The figure does not include drought, forest fire, and industrial accident hazards.*

Source: Pusch (2004), cited in Pollner, J. (2008)

To conclude, the countries of Central Asia are prone to climate-induced extreme events, which may and already have caused significant damages. Economic loss potential in size of GDP and in monetary terms varies from country to country. Tajikistan is the most economically vulnerable country in the region to hazards damages with economic loss potential of more than 70% of GDP, even not taking into account droughts (Figure 12). The differences are there; however, one thing is clear – frequency and severity of natural disasters is projected to increase across the whole region. Thus the effective preparatory adaptation measures are crucial.

4.2.4.3 Priorities of planned adaptation

The national communications of the Central Asian countries as well as the draft national policies and plans, suggest the following adaptation measures to respond to the above-mentioned projected impacts of climate change:

- *Legislative measures* - Defining the rules and regulations necessary to provide the basis for initial spatial planning and engineering activities;
- *Planning and Information* - Spatial planning for all natural emergencies to identify areas of high risk and consequent requirements for the use of these zones;
- *Financial measures* - Expanding the range and quality of insurance services, improving the regulatory framework and improving financial literacy;
- *Science and Information* - Monitoring of climate change and extending terrestrial network of hydrometeorological observation to prevent the threats of landslide, avalanche and mudflow under the conditions of more frequent heavy rainfall and rainfall during the winter months in the foothill regions;
- *Technology and information* - Improving the early-warning system for the public and organizations to minimize human casualties and economic damages;

- *Education, technology and infrastructure* – Providing assistance to the populations in distress due to flood, wild fire, severe frost and heat wave as well as other emergencies associated with climate change;
- *Infrastructure* - Strengthening mudflow protective technical facilities, dams and levees to protect communities from flooding (possible relocation of some small towns); and
- *Awareness and training* in the field of disaster prevention in order to avoid arbitrary decisions. Given the degree of climate change expected, information which is currently unavailable should be directed not only to analysing the existing situation but also possible changes in the future, and strengthening capacity for rapid response is essential.

In addition to these priorities on Climate Risk Management (CRM) described in SNCs, the other major study of ECA countries suggests the following general challenges in climate-induced risk management in relation to capacity:

- The concept of hazard risk management is not fully institutionalized;
- Coordination mechanisms between authorities are not well developed;
- Hazard warning and monitoring systems are required;
- Economic considerations are not fully integrated in investment decisions;
- Catastrophe risk financing tools are not fully utilized;
- Insufficient funding of disaster risk mitigation investments; and
- Information and communication systems require upgrading (Pusch, C. 2004).

4.2.2.3 Actions taken

Disaster response has traditionally been stronger in the countries of the former Soviet Union than disaster risk reduction. Of most importance today is the issue of monitoring, forecasting and early warning of natural and man-made disasters. Unfortunately, preventive measures still do not have the appropriate importance for many countries that still follow response-oriented disaster reduction mechanisms. (ECHO&UN ISDR, 2009)

In order to better address the urgent and vital issues of climate-related disaster risk reduction in the recent years a gradual shift from solely disaster response to investing in disaster risk reduction can be observed (Ibid, 2009). There have been already several major collaborative initiatives undertaken in the region despite certain transboundary issues related to political history and migration. The programmes mainly started from 2003.

In addition, due to its inter-sectoral nature, nature disaster risk management priority was integrated into various regional and national programmes. One example of a significant regional programme is the **Third Aral Sea Basin Programmeme** with the focus on Integrated Water Resources Management. Under Direction 1 of this program natural disaster risk management was identified as one of the key priority areas for the coming years, together with information management, IWRM implementation and safety of dams (IFAS, 2010).

Firstly, it is important to mention the **Central Asia and Caucasus Disaster Risk Management Initiative (CAC DRMI),** established by the Global Facility for Disaster Risk Reduction (GFDRR), the World Bank and the

United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat in collaboration with international partners. This initiative is focused on building the foundation for regional and country-specific investment priorities in the area of early warning, disaster risk reduction and financing (ECHO & UNISDR, 2009). As part of the work of CAC DRMI on coordination for disaster mitigation, preparedness and response, the report based on the analytical desk study *"Risk Assessment for Central Asia and Caucasus"* was produced in 2009 on disaster risks at the country, sub-regional and regional levels in line with the Hyogo Framework for Action (HFA) 2005-2015.

Secondly, another significant initiative on CRM in Central Asia is **Disaster Preparedness Programme funded by the European Commission (DIPECHO),** which started in 2003. The DIPECHO programme constitutes a platform for taking important decisions regarding response to and prevention of natural and man-made disasters, and promotes disaster resilience of the most vulnerable communities living in high-risk areas. According to Thierry Bertouille, ECHO Desk Officer for Central Asia, the 6th Central Asian DIPECHO programme will pay a particular attention to the following topics: coordination mechanisms, advocacy of public-private partnership, cross-cutting issue, integration of climate change into DRR operations and mainstreaming DRR in development actions.

Finally, in 2011 UNDP has initiated **"Central Asian Multi-Country Programme on Climate Risk Management (CA-CRM)"** for the period of 2011-2014. The uniqueness of this project will be that it will focus on enhancing the implementation of the created CRM programmes and recommendations given in the previously published analytical studies. This will be done through strengthening the DRM and adaptive capacity, promoting early action, implementing adaptive measures in the priority sectors and providing foundation for long-term investment.

The expected results of the programme include: a) Strengthened institutional frameworks and technical capacity b) Developed climate-resilient strategies, policies and legislation c) Expanded financing options to meet the national climate change adaptation costs d) Implemented climate change adaptation interventions in priority sectors e) Disseminated knowledge on how to incorporate climate change knowledge and risks into development processes at the national, sub-national and local levels.

There is a strong link between climate-related disaster mitigation efforts and adaptation interventions, and there is a need for a holistic CRM approach. For this reason, there is a potential for synergy between Central Asia's CRM and the existing disaster reduction initiatives in Central Asia. This synergy will, for example, be facilitated by bolting onto the existing Information Management Analysis Centres (IMAC) in Tajikistan in order to prevent duplication of efforts, promote data sharing and build on the foundations that the IMAC has established (Regional Project Document of UNDP, 2010).

4.2.2.4 Gaps and conclusions on disasters and extreme events

The following observations, gaps and conclusions can be made on climate risk management in Central Asia:

- CRM should be considered holistically, linking both the climate-related risk reduction and climate change adaptation intervention efforts;
- CRM in Central Asia should be built on the existing disaster reduction initiatives;

- CRM is aimed to manage vulnerability associated with firstly short-term climate variability and secondly long-term climate change;
- There is a need to develop an early-warning system, by investing in modernizing climate observation systems and weather services;
- Development institutions and credit market are ready to finance losses from climate-induced disasters, provided that appropriate adaptation measures have been taken in advance to minimize what needs to be "insured"; and
- When calculated by the governments budget allocations to cover expected losses are not estimated to be sustainable, therefore a range of financial instruments should be considered – pooled risk approaches, capital market mechanisms, and insurance and credit instruments.

4.2.3 Urban areas

4.2.3.3 Issues for this sector

The SNCs do not provide nearly any information on climate change impacts on urban areas in Central Asia. The recent trend of fast internal migration from rural to urban areas is largely caused by the increasing water stress as a result of reduced rainfall and runoff in addition to economic, social and political pressures. At the same time, still the big proportion of population in the region is living in areas of high risk of climate-induced water stress.

Climate change, environmental degradation and migration issues are tightly linked and are not a new agenda for Central Asia. In 1996, about 100,000 people were displaced due to severe environmental crisis in the Aral Sea region alone (Small, van der Meer and Upshur, 2001). Associated with environmental degradation, Central Asia experienced a multi-year drought beginning in the late 1990s. This, in turn, led to widespread unemployment in Karakalpakstan, a downstream autonomous region in Uzbekistan. It is believed that during the drought period between 1999 and 2001, about 273,000 people (about 20% of the region's total population) migrated to Kazakhstan and to the Russian Federation in search of better economic opportunities (Glantz, 2005, cited in University of Adelaide, 2009).

4.2.3.4 Priorities of planned adaptation

Adaptation planning and improvement of living conditions in the municipal urban sector received virtually no attention in the SNCs. Attention to this sector is mainly paid in the report of Uzbekistan and in the original version of the Concept of Adaptation to Climate Change in Kazakhstan. The key adaptation measures proposed in this sector are:

a) *Management*- Integration methods for solving climate change issues in municipal planning and budgetary policies to ensure the implementation of cost-effective interventions to prevent and minimize damage, including the development of the regulatory framework of urban development in terms of climate change and risk;
b) *Planning* - Development and adaptation of urban planning and architecture to reduce heat load (use of new technologies and materials, urban greening, shading buildings, etc.);
c) **Design** - Improving the design of industrial zones and road communications to reduce urban heat islands;

d) *Education and awareness* - Formation of a new risk-oriented philosophy and motivational environment, culture and public safety; and
e) *Capacity development* -Strengthening local institutions' capacity and provision of training to local authorities in terms of techniques, tools and mechanisms to improve the adaptive capacity of the economy and local communities to climate change.

4.2.3.5 Activities on the ground

No project has been found that are specifically dealing with adaptation to climate change in urban areas of Central Asia. Although there are many governmental programmes on urban development, none of them is taking into account the climate change projections and potential impacts. Considering the current fast trends of internal migration from rural areas to cities in addition to projected increasing severity and quantity of disaster extreme events, the climate change adaptation measures should be integrated into the municipal planning. Moreover, there is a growing need for more empirical research of the complex relationship between environmental degradation, demography and climatic change in the region.

4.2.4 Energy, industry, transport and oil and gas

4.2.4.1 Issues for this sector

Out of the four main energy sources for the region (Figure 12), the one that is going to be highly affected by climate change is hydropower. Tajikistan and Kyrgyzstan, two upstream countries, are relying almost completely on hydropower generation.

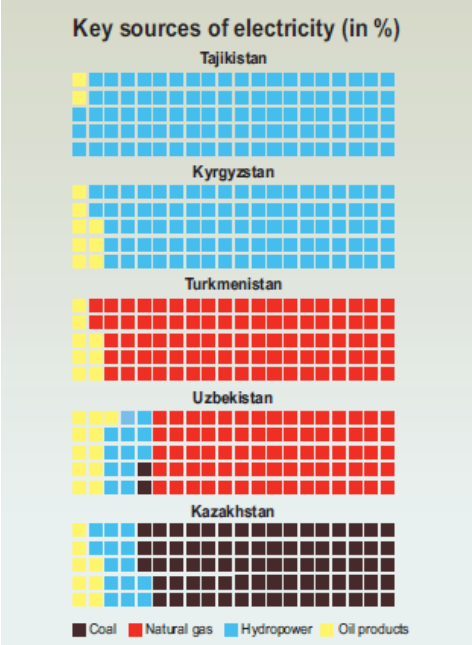


Figure 12. The key sources of electricity in Central Asia. *Source: FOEN (2009)*

According to UNDP (2009) and Biddison (2002) the issue of hydropower generation is part of the 'water-energy nexus', which requires the agreement on the transboundary-level trade-offs. The concern facing downstream countries is that water shortage in upstream countries will cause energy shortages, leading to upstream countries operating the basins of Toktogul and Nurek in full hydropower mode, leaving small amounts of water for downstream irrigation in summer.

The high level of dependence of Kyrgyzstan, the most upstream country of the Syr Darya River, on the energy supply from neighboring countries, is pre-conditioned by the Soviet policies on downstream countries trading energy from hydrocarbon during the winter period for irrigation water during the summer period. At the present time, downstream countries have access to cheaper energy production with fossil fuel, but depend on Kyrgyzstan to release water at the right time to irrigate the fields, mostly for cotton (Granit et al., 2010:20).

4.2.4.2 Priorities of planned adaptation

A few adaptation measures are mentioned in the national reports on energy, industry and transport:

a) ***Legislation*** - Improving the regulatory framework of municipal road construction;
b) ***Infrastructure*** - Improved reliability of the infrastructure sectors (transport and communications, power grids, heating, water mains and gas and oil pipelines);
c) ***Technology and infrastructure*** - Increasing access of the population of small isolated settlements to electricity, taking into account the negative consequences of climate change;
d) Adjustment of hydropower plant operations according to the stream flow change and projected climate impacts;
e) Enhancement of water storage capacity (build new water dams) in Tajikistan;
f) ***Education and capacity building*** - Raising awareness and ability to adapt these sectors, including training of specialists and managers;

g) *Science and Information* - Using updated climatic information when assessing natural linkages of petroleum products and natural gas, and when assessing the cost of fuel standards and lubricants;
h) Assessing the hydropower and the country's other potential energy resources is proposed as a first step of SNC in Kyrgyzstan; and
i) Development of specialized climatic zoning and new approaches to integrate climate factors.

4.2.4.3 Activities on the ground

In the draft Concept Note on Adaptation to Climate Change in Kazakhstan (UNDP, 2010) there were three main recommendations provided for these sectors:

- Strengthening reliability of the infrastructure sectors of the economy (transport and communication, electricity networks, heating and water mains, water pipelines and oil and gas pipelines);
- Improving the regulatory framework of municipal and road construction, increasing the public access to small distant electricity points taking into account the negative climate change consequences; and
- Raising awareness and adaptive capacity of these sectors, including trainings for specialists and heads of industries.

5. Gaps and Conclusion

This overview of the issues, plans and actual projects suggests that adaptation to climate change is crucial for Central Asia; however, it still remains in the initial phase and substantial action is still to be taken. The most important and at the same time the most vulnerable sectors in the region are water and agriculture. Recognizing the gaps between the planned and actually implemented projects is essential in order to be able to effectively plan short- and long-term adaptation measures. The following paragraphs describe the key observations and general gaps in adaptation for all sectors in Central Asia.

The first observation is concerning the **SNCs,** since the overview of the planned adaptation measures was mainly based on these official reports. Although the SNCs provide research-based and structured scientific data on climate change impacts and vulnerability by sector, the proposed adaptation measures lack clear structure and are rather defragmented. As a result, there is a mix of measures variable by type, scope and time span for each sector, which are not very well linked to each other. Moreover, there is often a discrepancy between the stated vulnerability and proposed adaptation activities. This makes it quiet challenging to use the SNCs for the policy planning purpose and specifically for the development of the national adaptation plans.

The second important observation on the SNCs is that despite of the fact that the list of the necessary adaptation measures in Central Asia is quite comprehensive, there is almost no information given on their practical means and steps of implementation. There are no financial and economic tools proposed in the SNCs, which is the most vital question when it comes to adaptation. Complete reliance on a country's state budget does not seem to be realistic given the scope of adaptation measures which is expected to be necessary. Only Kyrgyzstan and Turkmenistan mention the need to introduce economic stimuli for rational water use in their SNCs.

At **the sub-regional level** the multi-country climate change interventions almost do not occur. The activities are rather undertaken in isolation even within a broader context of development at the national level. At the same time, as it was described in the report that the most vulnerable sectors - water and agriculture - are highly dependent on inter-country relations and are conflict-prone. This makes climate change planning even more challenging, especially since the transboundary issues are still very much unresolved. The lack of regional co-operation among policy makers is reflected in the limited communication and dialogues among scientists, e.g. hydrometeorological centres. However, due to the historical commonalities, interdependencies, and integrity of the region's climate zone, transboundary, and interstate consultations and co-operation are necessary.

Moreover, some experts suggest that in the future the whole approach to adaptation planning might need to be reconsidered. All five countries are united by the common river basin and all of them face common threats related to ecosystem services of this basin. At the same time, the adaptation priorities proposed in the SNCs of each country are highly dependent on the economic and political interests, partially due to the fact that they are

based on the data within political boundaries. The ecosystem-based sub-regional adaptation planning might help to avoid such misinterpretations and focus on the common issues to resolve. Therefore, sub-regional environmental management, especially adaptation to climate change, should be mainly based on the ecosystem approach, rather than on solely political boundaries.

Due to the fact that there is no joint sub-regional framework on adaptation in Central Asia, it makes it challenging to assess the effectiveness and impact of all the existing projects and policies implicitly or explicitly related to adaptation. It is noted that currently all these projects are dispersed both geographically and conceptually. Therefore, some of them might be not very effective in terms of covering the areas of the highest risk or in terms of using the opportunity to maximize benefits from adaptation. The attempt to fill in this gap was made by Turkmenistan at the Interstate Sustainable Development Committee meeting in 2008, when the concept and content of the Regional Adaptation Plan for Central Asia was discussed. However, this initiative still did not have any follow up.

Moving on to what is actually happening at **the national level,** there is still no national adaptation plan officially adopted in the Central Asian countries. However, some countries are ahead of others in the process of developing these plans. In Kazakhstan the National concept on adaptation to climate change was developed within the UNDP project on adaptation and mitigation capacity development and submitted to the Ministry of Environment in December 2010 for further revision and adoption in the nearest future. In the other four countries the NAPAs are still being developed by the responsible ministries of environment with the major work done by the expert teams based in national hydrometeorological service organizations.

Moreover, the adaptation programmes and projects that do exist on the national level are not clearly linked to the existing sustainable development and sectoral policies. Those policies lack climate change components. This might be attributed to the limited coordinating role of the responsible ministries (such as Ministry of Environmental Protection in Kazakhstan) in improving co-operation between competent ministries to ensure adequate integration of climate change issues in the sectoral policies and strategies. This lack of coordination between state agencies is supported by the findings of the UNECE study (2008) which after assessing performance of the country in environmental management highlighted that "*intersectoral coordination and integration of the environment into areas such as energy, transport and agriculture are not sufficient*".

In order to better link the various sectoral policies and climate change adaptation in order to be considered as an important development issue, the countries of Central Asia being part of the Asia-Pacific region have already placed Green Growth as their priority objective and the Six Ministerial Conference on Environment and Development, Astana-2010, aims to develop the Regional Implementation Plan for Sustainable Development 2011-2015, specifying regional priorities, mapping out the way forward and launching specific thematic and programmatic initiatives, such as Zhasyl Damu: Green Development in Kazakhstan. However, eventually, this programme has acquired the status of being a sectoral programme of the Ministry of Environmental Protection of Kazakhstan.

On **the practical enforcement level**, the projects that explicitly target adaptation, such as SGP GEF projects, are designed to focus on local communities and carry only demonstration character, which represents a positive aspect in terms of generating ground-based knowledge and sharing practical experience. At the same time however, the limitation of such approach is that these projects are spread out across vast territories and do not rely on a solid scientific assessment of climate change vulnerability.

The main cause of this dispersion of projects is that there is no economic assessment of climate change losses, meaning there is no data (in the form of map or simple statistic), to determine where the economically most vulnerable areas are, and where the focus of investment should be. The lack of assessments of climate change risks and losses in economic terms creates difficulties in financial planning of adaptation policies and plans. There is also a need for exchange of such assessments and models at the regional level.

Another reason for projects' dispersion is the limited coordination of donor efforts in Central Asia. The recently created Asia-Pacific Adaptation Network under the Regional Resource Centre for Asia-Pacific of UNEP could potentially fulfill this role of providing a platform for knowledge sharing and expert recommendations on priorities of adaptation investments. The other sub-regional projects such as a just-started project of UNDP on Climate Risk Management in Central Asia, aims to address this barrier by establishing a Multi-Country Climate Network of experts to improve coordination and effective information exchange.

Regarding the **data availability and sharing,** there are several important gaps that need to be urgently resolved. First, some adaptation issues are almost or completely overlooked in the national communications. This is possibly due to the limited amount of research on them and possibly low capacity of local scientific centres. Examples of such issues are biodiversity, adaptation in cities and the issues of public health adaptation.

Second, it can be observed that current national communications are mostly focused on preventive adaptation (e.g planning, management andcapacity building), which are of course crucial to be able to effectively plan and mainstream the adaptation actions. There is a growing need, however, of incorporating more preparatory measures to be able to adequately respond to the projected extreme events, such as drought and flood. In the last twenty years the climate and environmental monitoring systems in the Central Asian countries have deteriorated. The World Bank estimated that each US dollar invested in modernizing the climate observation systems and weather services in Central Asia may yield US$2-3.5 (200-350%) in economic benefits by avoiding damages from natural disasters and safer operation of businesses.

Finally, current adaptation to climate change in Central Asia is adaptation within scientific uncertainty, high level of isolation and low level of policy-science dialogue. This is aggravated by the little incentive to share data across institutions and leads to the insufficient level of awareness on the side of decision makers of all available support tools and adaptation planning methods.

6. Recommendations

The findings of this report suggest that there are certain discrepancies between the proposed actions and the measures being actually undertaken for climate change adaptation in the Central Asian countries. Furthermore, there is some evidence that in some cases even the stated commitments do not completely meet the scope of the needed measures reflected in the official documents, such as the countries` National Communication reports under the UNFCCC. In this connection, recommendations given below are addressing the identified research and policy gaps between the needed and proposed measures, and offering solutions for the gaps between the proposed and actual measures.

Eliminating the gaps between the needed and proposed measures

With regard to the research gaps between the needed and proposed measures, there is a need for a robust socio-economic impact assessment, which would provide a necessary basis for development of adaptation policy and investment planning. For the later objectives it is very important that outputs of such assessment are properly communicated to the policy makers through establishing continuous science-policy dialogues at the national and sub-regional levels;

> One of the essential elements in narrowing the gaps between the available knowledge and concrete decision making is creation of mutual understanding. Scientists need to share knowledge between different areas (e.g. hydrology and climatology). They also need to connect to the problems that decision makers are facing. They should, for instance, not try to explain what the models they use are capable of doing but rather explain why their predictions give a range of possible futures. Decision makers on the other hand should try to connect to the limitations of science. They should, for instance, not expect an unequivocal answer but rather be satisfied with a limited range of possibilities. A one-time meeting between scientists and decision-makers will not achieve mutual understanding – it will require intensive co-operation.
>
> Timmerman & Bernardini, 2010

To facilitate needed research, it is necessary to strengthen the capacity in climate impact modeling of local scientific institutions, working in such sectors as water, agriculture and disaster management. In doing so, more incentives should be established for greater climate change data sharing among institutions and/or ministries, both on the national and regional levels. These activities should be coupled with raising awareness of society in

general, and policy makers in particular, on climate change vulnerability and adaptation, while output of any relevant research should be tailored to the needs of decision makers;[3]

On the policy-making level it is necessary to make sure that relevant national and sectoral development plans are elaborated in the participatory and transparent and science-based process, providing a clear vision of adaptation options, priorities and feasible tools of their enforcement and taking into account the transboundary context.

Eliminating the gap between the proposed and actual measures

To assure implementation of the proposed strategies it is important for the central governments to consider adaptation to climate change not as purely "environmental problem", but as one of the core development- related problems. Better integration of climate change adaptation into the states' agenda could be facilitated by emphasising on 'no regret' approach at the initial stages, i.e. undertaking policies and actions that generate net social benefits, while helping people withstand today's climate shocks and become prepared for future climate changes;

The national and sub-regional adaptation planning should be based not solely on the political boundaries and economic interests, but also on the ecosystem approach to climate change adaptation - a strategy for maintaining and enhancing ecological goods and services, which may become increasingly important to society in the face of climate change.

The effectiveness of adaptation measures can be enhanced through better project coordination and regular evaluation. The international donor adaptation efforts should be coordinated to be more effective and APAN could play this essential intermediary role. The regular evaluation of the effectiveness of the implemented adaptation measures within governmental and international activities is the last, but not the least, step in the adaptation cycle before engaging the stakeholders for new actions (Figure 7).

When undertaking the financial planning for the adaptation strategies the availability of Adaptation Fund should be considered, which was created to finance concrete adaptation projects and programmes in developing country Parties to the Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change. However, to avoid complete reliance on central budgets and international assistance, a greater number of adaptation economic and financial tools needs to be researched and utilized.

In terms of actual adaptation options, more attention should be given to the preparatory adaptation measures, including the capacity building to respond to the inevitable climate change impacts (drought, water shortage, flood, etc), knowledge and information exchange, environmental education at various levels, multi-stakeholder dialogues, advancement in early-warning systems as well as promoting economic and market-based management tools and incentives.

[3] One good example of good presentation of scientific information to policy makers is FOEN (2009) report "Climate change in Central Asia: A visual synthesis".

This report suggests continuing developing and expanding the existing good adaptation practices in the following fields:

- Elevating institutional capacity of the key decision-making bodies and mainstreaming adaptation into the sustainable development policies
- Co-operative and participatory integrated decision-making processes
- Integrated resource management (e.g. IWRM)
- Water efficiency and agricultural crop diversification
- "Green growth" (B2 SRES scenario) as a central approach to climate change adaptation
- Strengthening scientific capacity in immediate and long-term climate projections
- Range of financial instruments on climate risk management, such as insurance and credit instruments
- Innovative economic incentives for ecosystem services and practices improvement
- Creating conditions for private sector involvement
- Creating emergency assistance service in extreme situations
- Data sharing and multi-country partnership frameworks
- Environmental education options and incentives to strengthen the human capacity
- Continuous awareness raising on climate change among a wide range of stakeholders

In Central Asia it is clear that the priority adaptation sectors are water, agriculture and disaster risk management. Over the last few years there has been a significant progress made on adaptation – vulnerability areas identified, adaptation measures proposed, concepts of national adaptation plans drafted, a certain pool of "good" adaptation practices formed. However, this report proposes to focus on the further activities on: 1) Omproving the quality of thrproposed measures (eliminating the gaps between needed and proposed measures) 2) Enhancing the adaptation enforcement (eliminating the gaps between proposed and activities on the ground). In addition to water and agriculture, the sectors that require further research and policy action are public health, forests and biodiversity.

References

ABD, (2005). *Improving institutional capacity of Committee for water resources in the Republic of Kazakhstan*. (TA № 4484 KAZ) Almaty, Kazakhstan

ADB, (2008). *Land degradation in Central Asia. Revised Draft Final Report.* Central Asian Countries Initiative for Land Management Multi-country Partnership Framework Support Project.

Biddison, J.M. (2002). *The Study on Water and Energy Nexus in Central Asia*. Asian Development Bank.

Cai, X., McKinney, D., Rosegrant, M. W. (2001) Sustainability analysis for irrigation water management: Concepts, methodology, and application to the Aral Sea region, EPTD Discussion Paper, 86, Washington, D.C.

CAREC, (2009). *Analysis of opportunities for activities of CAREC in climate change and energy efficiency in Central Asia*

CAREC, (2010). *State policies and climate change mitigation planning in Kazakhstan.* Submitted to US. Agency for International Development, Mission for Central Asian Republic.

Chemonics International Inc, (2001). *Biodiversity Assessment for Central Asia: Regional Overview,* prepared for USAID, 118-CentralAsiaRegion-PNACN336_2001.pdf

European Commission – Humanitarian Aid Office, (2004). *Commission funds disaster preparedness actions in Central Asia worth EUR 2.5 million.*

European Commission Humanitarian Aid department (ECHO) and UN International Strategy for Disaster Reduction (ISDR), (2009). *Disaster Risk Disaster Risk Reduction in Central Asia*, Newsletter, October - December

FOEN, (2009). *Climate change in Central Asia. A visual synthesis.* http://www.preventionweb.net/files/12033_CCCAdec2009.pdf

Granit, J., Jogerskog, A., Lufgren, R., Bullock, A. de Gooijer, G. & Lindstrum A. (2010). *Regional Water Intelligence Report Central Asia.* Baseline Report. UNDP, SIWI and Water Governance Facility, Stockholm

Ibatullin, S., Yasinsky, V. & Mironenkov, (2009). *The impact of climate change on water resources in Central Asia.* Eurasian Development Bank. http://www.eabr.org/media/img/eng/research-and-publications/AnalyticalReports/%E2%84%966_2009_The%20impact%20of%20climate%20change%20on%20water%20resources%20in%20Central%20Asia.pdf

Intergovernmental Panel on Climate Change, (1997). *IPCC special report. The regional impacts of climate change: An assessment of vulnerability. Summary for policymakers.*

International Fund for Aral Sea, (2010). Website information http://www.ec-ifas.org/aral_basin/iuvr/

IPCC, (2001). Climate change 2001: impacts, adaptation, and vulnerability. http://www.ipcc.ch/pub/wg2SPMfinal.pdf

IPCC, (2007). Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

IUCN, (2009). *Ecosystem-based Adaptation.* Position paper at UNFCCC Climate Change Talks, Bangkok, Thailand, 28 September – 9 October. http://cmsdata.iucn.org/downloads/iucn_eba_policy_briefing___march_27_1.pdf

Jalling, L. (2003). Environmental issues in Central Asia. A source of hope or despair? Central Asia: Aspects of transition. New York and London: RoutledgeCurzon

Kazakhstan's Second National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change, (2009), http://unfccc.int/resource/docs/natc/kaznc2e.pdf

Kokorin, A., Kurayev, S. et al. (2009). *Economics of climate change.* Review of Stern N. report.

Kyrgyzstan: Second National Communication on climate change to the United Nations framework Convention on Climate Change, (2009), http://unfccc.int/resource/docs/natc/kyrnc2e.pdf

Mickin, P.P. (2000). Managing water in Central Asia. Central Asian and Caucasian prospects. Great Britain: Chameleon press.

NGI (2004). Landslide Hazard Map, Norvegian Geotechnical Institute (personal communication, 2008) cited in Pollner, J. et al. (2008)

Nimah, M.N., Moukarzel, S.N., Darwish, M.R., Farajalla, N., & Bashour, I. (2006). Water productivity: a basic tool for sustainable irrigation. In G. Lorenzini (Ed.) Sustainable irrigation management, technologies and policies (pp. 127-136) Southampton, Boston: WIT Press

Organization for Economic Co-operation and Development (OECD). (2006). *Financing water and environment infrastructure. The case of Eastern Europe, the Caucasus and Central Asia,* 75006 Paris, France

Oxfam, (2010). *Reaching Tipping Point? Climate change and poverty in Tajikistan*, http://www.oxfam.org/sites/www.oxfam.org/files/tipping-point-climate-poverty-tajikistan.pdf

Perelet, R. (2007). *Central Asia: Background Paper on Climate Change*, Human Development Report 2007/2008 Fighting climate change: Human solidarity in a divided world, Occasional paper

Pollner, J. et al. (2008) *Climate change adaptation in ECA. Draft report on disaster risk management.* http://siteresources.worldbank.org/ECAEXT/Resources/258598-1243892418318/DRM_and_Climate_Change.pdf

Pollner, J. Kryspin-Watson, J. & Nieuwejaar, S. (2008). *Climate Change Adaptation in Europe and Central Asia: Disaster Risk Management,* World Bank Europe and Central Asia Region. http://siteresources.worldbank.org/ECAEXT/Resources/258598-1243892418318/DRM_and_Climate_Change.pdf

Pusch, C. (2004). Preventable Losses, Saving Lives and Property through Hazard Risk Assessment, A Comprehensive Risk Management Framework for Central Europe and Central Asia, Disaster Risk Management Working paper series 9, The World Bank, cited in Pollner, J. et al. (2008)

Rakhimov, S. (2009). Impacts of climate change on water resources in Central Asia, *Water Resources Management in Central Asia: Regional and international issues at stake,* Documentos CIDOB, Asia 25. www.cidob.org/en/content/download/22811/254352/file/doc_**asia**_25.pdf

Shiklomanov A. 2009. Hydrological change in the mountainous and downstream regions of Central Asia. Proceedings of the International Workshop on the Northern Eurasia High Mountain Ecosystems, Bishkek, Kyrgyzstan, September 8-15, 2009. Available at: http://www.neespi.org/meetings/Bishkek_2009.htm

Simpson, M.C., Gössling, S., Scott, D., Hall, C.M. and Gladin, E. (2008) *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices.* UNEP, University of Oxford, UNWTO, WMO: Paris, France.

Tajikistan: Second National Communication on climate change under the United National Framework Convention on Climate Change, (2008), http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=TJK/COM/4%20E#beg

Timmerman, J. & Bernardini, (2010). *Perspectives on water and climate change adaptation: Adapting to climate change in transboundary water management.* Co-operative Programme on Water and Climate (CPWC), the International Water Association (IWA), IUCN and the World Water Council. *http://www.worldwatercouncil.org/fileadmin/wwc/Library/Publications_and_reports/Climate_Change/PersPap_06._Transboundary_Water_Management.pdf*

Turkmenistan: Initial National Communication on the United National Framework Convention on Climate Change (2006), http://unfccc.int/resource/docs/natc/tkmnc1.pdf

Turkmenistan: Second National Communication on the United Nations Framework Convention on Climate Change, (2010), http://unfccc.int/resource/docs/natc/tkmnc2.pdf

UNDP (2010) Draft Vulnerability assessment report in Kazakhstan. Submitted to the government of Kazakhstan in November 2010.

UNDP, (2009). *Central Asia Regional Risk Assessment: Responding to Water, Energy and Food Insecurity.* http://www.un.org.kg/en/publications/article/publications/un-agencies/50-united-nations-development-programme-in-kyrgyzstan/3240-central-asia-regional-risk-assessment-responding-to-water-energy-and-food-insecurity

UNDP, (2009). *Strengthening the capacity in the field of sustainable development through integration of climate change issues into strategic planning in the Republic of*

Kazakhstan. UNDP Project document, Proposal/Award ID: 00047016, http://www.climate-action.kz/uploads/files/Project_doc_in_Eng1.pdf

UNDP, (2010) Central Asian Multi-Country Programme on Climate Risk Management (CA-CRM), Regional Project Document.

UNECE (2009) *Guidance on water and adaptation to climate change.* United Nations Publications. http://www.unece.org/env/documents/2009/Wat/mp_wat/ECE_MP.WAT_30_E.pdf

UNFCCC. Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries, http://unfccc.int/resource/docs/publications/impacts.pdf

UNISDR & World Bank, (2009) *Risk Assessment for Central Asia and Caucasus. Desk study review.* http://www.preventionweb.net/files/11641_CentralAsiaCaucasusDRManagementInit.pdf

United Nations Development Program (UNDP), (2004). Water Resources in Kazakhstan in the New Millennium, UNDPKAZ 07, Almaty, Kazakhstan, viewed 25 October, 2006, http://www.undp.kz/library_of_publications/files/2496-19223.pdf

University of Adelaide, et al. (2009). *Climate Change and Migration in Asia and the Pacific, Executive Summary,* Asian Development Bank, Philippines. www.preventionweb.net/.../11673_ClimateChangeMigration.pdf

Uzbekistan: Second National Communication on climate change under the United Nations Framework Convention on Climate Change, (2008), http://unfccc.int/resource/docs/natc/uzbnc2e.pdf

World Bank, (2005). *Report No: 30853-TJ-Republic of Tajikistan Poverty Assessment Update.*

World Bank, (2009). *Adapting to Climate Change in Europe and Central Asia.* http://www.worldbank.org/eca/climate/ECA_CCA_Full_Report.pdf

World Health Organization, taken from http://www.euro.who.int/ on 23rd of March 2011.

Zimina, L. (2002). Developing water management in South Kazakhstan Water Management in the Southern Caucasus and Central Asia, viewed 20 November, 2006, www.transcend.org/t_database/pdfarticles/182.pdf

Annexes

Annex 1. Planned strategies and measures to adapt to climate change by sector in Central Asia

Table 1.1 Planned adaptation measures to climate change on water resources and agriculture in Central Asia

TYPE OF MEASURE	Prevention	PREPARATION	RESPONSE
POLITICS, INSTITUTIONS, GOVERNANCE	- Development agreements on transboundary water management and co-operation in water resource management (KZ, UZ); - Improving management of surface runoff (KG); - Establishment of IWRM at the national and transboundary levels (KZ); - Harmonizatione standards on transboundary water level (KZ); and - Agreements on co-operation for water quality management (TJ). -Link the policy of preservation and protection of ecosystems and agro-biodiversity policy with the climate change adaptation (KZ); - Improve public and social programmes for development of agriculture and rural areas; and -Grassland restoration management (KZ); Legal recognition of pasture users (KZ); Providinge each individual farmer or rural -community with several types of grazing land for seasonal use (KZ); and -introductioneof a regulated system of grazing animals (KZ).	- Review of operating modes of GPS (KZ); and - Prioritization of e economic activity in accordance with water availability (KZ); and - Load regulation in terms of livestock grazing on pastures in different grazing seasons to reduce the load of livestock grazing on pasture near settlements and heavily-degraded pastures (KZ).	- Organization of an effective veterinary and sanitary inspection, quarantine regulations and other measures to control livestock infectious diseases (KZ); and - Providing conditions for fertilization, lambing, shearing animals, sanitary control, migration to summer pastures, as well as storage of additional forage due to increasing instability of the climatic conditions (KZ).

TYPE OF MEASURE	Prevention	PREPARATION	RESPONSE
TECHNOLOGY, METHODOLOGY' PRACTICE	- Use of drains (KZ, TM); - introducemodern, efficient water distribution systems to minimize losses (KG); - Chemical and biological wastewater treatment (KZ); - Creation ofe buffer zones near surface water sources (KZ); a - Prevention of soil erosion and introduction of soil conservation technologies to minimize the human impact (KZ); - Improve land use to prevent land degradation, conservation of agricultural land with good parameters of humidity and soil fertility (KZ); and - Creation ofe zones for grazing cattles by a combination of natural grassland and areas especially planted with annual forage crops (KZ).	- Diversification of crop production, including valuable crops (KZ); - Replacing water-intensive crops with less water-consuming crops (CA); - Introduction of water-saving technologies in irrigated agriculture (CA); and - Introduction of water-saving technologies and water-recycling systems in industrial enterprises and social facilities (KZ).	- Revision of species of sheep in relation to climate change; - Restoration of of pasture system for sheep - Wider use of mountain pastures; and - Improvingetop soil for growing vegetation in degraded pastures, andplanting Haloxylon on arid and semiarid grasslands (KZ).
TECHNIQUE, INFRASTRUCTURE	- Rehabilitation ofe irrigation systems to minimize water loss (CA); - Improvinge the efficiency of on-farm and inter-farm canals (TJ); - Construction of the ROW in artificial ponds (KG); - Construction of reservoirs of long-term regulation (TM); and - construction of new dams to control the water flow impact on the environment (TJ).	- Use of water-saving irrigation systems such as sprinklers, drip irrigation, etc. (CA); - Providinge emergency services with necessary equipment to ensure their immediate response (KZ); and - Dredging and reconstruction of berths and piers on navigable rivers (KZ).	Rehabilitation ofe wells and installation of pumps from independent power sources for grazing purpose (KZ)

TYPE OF MEASURE	Prevention	PREPARATION	RESPONSE
ECONOMICS & FINANCE	- Economic incentives for water users to make effective use of water (KG, TM)	- Allocation ofe finance and infrastructure development as compensation for resettlement of people from unfavorable areas (KZ); and - Prioritization ofe economic activity in accordance with water availability (KZ).	Importof foodstuffs and industrial goods of which production is domestically unprofitable due to lack of water resources (KZ)
SCIENCE, INFORMATION	- Expanding the network of systematic observation and environmental monitoring (CA); - Mandatory environmental impact assessments of new projects on water resources (KZ); - Improve timeliness and reliability of hydrological forecasts (KZ); - Development ofe schemes of water resources (KZ); - Creation ofe observation posts for monitoring snow and ice in mountain areas in the upstream area of the Aral Sea basin (UZ); - Selection and breeding of highly-productive and drought-resistant crops (KZ, TM); - Science-based agricultural development - its mechanization and irrigation chemization (KZ); - - *** - develop of new moisture-saving agricultural technologies by modeling changes (shifts) in the distribution of precipitation (KZ).	- Weather forecasting, climate modeling system and early warning (CA); and - Study of the level of adaptability of sheep and identification of stress-resistant sheep for each climate zone (KZ).	

TYPE OF MEASURE	Prevention	PREPARATION	RESPONSE
EDUCATION CAPACITY DEVELOPMENT	- Capacity building to strengthen the institutional, technical and human resources (CA); and - Improvement of knowledge on timely adaptation to climate change and access to this knowledge for end-users (CA).	- Farmer training to new and effective methods of agriculture (KZ); and - Raising awareness of farmers on the weather conditions through the media, introduction of scientific approach in the management of livestock (KZ).	

Note:
KZ - The Republic of Kazakhstan
UZ – The Republic of Uzbekistan
KG - Kyrgyz Republic
TM - Turkmenistan
TJ - The Republic of Tajikistan
CA - All countries of Central Asia

Table 1.2 Strategies and measures to adapt to climate change in forestry and biodiversity in Central Asia

TYPES OF MEASURES	PREVENTION	PREPARATION	RESPONSE
POLITICS, INSTITUTIONS, GOVERNANCE	–Maintaining and expanding the network of protected areas and areas to reduce risks and increase the carbon potential (TJ, KZ); and –Development of cross-border ecological corridors and co-operation with neighboring Central Asian countries (TJ).	– Improving the legal and regulatory basis for forest conservation and reforestation, including updating of legislation based on new knowledge on vulnerability of forests to climate change (KZ, UZ); – Strengthening water protection, soil conservation, and spa and raw materials in the forestry sector (KZ); and – Accounting for the effects of climate change on forestry in the sectoral strategies and targeted programmes (KZ).	
TECHNOLOGY, METHODOLOGY, PRACTICE	Afforestration of the dried Aral Sea bed to fix the soil and reduce the amount of salt removal (KZ)	– Development of biological plant protection in agriculture (TJ); and – Further increasing percentage of forest land within forest-steppe and mountain zones.	Development of adaptive approaches in fisheries management(TJ)

TYPES OF MEASURES	PREVENTION	PREPARATION	RESPONSE
TECHNIQUE INFRASTRUCTURE		- Providing emergency services with necessary equipments to ensure their immediate response (KZ); and – Strengthening the measures (both organizational and technical) aimed at improving the efficiency of fire and forest pests control (KZ).	
ECONOMICS	– Justify the share of budget funding for provision of forestry in the current and future climatic conditions (KZ); and – Introduction of economic mechanisms for nature and environmental protection (UZ).		Organization of monitoring in terms of types of climate change indicators (UZ)
SCIENCE, INFORMATION	– Implementation of a number of applied research on the impact of climate change on forest vegetation and the forestry sector as a whole (KZ); – Conducting research on the impact of climate change on forests and forest vegetation (TJ); and – Awareness raising and information dissemination among the population (TJ).	– Conducting screening and selection of tree species and species with regard to the influence of climate change and opportunities to meet the raw material needs of the population (KZ)	

TYPES OF MEASURES	PREVENTION	PREPARATION	RESPONSE
EDUCATION DEVELOPMENT POTENTIAL	– Raising public awareness about the vulnerability of forests and implications for forest conservation-dependent economic activities and population groups (KZ); – Educating the local population with a sense of responsibility for the conditions and safety of the forest population (KZ, TJ); and – Training courses and seminars for the public secondary schools and higher educational institutions (TJ).	– Involving the people in the development and implementation of particular adaptation activities in forest ecosystems (KZ); and – Preparation of training materials and training courses for the forest institution workers and make changes and additions to the curricula of educational institutions that train personnel for the forestation sector (KZ).	

EDUCATION DEVELOPMENT POTENTIAL	– Improving education and training of specialists of epidemiological surveillance and public health (KG); and Develop research capacity in the aspect of exposure effects of climate change on human health (CA).	– Raising awareness about prevention methods and developing systems for identifying diseases in the earliest stages (KZ); – Raising awareness of health professionals about the features of pregnancy and labour in a hot climate (TJ); and Developing a heat warning system, including the instruction for medical staff (UZ).	– Raising public awareness through the issues of special publications, periodicals andbrochures on climate change and human health as well as through the media (KG); Raising public awareness of the increased risks of diseases (UZ).

Table 1.3 Strategies and measures to adapt to climate change in public health in Central Asia

TYPES OF MEASURES	PREVENTION	PREPARATION	RESPONSE
POLITICS, INSTITUTIONS, GOVERNANCE	– Identification of the major health risks from climate change in urban and rural areas (KZ); and – Develop national action plans to prevent and reduce the negative impacts of climate change on human health (KG).	Not specified	Not specified
TECHNOLOGY, METHODOLOGY, PRACTICE	– Development of measures to reduce the risks to health of the urban population with income below the subsistence level, and separately for health of the rural population which lacks potable water of acceptable quality (KZ); – Provision of safe drinking water (UZ); – Organization of prevention (UZ); and – provision of potable water in sufficient quantity (UZ).	– Introduction of new and improvement of existing technologies that aim at clean water, maintaining thermal comfort in buildings and reducing urban heat islands (UZ); – Development of an action plan on heat waves, including instructions for medical staff (UZ); and – Control ofinfections invector populations and pockets of particularly dangerous infections (UZ).	Not specified

TYPES OF MEASURES	PREVENTION	PREPARATION	RESPONSE
TECHNIQUE INFRASTRUCTURE	– Considering establishing a specialized centre for qualified control over the physical conditions of mothers and children under climate change (TJ)	– Strengthening the health systems through increased investment in their infrastructure in vulnerable regions, improving medical drug supply and expanding the range of free medical services of highly vulnerable populations; – Omproving logistics of sanepidemiological stations (UZ); and – Improving monitoring and protection of the drinking water sources (UZ).	Not specified
ECONOMICS &FINANCE	Not specified	Not specified	Not specified

SCIENCE, INFORMATION	– Developing a plan of scientific research in the field of climate change impacts on human health, and developing science-based prediction of possible deterioration of health in terms of climate change (KG); – Assessing the impact of CC on the ecology of infectious and parasitic diseases, including malaria, encephalitis, hemorrhagic fevers, parasites and other infections (KG); and – Assessing the impact of climate change on the features of the epidemic process and of the infectious and parasitic diseases, including the causes of the infectious diseases (KG).	– Expansion of the research work on the problem of assessing the adverse effects of climate change on human health (KG); – Complementing the research programmes with the subssection "climate and health" (UZ); and – Regular preparation of the national reports to assess the impacts of climate change on human health (KG); – Define settlements of the country, and identifying the most pronounced changes in climate and related risks to public health (KG).	Not specified

Annex 2. Inventory of adaptation projects and programmes in Central Asia

I. Central Asia

1) Water resources and agriculture

Countries: Kazakhstan, Kyrgyzstan
Title of the project/practice: «Development of Ili-Balkhash Basin Integrated Management Plan»

Type of action on adaptation to climate change :
Technological
Technical and infrastructural
Educational and Awareness-raising

Project goal and objectives:

- To create the system of integrated water resources management;
- To preserve the unique ecosystem; and
- To acquire rational wildlife management skills.

Project tasks:

- To assess the current state of Ili-Balkhash basin (IBB) ecosystems and the impact on the economy sectors;
- To develop the IBB Integrated Management Plan on the basis of the plans of the Government of Kazakhstan, spatial development plans, and sector projects and programmes;
- To compile a portfolio for submission to the Government on creation of IBB Development Board.
- To develop an interstate agreement between Kazakhstan, China and Kyrgyzstan on transboundary rivers management; and
- To develop mechanisms of introducing the IBB Integrated Management Plan.

Project implementation organization: Regional Environmental Centre for Central Asia (CAREC)
Partner organizations: Ministry of Economic Affairs and Budget Planning, Ministry of Environment Protection, Committee for Water Resources, Regional (municipal) authorities
Donors: European Commission

Duration of the project:
July 2005 – January 2007

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed

Activities and outcomes of the project:

- The model of IBB management was developed on the basis of the results of the casestudies and research of best practices and management models applicable for IBB;
- Creation of networks and sustainable communication with the stakeholders dand directly involve them to ensure the project success, development and introduction of the IBB Development Plan and other objectives of the project;
- The wide public is aware of the goals and tasks of the project, and ensuring that

freely accessiblerelevant information on the state and development of IBB is available.
- Proposals on the tasks, status, responsibilities, structure and functions of the Basin Board are coordinated at the national and local levels;
- Realistic and feasible plan of IBB development with accurately defined aims, and policy and performance mechanisms, andagreement achieved between all the interested parties on the priorities and directions of afurther development of the region;
- Draft agreement on the Basin management partnership as a legal basis for a future activity and the IBB Development Plan implementation; and
- Trained and efficient secretariat possessing all the relevant technology and working groups for a specialist and technical support to the IBB Development Plan implementation.

Contact information:
Iskandar Mirhashimov, CAREC Project Manager
Email: Iskandar@carec.kz
Website: www.carecnet.org

Countries: Central Asia
Title of the project/practice:
«Intersectoral Water Partnership on Transboundary Water Resources in Central Asia»

Type of action on adaptation to climate change :
Technological
Technical and infrastructural
Educational and Awareness-raising

Project goal and objectives:
- To create intersectoral working groups in each Central Asian country to develop two project proposals. The first project proposal should be directed at the joint interstate management of one or several small transboundary rivers running on the territories of both countries. The second proposal deals with the Integrated Water Resources Management Plan (IWRM implementation) in the Central Asia region.
- To prepareconditions for the implementation of the projects on the intersectoral basis.
- To build up a dialogue between the Central Asian countries on water resources, and to use and replicate the best practice in the project preparation and implementation.

Project implementation organization: Regional Environmental Centre for Central Asia (CAREC)
Partner organizations: Governments of the Central Asia countries, Ministries (committees) for Water Resources, Ministries (committees) of Environment Protection, local authorities, local communities, NGOs
Donors: European Commission

Duration of the project: 2008-2009

Implementation stage of the project

(planning/initial/implementation/completion/completed): Completed
Activities and outcomes of the project: • The first component 1. During the discussions and consultations the national and regional working groups prepared project proposals based on multi-sectoral co-operation and taking national and regional interests into account. 2. The prepared projects meet the following requirements: They are realistic and feasible, logically built, have notable outcomes, and confirmed by obligations and responsibilities of the countries to meet the requirements of the investors and donors. • The second component 1. The executed projects and side events have created conditions to implement similar projects in the region. The participation of relevant stakeholders has been provided. There is a common understanding of a need for IWRM in the region. 2. The Central Asia Initiative (CAI) dialogue under the project on water resources receives support at the intersectoral level, which ensures development of true interest and dialogue at the regional level.
Contact information: **Iskandar Mirhashimov, CAREC Project manager** **Email:** Iskandar@carec.kz **Website:** www.carecnet.org

Country: Countries of Central Asia - Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan **Title of the project/practice:** «Harmonisation and Approximation of Water Standards and Norms in Central Asia»
• **Type of action on adaptation to climate change :**Technological • Technical and infrastructural • Educational and Awareness-raising
Project goal and objectives: Creation of national multi-sectoral institutional frameworks for harmonization of water standards and norms with the international agreements, including approximation of water standards to EU Integrated pollution prevention and control. **Project tasks:** • Assessment research • Capacity building • Support of reforms in standards • Replicating knowledge and practice
Project implementation organization: Regional Environmental Centre for Central Asia (CAREC) **Partner organizations:** Governments of the Central Asia countries, Ministries (committees) for Water Resources, Ministries (committees) of Environment Protection, hydrometeorological agencies, water users, Interstate organisations (ICSD, ICWC, IFAS), NGOs **Donors:** European Commission

Duration of the project: November 2008 – 30 April 2010
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed
Activities and outcomes of the project: • 4 national reports "Analytical report on water quality standards, norms and problems".; • A number of national and regional seminars and awareness-raising campaigns; • National intersectoral working groups are formed. The task of working groups is to promote joint water quality management and harmonization of national standards with the EU standards; and • Materials of research, case studies, reports and project documents.
Contact information: **Iskandar Mirhashimov, CAREC Project manager** **Email:** Iskandar@carec.kz **Website:** www.carecnet.org

Countries: Five countries of Central Asia **Title of the project/practice: Strengthening Civil Society Networks to Address Dryland and Poverty Issues in Context of Strategic Development Frameworks the United Nations Convention to Combat Desertification (UNCCD) (Drynet)"**
Type of action on adaptation to climate change : Information Civil society mobilization Educational and Awareness-raising
Project goal and objectives: To stimulate/assist the integration of the environmental dimension, in particular dryland issues, into the national development-related policy frameworks such as Poverty Reduction Strategy Papers (PRSPs), EU country strategy papers, trade related agreements, aid agreements, 5-year development plans, etc.

2) Forestation, biodiversity and ecosystems

Country: Central Asia **Title of the project/practice:** «Central Asian Countries Initiative for Land Management (CACILM) Multi-country Partnership Framework Support»
Type of action on adaptation to climate change: Regional Technical Assistance
Project goal and objectives: Restore, maintain, and enhance land productivity in Central Asia. It is expected that this initiative will lead to improved economic and social well-being for the populations dependent on these resources, while preserving the ecological functions of the land.
Project implementation organization: ADB **Partners of the project and Donors:** Technical Assistance Special, Global Environment Facility, ATF - IFAD

Duration of the project: 10 August 2006 - 28 October 2010
Implementation stage of the project *(planning/initial/ implementation/completion/completed):* Completed
Contact information: **Website:** http://www.adb.org

Results:

- Improved status, opportunities and influence of dryland civil society organizations (CSOs) to influence a more transparent and effective NAP implementation. Since 2005 CSOs were included as valid actors into the Working groups of Central Asian Countries Initiative for Land Management (CACILM) and NAP development in Kazakhstan.
- Raised the applied awareness, expanded the network and strengthened capacity of the key dryland stakeholders in Central Asia. Through the applied awareness activities (newsletters, best practices collection, media tours and radio programmes) the Drynet project was able to influence the mindsets of the CSOs and governmental agencies towards better co-operation and achievement of better results. The former International NGOs Network on Desertification (RIOD) was expanded and strengthened through Drynet by adding the number of qualified and motivated actors.
- Facilitated the national and regional multi-stakeholder co-operation and integration of desertification and sustainable land management issues into the decision-making process.

The project also:

- Has "shaken" and renewed the activities on combating desertification in Central Asia by contributing to the better information and expertise exchange.
- Contributed to a better and more open dialogue between CSOs and United Nations Convention to Combat Desertification (UNCCD) focal points as well as CACILM national representatives.
- Published and distributed newsletters in Russian, English and other five national languages. This was of a great value in the region since most of the local technical specialists, practitioners and farmers understand only their national language.
- Simplified and raised awareness on the UNCCD and NAPs among a wide range of stakeholders.
- Personified the responsibility, and improved the dialogue - coordination of the state authorities, scientific institutions and CSOs was strengthened through Drynet national seminars and trainings.
- Diversified the number of awareness-raising tools on desertification, land degradation and poverty through media tours, radio and TV broadcasts, newspaper and journals articles, newsletter Environmental Cinema Halls, and communication trainings for scientists.
- "Set the stage" for further drylands projects initiated by local CSOs and farmers within the established national and regional network, called Drynet.

Partner organizations: Both ends, 14 NGO partners worldwide
Donors: European Commission

Duration of the project: 2007-2013

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Phase I completed, phase II started in 2011

Countries: Kazakhstan, Uzbekistan **Title of the project/practice:** « Stabilization of Desiccated Aral Sea areas in Central Asia »
Type of action on adaptation to climate change : Technological Technical and infrastructural Educational and Awareness raising
Project goal and objectives: Together with the international donor community (UN environmental protection programmes, the UN Convention to Combat Desertification), the project supports the efforts of the Kazakh and Uzbek governments to limit the destructive effects of wind erosion. The negative impacts of this regional environmental catastrophe are being reduced and arable areas preserved for future generations. The dried-out sea bed is being stabilised and put to agricultural use, helping to preserve the area for settlement. Project measures also reduce the severe threat to the health of the population, thus preventing a mass exodus from the region and securing the agricultural livelihoods.
Partner organizations: Kyzylorda Oblast Administration (Kazakhstan), Ministry of Agriculture and Water Resources (Uzbekistan) **Donors:** Bundesministerium for wirtschaftliche Zusammenarbeit und Entwicklung (BMZ)
Duration of the project: January 2005 -December 2007
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed

USAID projects

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
1	STOP Avian Influenza (STOP AI)		This project works to increase the ability of the Central Asian governments and private poultry producers to carry out prevention, biosecurity, biosafety, and preparedness measures as well as to update and revise the national preparedness plans. The project also aims to increase coordination between the Ministries of Health, Agriculture, and Emergency Affairs both within and between countries, promotes	Contact at USAID: Kairat Davletov Implementing organisation: Winrock International 101/1 Manas Pr., Bishkek, Kyrgyzstan, 720033 Ph.: +996-312-69-4125 +996-772-57-0064

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
			communication and coordination among the donors and other stakeholders in the region. The project conducts "training of trainers" sessions to raise awareness of Highly Pathogenic Avian Influenza (HPAI), improve disease surveillance and strengthen biosecurity education. This is a regional project implemented in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.	
2	**Media Support Initiative**	September 2009 – September 2014	This programme will · Increase access to objective news and information through the continued support for and further development of the innovative satellite broadcast channel and programming; and · Strengthen the media legal-enabling environment in Central Asia. This is a regional project implemented in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.	**Contact:** Maria Stefurak (AOTR) **Implementing Organization:** Intern et Network

1) Public health

USAID projects

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
1	**Health Improvement**	**September 2009-September2012**	To improve the capacity of the public health systems of Central Asia to better meet the health needs of vulnerable groups, the project will work to: · introduce quality improvement methodologies at all levels of health services management; · provide technical assistance, training, equipment and	Contact at USAID: Bryn Sakagawa; Sholpan Makhmudova Implementing organisation: TBD Development Outreach and Communications Specialist

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
			commodities; and · assist the Central Asian countries to improve their management, financing and implementation of medical services provided for tuberculosis, HIV/AIDS patients, and primary health care including maternal and child health services. This is a regional project implemented in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.	USAID/CAR Park Palace Building 41 Kazibek Bi, Street 050100, Almaty Kazakhstan 7(727) 250-76-12 or 7(727) 250-76-17

II Kazakhstan

1) Water resources and agriculture

Title of the project/practice: «Demonstration of Adaptive Land Management under Climate Change Conditions»
Type of action on adaptation to climate change: • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Mitigation of the climate change impacts on agriculture in view of overcoming risks and vulnerability of the rural community by developing adaptive land-use model, and demonstrating its environmental, economic and social validity under the climate change conditions.
Project implementation organization: GEF/SGP **Partner organizations:** Public Association *Association of Landscape Planning Development* **Donors:** *CBA Grant*
Duration of the project: November 2009 – April 2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Initial
Activities and outcomes of the project: The project activity provides for reconstruction of the destroyed dams, culverts and existing surface water diversions. The second direction of the project activity is land-use landscape planning – withdrawal of low-output lands from arable land register and meadow formation on them as well as creation of an eco-landscape skeleton of the territory and of meadow formation on water protection zones, etc.
Contact information: **Katerina Yushchenko,** UNDP GEF Small Grants Programme National Coordinator **Email:** katerina.yushenko@undp.org **Website:** www.undp.org

Title of the project/practice: «Adaptation of Farmers' Agricultural Practices in Response to Intensified Climate Aridization in Akmola Oblast»
Type of action on adaptation to climate change: • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Demonstration of new agricultural practices to enable mitigation of the risks of reduced

water supply levels from the Vyacheslav water basin and to benefit from climate change in the winter period.
Project implementation organization: GEF-SGP **Partner organizations:** Public Foundation *Akbota*, *Kaisar* LLP, Farms of the Arshaly district, public enterprise *Sou-arnasy,* International Maize and Wheat Improvement Center (CIMMYT) **Donors:** *CBA Grant*
Duration of the project: November 2009 – October 2011
Implementation stage*:* Initial
Activities and outcomes of the project: Sociological polls in the Arshalyn district as part of the workshops to prepare the vulnerability reduction assessment of the target group focused by the project. Environmentally safe technologies are being introduced and popularized. School *Young Farmer* of the Vyacheslav high school was actively involved in introduction and demonstration of drip irrigation technology among the farmers in comparison with the traditional method, thus showing the village inhabitants the benefit of drip irrigation on their private vegetable fields.
Contact information: **Katerina Yushchenko,** UNDP-GEF Small Grants Programme National Coordinator **Email:** katerina.yushenko@undp.org **Website:**

Title of the project/practice: «Northern Aral Sea and Syrdarya Control»
Type of action on adaptation to climate change: • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Increase the sea depth and desalinize the sea water
Project implementation organization: Government of Kazakhstan **Donors:** World Bank
Duration of the project:
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Initial
Activities and outcomes of the project: To build up the Kokaral dam from the current point of 42 metres to 48-50 metres and divert the water release to the Large Aral via a strait in the western part of the Small Aral (from the current strait of Berg through the bay of Shevchenko)

Contact information: **Website:** http://www4.worldbank.org

Title of the project/practice: «World Bank Support for Improvement of Environmental Conditions, Agriculture and Fish Production in the Syr Darya River Basin»
Type of action on adaptation to climate change: • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: The project will help sustain and increase agriculture, livestock, and fish production in the Syr Darya basin. It will also aid in securing the existence of the Northern Aral Sea (NAS) and improving the environmental conditions in the delta and around NAS leading to improved human and animal health and conservation of biodiversity. This will be the first phase of the overall Syr Darya river basin development programme in the context of the Aral Sea Basin Programme.
Project implementation organization: GEF-SGP **Partner organizations:** Public association *Wiedergeburt (Revival) Taldykorgan Oblast German Society*, German Agency for International Co-operation (GIZ), Burlutobi Forestry **Donors:** *CBA Grant*
Duration of the project: 20 June 2001
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: **Rehabilitation of the Northern Aral Sea:** Construction of a proper dike across the Berg strait, a deep canal connecting the Northern Aral Sea (NAS) and the Large Southern Aral Sea (LAS), will help create a stable level of the NAS, promote acceptable salinity levels and facilitate water flows to the LAS during periods of high inflow. **Improving the Hydraulic Control of the Syr Darya:** Rehabilitation and construction of hydraulic structures will contribute to regulating and improving water management, controlling allocations to various water users and increasing the inflow for the NAS. **Rehabilitation of Chardara Dam:** Rehabilitation of the Chardara dam, which currently does not meet the normal safety standards and is considered at risk, will ensure the dam's safety for the immediate future. **Aquatic Resources Restoration and Fisheries Development:** This component aims to maximize benefits from additional fisheries in the NAS created as a result of the stabilization of the NAS level and salinity, as well as to improve the flow of water to the delta lakes. **Monitoring and Evaluation:** The objectives of this component are to evaluate how well the project's goals are met, and to assess the project's physical, environmental, social, agricultural and economic impacts. **Project Management and Institutional Development:** This component will enable the government to implement the project. It will support the operation of a Project

Management Unit (PMU), and finance overall project management, as well as provide technical assistance in such areas as construction supervision, procurement and accounting. It also includes an **institutional sub-component** which will help to increase the capacity of national authorities and agencies in river basin management. The Syr Darya Control and Northern Aral Sea loan has a maturity of 20 years, with a five-year grace period. Kazakhstan joined the Bank in 1992, and since then the World Bank's commitments to Kazakhstan have totaled approximately USUS$ 1.88 billion for 22 projects.
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2) Forestation, biodiversity and ecosystems

Title of the project/practice: «Planting of Forest Protection Belts to Combat Dry Hot Winds and Retain Snow and Moisture as Effective Method of Climate Change Risks Reduction»
Type of action on adaptation to climate change : • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Reduction of land-degradation risks caused by increased summer temperatures, dry winds and decreased winter snowfalls by: planting forest protection belts (100 hectares of fruit trees) to fight wind soil erosion, retain snow, decrease wind speed; irrigation of fruit trees and cultivation of vegetables, grain and forage crops in spaces between rows by means of drilling deep shafts and drip irrigation.
Project implementation organization: GEF-SGP **Partner organizations:** Farmer and Entrepreneur Support Fund, Production co-operative *Kara-kazim*. **Donors:** *CBA Grant*
Duration of the project: March 2009 – April 2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: More than 5,000 saplings of fruit trees were planted on the degraded land: apple, apricot, peach, nut and pear trees. The rate of sapling establishment has made it at 96%. On 5 hectares 5,800 bushes of grape were planted, with germinating ability of 97%. A 75-metre shaft was drilled for irrigating the plantations. Two 5- and 7-ton tanks were established along with two electric pumps to lift water from the canal. The forest belts are watered by two ways: drip irrigation from the shaft and furrow irrigation directly

from the canal. 15,000 metres of plastic pipes for drip irrigation and 1,000 metres of mains are built. The drip irrigation system delivers water to each sapling.
On one site in spaces between the rows of forest belts winter wheat was sowed, and on the other lucerne. The crop was harvested and the wheat seeds are being peeled for next sowing.
To prevent degradation of rural pastures the non-milch part of private cattle is moved to remote summer pastures.

The double benefit of creating forest-protection belts from fruit trees is not only production of fruits and their products but also cultivation of a variety of vegetable, grain and forage crops. Crop rotation on the land of spaces between rows will improve fertility of the degraded land.

Good care allowed achieving high establishment of saplings and keeping them in good state. The system of drip irrigation was created, which allowed even irrigation of trees and prevention of overwetting and salinization of soil. Comparison of these two methods of irrigation, i.e. drip irrigation and furrow irrigation directly from the canal shows better state of saplings when watered with the drip irrigation method. The local residents showed great interested and actively participated in the project activities. The seminar on assessment of households' climate change vulnerability has shown full understanding of the current changes and their impacts on the land management practices.

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Title of the project/practice: «Development of the National Plan for Integrated Water Resources Management and Water Efficiency in Kazakhstan»

Type of action on adaptation to climate change : Institutional and political

Project implementation organization: Water Resources Committee of the Ministry of Agriculture of the Republic of Kazakhstan
Donors: Norway/DFID

Duration of the project: - 1 July 2004 - 31 December 2007

Implementation stage of the project *(planning/initial/implementation/completion/completed): Completed*

Activities and outcomes of the project: Ad-hoc intersectoral working group on IWRM Plan development was created; two national forums on IWRM were held; Draft National IWRM and Water Efficiency Plan was prepared in co-operation with the key stakeholders; four trainings were held to strengthen the role of basin management; technical research and opinion polls were carried out to assess the access of the population to safe potable water and basic sanitation in all regions of Kazakhstan; and a report «Access of the population in Kazakhstan to safe potable water and basic sanitation» was published in whichcriteria of access of the population in Kazakhstan to safe potable water and basic

sanitation were developed.

Title of the project/practice: «Autumnal/Early-Spring Fields and Pastures Irrigation as Adaptive Mechanism for Efficient Use of Water Resources in Southern Kazakhstan»
Type of action on adaptation to climate change: • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Creation of fodder supplies for livestock farming on the degraded land of Least Concern (LC) through introduction of water efficient technology – water loading irrigation. The Project objectives are to build the capacity of LC and assist sustainable water resources management practices that give means for a living and mitigating climate change risks (intensified climate aridization).
Project implementation organization: GEF-SGP **Partner organizations:** Public association *Kogal* of a village named after Sadu Shakirov, Limited liability partnership *Jardemshi* **Donors:** *CBA Grant*
Duration of the project: March 2009 – April 2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: A method of water-loading irrigation of LC fields for cultivation of perennial fodder crops, i.e. lucerne, on the 30-hectare area of furrow land used by LC for grazing, allows receiving high-calorific hay for winter feeding of cattle and using this field for grazing after the last hay harvest. Autumnal/early-spring fields and pastures irrigation when water is not scarce gives LC a chance to irrigate fields free of charge at the expense of ecological water discharges. An agreement was attained with the Water Systems Management on water discharges from the repaired channel of the Sharuashlyk Canal to the LC land of Sadu Shakirov village. Sharuashlyk Canal was reconstructed. A 7,000-metre flumed aqueduct of the channel was cleaned, and the outside channel walls were reinforced by earthen embankments. More than 100 metres of channel walls were cemented. Five water-distributive locks

were built. As a result, 12 kilometres of the canal were restored. For drawoff, water diversions were made for livestock watering and field irrigation. Since September 2009 water has been discharged through the repaired channel – 1.5 m³/second form the main lock 30 kilometre from the village *S.Shakirov*. An agreement was attained with the local water distribution agency on metering the amount of consumed water during the summer period from the main distribution lock built by the NGO Kogal, and not from the main lock.

A field for sowing lucerne was prepared. A low-grade flat plain was chosen. Irrigation furrows were cleared for water loading irrigation. The 30-hectare field for the lucerne sowing was ploughed to gain better stored soil moisture. The seminar on assessment of LC climate change vulnerability has shown full understanding by LC of current climate change and water loading irrigation potential for growing agricultural crops.

The project activities will help LC of Village *S.Shakirov* to develop sustainably under intensified climate aridization. The rural population will be less vulnerable to climate change.

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Title of the project/practice:
«Adaptation of Pastoral Cattle Farming of Lepsy Local Community to Climate Change»

Type of action on adaptation to climate change :

- Technological
- Technical and infrastructural
- Awareness raising

Project goal and objectives:
Decrease in the climate change adverse impacts by rational use of the sand pasture ecosystems: reduced grazing loads on the pastures; expansion of the existing pastures by optimizing water management; employment of the new rangelands that are currently unused; and arrangement of seasonal pasture rotation.

Project implementation organization: GEF-SGP
Partner organizations: Public Foundation *Farmer of Kazakhstan*", Private Foundation *Aray Youth Centre*
Donors: *CBA Grant*

Duration of the project: March 2009 – April 2011

Implementation stage of the project *(planning/initial/implementation/completion/completed):*
Implementation

Activities and outcomes of the project:
The scheme of pasture rotation is introduced: spring pastures (Lake Berlu) - 1,000 hectares from 1 April until 15 July 15; summer pastures - 850 hectares, 27 kilometres

away from the aul (local human settlement) from 15 July until 20 September; autumn pastures – 2,000 hectares from 20 September untill 1 December; winter pastures – 2,000 hectares 32 kilometres to the east of the aul along the river Lepsy from 1 December until 31March.
Sustainable Pasture Management is organised on 5,850 hectares of pastures.
Three wells were repaired.
At pasturing sites the life of shepherds was organised: a yurta (a nomad's tent) and a solar generator are put up, shelters are constructed, fresh water and products are delivered.
On August 26, 2009 a field seminar was organised with the shepherds.
Grazing loads on the pastures in the vicinity of human settlements are lowered by 17.4 %.
Live weight of livestock grazed on a pasturing site is 10 % higher than that of livestock grazed on close to the settlement.
The organised system of pasture rotation is apprehended by the local residents - was a pledge of its viability upon termination of Lepsy LC financing by CBA.

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Title of the project/practice:
«Reducing Vulnerability of Burevestnik Rural Community, Naurzum District of Kostanay Region, to Global Climate Change»

Type of action on adaptation to climate change :
- Technological
- Technical and infrastructural
- Awareness raising

Project goal and objectives:
To reduce vulnerability of the Burevestnik rural community to global climate change by informing, training, securing water delivery, manufacturing and building equipment that demonstrates water-efficient technologies and introducing modern efficient technologies for water and lands in cultivation of agricultural crops.

Project implementation organization: GEF-SGP
Partner organizations: Public Association *Petrel*, *Zhito* LLP, farms of A. Suhoteply and G. Torhova, Public Association *Ak Tyrna Eco-Centre*
Donors: *CBA Grant*

Duration of the project: November 2009 – May 2011

Implementation stage of the project *(planning/initial/implementation/completion/completed):*
Initial

Activities and outcomes of the project:
Informing and training the local population to manage the risks of global climate change, strengthening dams and building equipment that demonstrates water-efficient technologies.

Introduction of modern water and land efficient agricultural crop production technologies on a 2,000-hectare wheat field of the Burevestnik rural community.
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Title of the project/practice: «Arid-Land Management»
Type of action on adaptation to climate change : Scientific and informational
Project goal and objectives: The main objective of the project is to demonstrate sustainable land management practices for the regions with arid ecosystem, which will facilitate transition to pasture livestock farming. The global environmental goal of the project is to increase the level of CO_2 absorption in order to inhibit the processes of climate change and land degradation, and to improve biodiversity in the arid regions. In order to attain these goals the project will assist the farms and their associations in: • developing sustainable land management practices in the arid regions; • ensuring basic service support in selling agricultural products; • monitoring the level of CO_2 absorption to estimate the capacity of Kazakhstan in forming "carbon credits" in various agricultural ecosystems; and • organising awareness-raising campaigns and outcomes dissemination strategies to replicate the good practice in similar regions of Kazakhstan and other countries of the Central Asia. The project underlines the importance of an integrated approach to ecosystem management to execute environmental, economic and social tasks which are expected to give benefits at the local, regional and global levels.
Project implementation organization: Ministry of Environment Protection of Kazakhstan. Project manager: Sholpan Moldahmetova **Partner organizations:** Farms *Kyzylgoi, Muhtar* and *Kairakty* **Donors:** World Bank. Ministry of Environment Protection of Kazakhstan
Duration of the project: 2003-2008
Implementation stage of the project *(planning/initial/implementation/completion/completed):* ***Completed***
Activities and outcomes of the project: **Component 1: Developing sustainable land management practices** As of 1 July 2007 direct sowing of grain crops on stubble was fulfilled on 5,100 hectares, sparing cultivation on 7,300 hectares, acceleration of natural recovery processes on 5,911 hectares and improvement of the degraded pastures on 1,491 hectares. As a whole, of 19,500 hectares under the project implementation 19,802 hectares have been restored so far. 6 million acacia bushes and 1,320 Eurotia bushes were planted. 25.5 hectares of Eurotia bushes were sown manually. A 2-hectare Eurotia arboretum was built. Pilot demo fields were organised in the farms *Kyzylgoi, Muhtar* and *Kairakty*. The state of *Kyzylgoi* and *Kairakty* demo fields is good. *Muhtar*

demo fields had cases of furrow subsidence on plots with integumentary crops of Agropyron with winter wheat and winter rye. Taking into account the remarks of the World Bank Commission additional sowing was done in the autumn. This year the crops are good.
The contracts are being signed at the moment to fullfil autumn field works. 4,500 more hectares of the arid land are planned to be restored.
100 tons of diesel fuel 10 tons of lucerne seeds and 12 tons of Agropyron seeds; 10 tons of rye; 192 tons of mineral fertilizers; 1,200 litres of herbicides; and 5,000 saplings of bushes were bought.
In 2006 hayseed cleaning and clearing equipment was bought and delivered for implementation of a seed-growing programme "farmer to farmer". The equipment was installed in the village *Krasnaya Polyana* (Red Clearing) and is now used for hayseed clearing. In 2006 20 tons of Agropyron seeds were provided under the "farmer to farmer" programme. In 2007 15 tons of seeds were planned to be harvested.
According to *Livestock Farming* (scientific and production centre), in view of arid conditions of 2006 natural meadowlands provided only 70-100 kilograms perhectare of fodder, and Agropyron crops grown under the project implementation yield 700-800 kilogram per hectare of hay (7-8 times more).
The association *Shetsky* and four farmers' partnerships *Burminsky, Keregetas, Merei - 2005 and Aksu-Ayulin* created under the framework of project implementation became reliable partners in execution of the programmes on restoration of the degraded land.
The performance of 16 windmill electricity-generating units installed on the remote pastures was assessed. On the whole the performance of these installations was assessed as satisfactory. At the same time it should be noted that the use of the energy output by the farmers is insufficient. There were cases when the unit stood idle due to no wind or water pump failure. As a result, there was an estimation of the scope of alternative sources of energy used under the pasture livestock farming conditions, and 5 solar batteries were purchased.
Solar batteries installation criteria should be developed during the Meeting of the Technical Commission.
The farmers were convinced that grain manufacture is unprofitable under the arid conditions of Shetsky district, and hay crops sustainably provide net profit of KZT5,000-5,500 (€24.16-26.57)/hectare.

Component 2: Assistance to farmers in selling the produce
Creation of milk centre in *Jaryk* allowed increasing purchase of milk from the local population. As of 1 May 2007 the population sold 4,815 tons of milk, which is 1,037 tons more compared to the relevant period of the previous year. This allowed local milk producers to receive from the dairy companies more than KZT87.7 million (€423,720), which is KZT17.1 million (€82,620) more than in 2006.
After the three milk centres were opened, the quantity of suppliers has grown constantly. This allows mitigating the problem of unemployment in the remote rural territories.
Slaughter shop was opened in Village *Aksu Ayuly* on 29 June 29 2006 during the Field Day under the framework of the project *Arid Land Management*. The plant is equipped

with 40-ton scales and weighing scales for herds and carcasses. Creation of farmer association to manage the market and the shop is being discussed at the moment. In 20 pilot farms where livestock farming is being monitored, the population of cattle in relation to the previous year increased by 49 or by 6.8 %, while the average in the district and in the control set of Aktogay district increased by 6.6 % and 3.0 % accordingly. The population of horses in the selected farms increased by 34 (19.3 %), while the average in the district and in the control set was 2 and 5.2 % accordingly. Growth of sheep population was also above average (5.1 % in the selected 20 farms and 3.4 % in the district and the control set). Such an increase in livestock population became possible due to laying-in of fodder of better quality and in accordance with the requirement. In 2006 the selected 20 farms procured 5,871 tons of hay, which was 2,541 tons more than in 2005. The population bought 760 tons of hay worth KZT4 million (€19,330). The milk yield in the selected 20 farms increased by 15.4 % in 2006 in comparison with 2005, while the district as a whole made it at 13.9 %. Such significant growth in livestock population and incomes was due to enhanced fodder supplies of the livestock farms based on improved pastures and hayfields.

Component 3: Monitoring the level of CO_2 absorption

This component is executed according to the schedule developed by the local institutes (space research, pedology and botany) and Hydrology and Remote Sensing Laboratory of USDA's Agricultural Research Service which works in the project as a contractor. During this period basically all attention was paid to completing the soil database and land management database to be used in the CO_2 absorption model (Environmental Policy Integrated Climate (EPIC) model) in EPICsoil. The database was digitalized to be used to develop a map of possible use of the land in the pilot territory. A special software was developed allowing input of soil data into the database in simulation the model. The web-based EPIC model was adapted for experimental tests on PCs without access to the Internet in order to provide access for all interested scientists. A training was organised for Dr. Pachikin, a soil scientist, during his visit in April 2007 to the US Department of Agriculture. A training was organised in Almaty for the scientists of the institutes for space research, pedology, botany and climate. Twelve specialists took part in the training on the model theory and various inputs and outputs of the model, held by two experts of the Laboratory of USDA's Agricultural Research Service on 18 – 25 May 2007. A comprehensive geobotanical description was carried out to monitor biodiversity in the pilot territory. For mapping there revealed the sites of human-induced transformation of vegetation. On the pilot sites where hay crops were sown, introduction of native flora species into the structure of cultivated phytocenoses was observed, which testified of the increase in biodiversity and formation of vegetative communities that approached natural steppe flora structure. Insignificant reduction in quantity of flora species was observed on the pilot sites with natural recovery processes on a fallow land, mainly due to loss of weeds. This is a positive process as during the first stages of the fallow land grassing outbreak of biodiversity was observed due to abundance of weed species.

Component 4: Organizing awareness raising and replication of the good practice
The Observation Mission of the World Bank which took place in the beginning of May 2007 expressed their satisfaction of the general course of the project implementation. At the end of May a tender defined a Kazakhstani press club to execute activities under the component. On 29 June the club held a Field Day on the issues of efficient arid land management with the participation of representatives of the Ministries of Environment Protection, Agriculture, Industry and Trade of Kazakhstan, World Bank, regional municipalities of Kazakhstan, local executive agencies, nature protection agencies, managers of farms, farmers of the district and the media. Special television programmes were broadcast on the Karaganda regional and national TV channels. A documentary film is planned to be made using the outcomes of the project implementation. Besides, a number of training seminars are planned for the farmers of the pilot territory.

Component 5: Ad-hoc Project Management Group
To coordinate the project implementation the Ministry of Environment Protection of the Republic of Kazakhstan created an Ad-hoc Project Management Group, without the formation of a legal entity. The Group personnel were selected on a competitive basis. Purchases of goods and services are carried out according to the World Bank's procedures and on the basis of decisions of the Ministerial Tender Commission upon approval of the World Bank.
During the 3 years of the project implementation the following equipment and services have been bought: soil-cultivating and sowing equipment, seed dressers, slaughter shop in a modular form, dairy and laboratory equipment, windmill electricity-generating units and solar batteries worth more than US$ 1 million.

Website: http://eco.gov.kz/proekt/pr_resp2.htm

Title of the project/practice: «Sustainable Pastoral Management for Better Livelihood of Rural Population and Preservation of Ecological Integrity»

Type of action on adaptation to climate change : Technological

Project goal and objectives:
The main objective of spring planting is transformation of unused farrow lands to highly-productive cultivated hay fields and pastures by means of sowing perennial forage crops. The most productive locally-adapted plants are agropyron, lucerne and holy clover.

Project implementation organization: UNDP, GEF
Donors: UNDP, GEF and Government of Kazakhstan

Duration of the project: 1-20 March 2010

Implementation stage of the project *(planning/initial/implementation/completion/completed):* completed

Activities and outcomes of the project: In total 600 hectares of farrow lands were allocated for perennial forage crops. Replication and distribution of the good practice in creation of cultivated pastures will lead to increase in supply of forages, increase in livestock yield, and as consequence to rural life improvement.

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Title of the project/practice:
«Land Management Practices for Climate-Resilient Horse Breeding in Kargaly Village»

Type of action on adaptation to climate change :

- Technological
- Technical and infrastructural
- Awareness raising

Project goal and objectives:
Adaptation by the local Kargaly community to climate change by changing the monoculture approach for the diverse crop production and horse breeding in order to demonstrate social and economic expediency of the project by introducing environmentally sustainable land management that makes use of water-efficient technologies and pasture rotation. The project provides for transition to herd horse breeding.

Project implementation organization: GEF-SGP
Partner organizations: Public Association *Ult tagdyry-Astana*, *MTS-Korgalzhin* LLP
Donors: *CBA Grant*

Duration of the project: November 2009 – October 2011

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Initial

Activities and outcomes of the project:
The local population's vulnerability to climate change has been assessed: the community land is situated in an acutely continental climate zone with long winters and short summers. In certain years the losses of meadowlands yields because of the adverse weather conditions, i.e. drought, dry wind, late-spring and early-autumn frost and other weather phenomena, reach 50-70%. Climate change has a strong impact on the poor rural population. The problem of climate change can lead to considerable decrease in the living standards of the community members.
A seminar was held according to the results of this assessment.

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Title of the project/practice:
«Adaptation to Growing Climate Aridization through Climatically Sustainable Pastoral

Management Arrangements»
Type of action on adaptation to climate change : • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Reduce the impact of climate aridization caused by climate change by planting Haloxylon and improving fertility of estuary areas.
Project implementation organization: GEF-SGP **Partner organizations:** Public Association *Wiedergeburt (Revival) Taldykorgan Oblast German Society*, GIZ, Burlutobi Forestry **Donors:** *CBA Grant*
Duration of the project: March 2009 – April 2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: In 2009-2010 distant pastures were organised for livestock grazing for auls (local nomad settlements) *M.Tulebaev, Ulga* and *Krasny Rybak* (Red Fisherman). 980 kilograms of Haloxylon seeds were bought and sown on 80 hectares of the degraded lands. A Haloxylon arboretum was created on the area of 1 hectare High germinating ability of Haloxylon was achieved. To increase the fertility of estuaries 6,000 kilograms of saltpetre were bought and brought into soil on 20 hectares of an estuary. Snow retention was done. 15-20 kilometres of access roads and irrigation channels were repaired. Hay crop on the fertilised estuary is 2.7 times higher.
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3) Public health

Title of the project/practice: «Health Protection from Climate Change in Kazakhstan»

Type of action on adaptation to climate change : Scientific and informational

Project goal and objectives

Training of experts of public health services and environmental protection

- To define climate change impacts on human health, including working out a training material and its translation into the Kazakh language, and foreign universities specialist technical assessment.
- The task of the training is to define all the risks to health, reveal vulnerable territories and populations, prepare trainees to execute a national assessment and disseminate its results with the assistance of the relevant stakeholders and politicians.
- These activities will be executed under the patronage of the Ministry of Health Protection of Kazakhstan with the support of WHO Europe, State Sanitary and Epidemiologic Agency, Kazakh Scientific Centre of Quarantine and Zoogenous Infections named after Aykimbaev, MEP of Kazakhstan, Ministry of Education and Science of Kazakhstan.

Development of the National Adaptation Strategy and Action Plan to prevent and respond to climate change, and their popularisation

- Climate change in Kazakhstan and its impacts on human health have not been studied at a sufficient degree yet, with modelling of various trend scenarios. In this respect, the first task is to assess the climate change impacts on human health in conformity with the European Commission's Impact Assessment (EC/IA), WHO and Public Health Agency of Canada, and evaluation of the burden of illnesses on the basis of existing national assessments and studies. Furthermore, the Strategy/Action Plan will be developed with the direct participation of relevant stakeholders according to WHO 61.91 requirements.

The Strategy/Action Plan includes:

- Environmental protection goals
- Action Plans of each stakeholder
- Target activities in vulnerable areas and for their population
- Definition of responsibility of each link
- Time framework of plan execution
- Integration of national plans and budgets

- The National campaign on climate change and its impacts on human health will include replication of climate change adaptation mechanisms (for flood, extreme heat wave, drought, etc.) through the media, educational institutions and local enforcement authorities. The campaign will be executed under the guidance of the Ministry of Health Protection of Kazakhstan with the support of WHO Europe, State Sanitary and Epidemiologic Agency, Scientific Centre of Quarantine and Zoogenous Infections, MEP of Kazakhstan and Ministry of Education and Science of Kazakhstan.

Informational support and capacity building during preparation and response to climate change

- To strengthen the definitions of the risks of infectious diseases and emergency management being the consequence of climate change. Kazakhstan has already faced the problems of spreading and impacts of infectious diseases caused by climate change. This includes the risk of growth and spreading of such diseases as cholera, plague, Crimean–Congo haemorrhagic fever (CCHF), which demand revision of the existing mechanisms and development of certain procedures. In this respect, relevant technical and other supports are required to enhance supervision and monitoring of climate change-sensitive infectious diseases spreaded by water and insects.
- To define the capacity for ensuring the International Medical and Sanitary Regulations.
- To define the gaps and propose necessary recommendations to overcome them.
- To carry out research that will facilitate development of the plan and calculation of the estimated necessary technological transfer.
- To provide the necessary equipment to carry out Polymerase Chain Reaction (PCR) diagnostics of key infectious diseases.

To enhance preparedness and response to emergencies, as Kazakhstan is still facing problems of the quality of services, insufficient development of information technologies and absence of a developed response strategy in the system of public health services when an emergency occurs.

Consequently, within the framework of the project a number of national experts in public health services will be trained on the standard emergency procedures and a plan of response to emergencies.

Project implementation organization: WHO
Partner organizations:
Donors: The German Federal Ministry for the Environment, WHO

Duration of the project: started in 2010

Implementation stage of the project *(planning/initial/implementation/completion/completed):* ***implementation***

4) Disasters and extreme events

Title of the project/practice: «Climate Risk Management in Kazakhstan»
Type of action on adaptation to climate change : • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: To promote reduction of climate-related disasters and adaptation to climate change in Kazakhstan and to integrate the climate risks
Project implementation organization: **Partner organizations:** • Ministry of Environment Protection • Ministry of Emergency Situations • Water Resources Committee of the Ministry of Agriculture • GEF-SGP **Donors:** UNDP
Duration of the project: 2011-2014
Implementation stage*: (planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: • strengthened institutional frameworks and technical capacity to manage the climate change risks and opportunities in an integrated manner; • development of climate-resilient strategies, policies and legislation in the priority sectors and geographic areas; • expanded financing options to meet the national climate change adaptation costs; • implementation of the climate change adaptation interventions in priority sectors; and • disseminated knowledge on how to incorporate climate change knowledge and risks into the development processes at the national, sub-national and local levels.
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III Kyrgyzstan

1) Water resources and agriculture

Title of the project/practice: «Second On-Farm Irrigation Project»
Type of action on adaptation to climate change : Technological
Project goal and objectives: Improved sustainable irrigation services to increase the yields of agricultural produces
Project implementation organization: Ministry of Agriculture **Donors:** World Bank, Government of Kyrgyzstan
Duration of the project: 2008 - 2013
Implementation stage of the project *(planning/initial/implementation/completion/completed):* implementation
Activities and outcomes of the project: • Ongoing process of WUA selection to take part in restoration of the irrigation systems. • The Board of the Central Support Department has performed a preliminary assessment of all WUAs in the country using the results of 2007. From the very start of the project implementation Eleven WUAs have been selected and considered as applicants for the rehabilitation works. five of the WUAs received approval to start the rehabilitation works, and two –receive an approval to engineer them. Of the five WUAs which obtained approval for rehabilitation, one WUA, *Shilbili,* in Karabuuri district of the Talas region, has held the auctions. Four WUAs have published calls for participation in the auctions.
Contact information: Nurlan Jailobaev 4ª Toktonaliev street, Bishkek, Kyrgyzstan Tel.: +996 312 54-91-03, Fax: +996 312 54-11-74 **Email:** onfarmir2@elcat.kg

Title of the project/practice: «Improvement of Water Resources Management»
Type of action on adaptation to climate change : Technological
Project goal and objectives: • improved sustainable irrigation services and water resources management to increase productivity in the irrigated agriculture; and • increase efficiency in the national water resources management to respond to the interests of water users and the country as a whole.
Project implementation organization: Ministry of Agriculture **Partner organizations:** **Donors:** World Bank, Government of Japan, Government of Kyrgyzstan
Duration of the project: 2006 - 2011
Implementation stage of the project

(planning/initial/implementation/completion/completed): implementation
Activities and outcomes of the project: Designing of irrigation systems, improvement of the legislation
Contact information: Darman Alibaev Department of IWRM Project implementation 4ª Toktonaliev street, Bishkek, Kyrgyzstan Tel.: +996 312 54-91-10, +996 312 54-49-72 **Email:** wmip-piu@wmip-piu.kg **Website:**

Title of the project/practice: «Water Users Associations Support Programme»
Type of action on adaptation to climate change : • Institutional and political • Financial and economic
Project goal and objectives: • To increase the institutional potentials (electiveness, transparency, good management); • To increase financial stability by means of improving the irrigational services payment collection and technical management; • Rehabilitation, reliable operation and maintenance of an irrigation infrastructure; • Rational use of water resources with participation of farmers and through a joint effort; and • To increase agricultural productivity and incomes of farmers.
Project implementation organization: Ministry of Agriculture **Partner organizations:** **Donors:** USAID
Duration of the project: 2004 - 2010
Implementation stage of the project *(planning/initial/implementation/completion/completed): implementation*
Activities and outcomes of the project: • The Water Users Associations Support Programme (WUASP) works with 24 WUAs in the South of Kyrgyzstan (Zhalalabad, Osh and Batken regions). • More than 18,000 people participated in over 600 trainings on institutional development, business, WUA management and land and water management. • WUASP allocated US$1.39 million to 29 WUAs. As of today more than US$750,000 was already given out to 19 WUAs. The financial resources were used for rehabilitation of more than 300 kilometres of drainage and irrigation canals, construction of 100 irrigational board shutters and hydroelectric complexes, and equipping the WUA offices with the office facilities. The net profit of farmers from 1 hectare of land has increased by approximately 185% since 2005 (average data for cotton, wheat, and corn).

- This year 3,000 hectares of land which had actually been abandoned will be used again for agricultural purposes.
- Owing to the improved irrigation the farmers could increase the secondary grain crops (late crops after winter wheat – first of all, corn). Due to improvement of water management cotton was replaced with crops that give higher profit; the area under cotton has decreased by 33 % for the last two years.
- Improved attitude of farmers to the WUA. Irrigation services payment rates have doubled. For the past two years the WUAs have collected more than US$300,000 for operation and maintenance of the irrigation systems.
- They have also made their own contributions worth US$300,000 to receive the WUASP grants. The estimated total of beneficiaries (local residents receiving irrigation water) reach more than 192,000 people.

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Email: baxterjohnc@gmail.com
Website:

Title of the project/practice: «Demonstrating Sustainable Mountain Pasture Management in Suusamyr Valley»

Type of action on adaptation to climate change : Educational and awareness raising

Project purpose: Functional integrity of the mountain rangelands in the highlands of Kyrgyzstan as a contribution to greater ecosystem stability, reduced soil erosion and enhanced food security.

Project problem: Development in the Suusamyr Valley of a cost-effective and replicable pasture management mechanism which reduces the negative effects of livestock grazing on the land and improves the rural livelihoods"

Project implementation organization: Ministry of Agriculture
Partner organizations:
Donors: GEF-SGP

Duration of the project: 2007 - 2012

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation

Activities and outcomes of the project:
Outcome 1: A set of innovative pilot measures which have been designed and validated for demonstrating the feasibility and profitability of sustainable rangeland management.
Outcome 2: Capacity and awareness of the rural communities and local governments for monitoring, planning and regulating the use of the pastures in a sustainable way.
Outcome 3: An enabling environment which allows the rangeland users to effectively and sustainably manage pastures.
Outcome 4: Training, assessment and adaptive management.

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Title of the project/practice: «Central Asian Countries Initiative for Land Management»
Type of action on adaptation to climate change : Institutional and political
Project goal and objectives: Sustainable management of land resources
Project implementation organization: Ministry of Agriculture of Kyrgyzstan **Partner organizations:** **Donors:** ADB, German Technical Centre
Duration of the project: 2007 -
Implementation stage of the project (planning/initial/implementation/completion/completed)*:* Implementation
Activities and outcomes of the project: Promoting rational land use
Contact information: 4ª Toktonaliev Street, Room 231, Bishkek 720055, Kyrgyzstan Fax +996312 54-09-75. Tel. +996312 56-63-58. **Email:** cacilm@ktnet.kg

The GEF Small Grants Programme's projects

№	Name of the project	Duration of the project	Goal	Results	Contact
1	**Stabilisation of Ecosystems of Isfana-Say Transboundary River**	2002	Decrease in the water pollution levels in the Isfana-Say river by reconstruction of the drainage system, monitoring ecosystems and undertaking awareness-raising activities and training, and introduction of a new system of payment for maintenance of the drainage system.	· Water treatment facilities are reconstructed; · Cleanliness monitoring · · a Report is released; and · 880 metres of pipes are replaced.	Public foundation "Bilek" NGO Chairman: Azamat Abdurahmanov
2	**Inventory of Resources and Environmental Assessment of River Ton**	2002	Development of a project proposal on creating a special mode of using the territory, or a communal reserve.	Project proposal is made.	Public association "Janai Ozone" NGO

№	Name of the project	Duration of the project	Goal	Results	Contact
	Estuary to Create Communal Protected Territory				Chairman: Musabek Baiseitov
3	**Protection of River Banks by Planting Saplings and Strengthening the Banks by Traditional Methods**	2003	Protection of the river banks by planting saplings and strengthening the banks by using the traditional methods. High waters threaten a Siberian stag nursery.		Public association "Eco - health" NGO Chairman: Abdybek Satarov

USAID projects

№	Name of the project	Duration of the project	Description	Budget, Contact, Implementer
1	**Kyrgyz Agri-Input Enterprise Development (KAED)**	**2001-2010**	The project strengthens the agro-input sector and food security in the country. In co-operation with the Association of Agri-businessmen of Kyrgyzstan and other local service providers, the project works to improve farmer and business profits by: • strengthening the input-supply systems and markets; • enhancing the technology transfers and the private sector's extension services; and • introducing improved animal feed and health practices.	Contact: USAID Implementing organisation: International Fertilizer Development Center (IFDC)
2	**Water UsersAssociations Support Programme (WUASP)**	**2004-2010**	The project works with the Water User Associations (WUA) to help improve the management of the local water delivery systems and improve productivity of the land. The project: • funds and helps implement small-scale irrigation infrastructure projects; • trains WUA members on democratic practices, business planning, accounting and determining fair and accurate water	Contact: USAID Implementing organisation: Winrock International

			allocations; and • educates the communities on the benefits of WUA structure.	

2) Forestation, biodiversity and ecosystems

Title of the project/practice: «Development of National Strategy for Adaptation to Climate Change»
Type of action on adaptation to climate change : Institutional and political
Project goal and objectives: Development of a national strategy for adaptation to climate change
Project implementation organization: State Agency on Environment Protection and Forestry **Partner organizations:** Ministry of Health, Ministry of Emergency Situations, Ministry of Agriculture, Centre for Climate Change, Ozone Centre **Donors:** At the initial stage partially UNDP (now there is a search of donors for the end)
Duration of the project: 2009 -
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed
Activities and outcomes of the project: Draft strategy for adaptation to climate change is prepared
Contact information: Iliasov Shamil, 142a, Room 234, Bitter Street, Bishkek 720005, Kyrgyzstan, Tel.: +996 312 548852, Fax: +996 312 548853 **Email:** shami_il@mail.ru **Website:**

The GEF Small Grants Programme projects

№	Name of the projects	Duration of the project	Goal	Results	Contacts
1	**Decreasing destruction rate of juniper forest ecosystems withendemic inhabitants which are included in Red Book of species such as maral (Cervus elaphus sibiricus Sev.) and lynx (Felis lynx isabellina Blyth) in vicinity of Barskoon**	August 2002 – May 2004	Reduction of anthropogenic pressure on natural the juniper forests and flood-plain brush-wood vegetations through fast growing trees planting (poplar	- Fast-growing trees planting (poplar) with the purpose of preventing natural juniper forests on the nearest mountain slopes and of responding to the future household needs of the local population; - Illegal deforestation	Public Association *Karek* -PAK (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
	village located on northern slope of Teskey Alatoo range, through creation of buffer plantations of fast- growing trees. (KYR/SGP/OP2/Y4)		and willow) which will form a buffer zone between the village and natural forest.	stopped; - Preservation of habitats of different birds and animals; and - Rising public awareness on global and local environmental problems.	
2	Reduction of illegal deforestation cases in juniper forests and flood-plain bushes of northern coast of Issykl-Kul Lake located between Kojoyar and Semenovka villages through planting fast-growing trees. (KYR/SGP/OP2/Y4/CORE/2002/23)	August 2002 - November 2003	Stoppage of deforestation rate through creation of fast-growing trees plantations which will be used by the population as firewood and timber without elimination from the natural plant species which are endemic and and included in the Red Book of species.	**Ecological benefit** Protection of species of plants included in the Red Data Book of Kyrgyzstan, part of them are endemic. **Economic benefits** · Provide people with firewood and timber; and - Using of flood-plain brush-wood vegetations for current gathering instead of cutting down of these plants.	Public Association *POPULYUS* - PAP (NGO)
3	Preservation of biodiversity in Besh Tash reserve, by planting fruit and quick-growing trees and giving ecological education to scholars. (KYR/SGP/OP2/Y4/CORE/2002/30)	September 2002 – December 2003	Preservation of biodiversity in Besh-Tash natural park by plantation (11 hectares) of fast- growing and fruit trees nearby close settlements and increasing of environmental education the among children and schoolboys. Three tree nurseries will be crated in the school.	- People have known about the environmental problems of the given area and endangered species included in Red Book; - Illegal deforestation stopped; and - Preservation of habitats of different birds and animals.	*Civil Society for Environmental Safety and Overcoming Poverty* - CSE (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
4	**Rehabilitation and preservation of** Semenov ` s fir **(KYR/SGP/OP2/Y5/CORE/2003/36)**	March 2003 – September 2005	Conservation and rehabilitation of Semenov ` s fir (Abies Semenovii B.Fedtch) – endemic species of Kyrgyzstan flora.	· Creation of Semenov ` s fir nursery (1 hectare), with the subsequent planting of seedlings in the plantation (17.8 hectares); · Creation of transitive branch of the plantation (1.2 hectares); · Training of local residents of Kara-Koyun settlement to look after saplings of Semenov ` s firs and fruit trees and bushes; and · The informational campaign directed to prevent cutting of Semenov ` s fir and to demonstrate economic and ecological advantages of cultivation and sale of Semenov ` s fir saplings.	Public Foundation *Ak-Kayin* - PFAK (NGO)
5	**Establishment of arboretum and community reserve in Ak-Suu district (KYR/SGP/OP2/Y5/CORE/2003/38)**	March 2003 - September 2005	The project tried to solve the problem of ecosystems rehabilitation in the vicinity of the Kara-Kyz village.	· Creation of an arboretum (20 hectares). The arboretum consisted of tree nursery for species which are included in the Red Book of Kyrgyzstan: Semenov fir, Knorring hawthorn, Nedzvedskogo apple, etc. Saplings of fast-growing trees (poplar and willow), wild-growing fruit bushes (barberry, sea-buckthorn) and apricot were also planted in the territory of the tree nursery. · Planting of sea-	Public Association of farmers*Ak-Suu Baba Diykani* - PAKS (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
				buckthorn and willows in the flood lands of Zhergez river. · The Protection of nesting and mating places of black cocks, which is a basis for creation of community-based reserve (about 40 hectares). The basic method of protection is stopping of access for cattle and people during the black cocks mating season.	
6	**Rehabilitation of pistachio and almond bushes in adyr zone of southern Kyrgyzstan (KYR/SGP/OP2/Y5/CORE/2003/39)**	June 2003 - September 2004	Rehabilitation of fragments of a pistachio forest belt in the vicinities of Suluctu town.	**Benefits achieved by the participants during the implementation** · Rising public awareness on global and local environmental problems; · Preservation of rare almonds Bucharica Korsh included in the Red Book in the vicinity of the Sulukta town; · Decrease in landslides and mudflows; · Stoppage of pasturing on the protected territory; and · Saplings will absorb coal dust from the direction of coal-field strike in the future.	Public Foundation *Karchygabek* - PFK (NGO)
7	**Reducing environmental load to natural countryside ecosystem through organising pasture rotation. (KYR/SGP/OP2/Y5/COR**	August 2003 - September 2005	Reduction of manmade pressure on the natural ecosystems in the buffer zone of the Sary-Chelek	· Monitoring of pastures located in the village's vicinity; · Mobilization of local people and local authority to solve the	Public Association *Aksi Baly* - PAAB (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
	E/2003/44)		Reserve.	environmental problems; · Organizing pasture rotation through dividing the area into separate zones and introduction of scheduled grazing (100 hectares); · Seeding in the fenced plots of regulated pastures; · Cleaning 15 springs and constructing watering place for animals; · Conducting seminars for exchanging experience with neighbouring villages; and - Information and advocacy campaign.	
8	**We have to convert desert into beautiful oasis (KYR/SGP/OP2/Y5/CORE/2003/56)**	November 2003 May 2005	Rehabilitation of biodiversity and prevention of land degradation in mountain and forest ecosystems by planting walnut trees on mountain slopes around the Turpakkorgo village and creation of an industrial unit for production of seedlings with closed root (briquettes).	· Mobilization of local people; · Procurement and planting of saplings of walnut, wild apple, almond, currants and sage; · Raising local people's awareness about environment and sustainable nature management; · Launch of mini-plant for producing seedlings that have closed root system (briquettes); · Terracing a flank of hill (12 hectares); · Fencing the territory; · demonstration of alternative livelihood; · allocation of plots	Public Ecological Foundation *PEFNEF New Eco-Forest* (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
				among the local population; and · information campaign.	
9	**Wood-cutting reduction in natural forest plots by creation of industrial plantations of fast-growing trees (KYR/SGP/OP2/Y5/CORE/2003/60)**	November 2003 – December 2004	Creation of industrial plantations of poplar "Piramidalnaya" and willow at the Kegeti riverside to prevent forest cuttings in the nearby forest ecosystems.	· Conducting seminars and trainings for the local population; · Fencing the territory of 15 hectares; · Purchasing and planting saplings; · Takingcare of saplings; and · Information campaign.	Public Association *SAZET* - PAS (NGO)
10	**Conservation and rehabilitation of habitat of reptiles included in Red Book such as Central Asian tortoise (Agrionemys horsfieldi), steppe viper (Vipera ursini), glass snake (Pseudopus apodus) in Kara-Koyun plot through rehabilitation of wood vegetations in the zone of deciduous bushes of southern slope of Fergana Range(KYR/SGP/OP3/Y1/CORE/2005/01)**	July 2005 – June 2007	Conservation and rehabilitation of the habitat of Red Book reptiles through organising community-based patrol, fencing and planting saplings of almond and pistachio in 50 hectares of land.	**Ecological benefit** Preserving the habitat of several species of reptiles included into Red Book of Kyrgyzstan, 2 are endemic species of Central Asia, and volume provision of reptiles reduced. **Economic benefits** Products of pistachio and fast-growing trees provid additional incomes and reduce expenses on timber. It is possible that the established workshop on forest products processing (herbs, pistachio, fruits) created new workplaces. **Socio-cultural or political benefit** The population changed their attitude toward biodiversity conservation andutilize it in a more sustainable way than	Public Association - *PAB* (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
				earlier.	
11	**Protection and reproduction of endemic species included in Red Book of Kyrgyzstan (Sorbuspersica Hedl. and Pyrus korshinskyi Litv) by rehabilitation of wood and bush vegetation plot nearby Tatar village, located in the steppe belt of southern slope of Alay Range. (KYR/SGP/OP2/Y6/CORE/2004/96)**	April 2005 – December 2007	Elimination of causes of disappearance of the indicated species by fencing and planting wood and bush vegetation on a plot that was earlier used as a pasture.	**Ecological benefit** Conservation and widening of a habitat of wood and grass vegetation included in the Red Data Book of Kyrgyzstan. **Economic benefit** Collecting and processing of fruits and saplings sale as a supplement to traditional cattle-breeding and plant-growing.	Public Foundation *Ecosos* - PFE (NGO)
12	**Reduction of man-made pressure on natural juniper and spruce forests of Kara-shoro National Park by stimulation of growing local fast-growing species of trees and pasture rotation schemes in the settlements adjacent to borders of the national park located in the South-West slope of Fergana Range (KYR/SGP/OP3/Y1/CORE/2005/04)**	July 2005 – June 2007	Environmental threats in the Kara-shoro National Park and its buffer zone are intensive cutting down of wood-bushes vegetations on flanks of hill, over cattle pasturing and. The result is soil degradation.	**Ecological benefits** · Considerable decrease in man-made pressure on natural juniper and spruce forests; and · Decrease in land erosion and degradation tempos in the buffer zone of the Kara-shoro National Nature Park. **Economic benefits** The local people received the opportunity to diversify their economic activity, which can lead to increase in common incomes and decrease in incomes from cattle breeding. **Socio-cultural or political benefits** · Interaction between the population, NGO and administration unit of the Karashoro National Park	Public Foundation *PFEO* (NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
				becmes stronger; and · The pasture circulation changed the traditional extensive cattle breeding.	
13	**Rehabilitation of wood and bush components of steppe landscape, including endemic and Red Book species such as Nedzveskiy's apple (Malus niedzwetzkyana Dieck), Central Asian's pear (Pyrus asiae-mediae), Knorring's hawthorn (Crataegus knorringiana Pojark) through planting wood and bush vegetation in the fenced plot on the eroded slope near the Kyzylata village (KYR/SGP/OP3/Y1/CORE/2005/05)**	July 2005 – November 2006	Rehabilitation of wood-bushes components on the southern slope of the Chatkal Range.	**Ecological benefit** Rehabilitation of the previous wood-bushes vegetations of the steppe ecosystem, which contains species included into Red Book – a part of them are endemic species of the western Tyan-Shan Mountains. **Economic benefit** The local people received an opportunity to diversify their economic activity, which can lead increase in common incomes and decrease in incomes from cattle breeding.	Public Association *PAMK* (NGO)
14	**Afforestation of slope prone to landslides in the vicinity of Gulcha settlement**	2002	Prevention of landslides and preservation of mountain and wood ecosystems inhabiting a rich variety of birds, animals and plants by forestation and planting saplings on the hillsides.	Sea-buckthorn, dog-rose, mountain ash, almond, pistachio, bushes, etc. planted on 10 hectares.	Public Association *Alai Ata-Zhurt* (NGO) Chairman: Sonunbubu Ismailova
15	**Restoration of natural ecosystems in the vicinity of human settlements in the Fergana Ridge**	2002	Decrease in load on ecosystems in the vicinity of human settlements by restoration of droves and natural ecosystems by	· Droves are rebuilt; and - · Nut woods are planted on 7 hectares.	Association of Businessmen *Kok-zhangak* (NGO) President: Rysbek

№	Name of the projects	Duration of the project	Goal	Results	Contacts
			planting relict wood.		Akumbaev
16	**Restoration of nut woods in landslide-prone site Jalgyz-Jangak**	2002	Restoration of biodiversity and decrease in land degradation and landslides in the mountain and wood ecosystems by planting nut woods on hillsides.	Nut wood are planted on 40 hectares.	*Rural Support and Development Foundation* (NGO) Director: Durusbek Toroev
17	**Planting for rural well-being**	2002	Industrial planting of poplar and willow to prevent deforestation of the flood-plain forest and wind-shelter plantations in the Barskoon settlement.	· 20-hectare industrial plantations of poplar are created; and · seminars are held.	Public Association *Karek* (NGO) President: Erkingul Imankojoeva
18	**Road to prosperity**	2002	Develop a project proposal on creating a support foundation to preserve the ecosystems and decrease land degradation.	A project proposal is made.	Association of Businessmen *Kok-zhangak* (NGO) President: Rysbek Akumbaev
19	**Restoration of nut woods in the vicinity of Tegene settlement**	2002	Preservation of biodiversity by restoration of relict woods through planting of nut wood saplings, construction of arboretum and regulation of grazing.	Restoration of 20 hectares of relict woods.	Water Users Association *Karyer-zhon* (NGO)Chairman: Nadyrbek Ryskulov
20	**Preservation of sea buckthorn from environmental danger**	2002	Preservation of sea buckthorn by replanting and	6,000 sea-buckthorn replanted.	Public foundation *Kenenbay*NG

№	Name of the projects	Duration of the project	Goal	Results	Contacts
			protective activities.		O Chairman: Uriika Abdyldaeva
21	**Environmentally friendly organic fertilizer in rural regions**	2003	Development of a project proposal on substituting synthetic fertilizers, pesticides and herbicides with granulated organic fertilizers.	A project proposal is made.	Aksyj Regional Public Association *ULGU* (NGO) CEO: Elmira Aiylchieva
22	**Preservation of Juniper forests by changing traditions**	2003	Changing the tradition of using Juniper to fence tombs by organizing workshops on manufacturing sepulchral fences from other materials, planting poplar saplings, creating Juniper arboretum and raising environmental awareness of the local population.		Public Association *Kenpeiil* (NGO) Chairman: Ismailov
23	**Restoration of endangered species of bushes of nut woods in Kerben Valley, Aksy region**	2003	Preservation of biodiversity by restoration of relict woods through planting of nut wood saplings, and construction of arboretum in the vicinity of the Kerben settlement.	Nut saplings are planted on the rented land of the NGO's and private plots.	Public Association *Altyn-balalyk* NGO Director: N. Atambaeva
24	**Creation of communal forest plantation of nut, almond and arboretum**	2003	Restoration of the relict woods, planting fast-	80 hectares of the rented land of the NGO are distributed between	Public Foundation *Eco-Oy*

№	Name of the projects	Duration of the project	Goal	Results	Contacts
	in Tushunuk settlement		growing trees and creation of arboretum by involving the communities.	community families.	(NGO) Chairman: Kursantbek Attokurov
25	Fast-growing tree plantations in Sutuu-Bulak River flood-plain	2003	Creation of communal industrial poplar and willow plantations in the Sutuu-Bulak River flood plain in the Svetlaya Polyana settlement to fight deforestation in the nearby ecosystems.		Public Association for support of education, culture and business women *YSYK-KOL SABATY* (NGO) Chairman: Doktorgul Kendirbaeva
26	Creation of communal forest plantation of nut, almond and arboretum in Tushunuk settlement	2003	Restoration of relict woods, planting fast-growing trees and creation of arboretum by involving communities.	80 hectares of the rented land of the NGO are distributed among community families.	Public Foundation *Eco-Oy* (NGO) Chairman: Kursantbek Attokurov
27	Development of sustainable local communities development methods for settlements in vicinity of nut wood plantations	2003	Evaluation of the needs of the local communities and development of methods for deeper processing of nut wood products.	Scientifically- and economically- proved design offer is handed over.	Public Association *Assistance to Local Initiatives* (NGO) Chairman: Bolotbek Soldatov
28	Planting pistachio and Bukhara almond	2003	Preservation of the Red Book Bukhara almond.	30 hectares of almond saplings and pistachios are planted and distributed among the local residents.	Public Foundation *Karchygabek* (NGO) President:

№	Name of the projects	Duration of the project	Goal	Results	Contacts
					Saida Juraeva
29	**Turning desert into oasis**	2003	Restoration of biodiversity and decrease in land degradation in the mountain and wood ecosystems by planting nut woods on the hillsides around the Turpakkorgo settlement.	The new briquette technology is introduced as well as production of nurslings with closed root system. The sites are distributed among the local population.	Public Eco-Foundation *New Eco-Forest* (NGO) Chairman: S. Zalimbekov
30	**Reducing environmental load to natural countryside ecosystem through organising pasture rotation**	2003	Reducing environmental load to the natural countryside ecosystem around the Karasuu settlement by creating cultivated pastures and their turnover, and also cleaning springs and creating earth tanks that do not break eco-balance.		Public Association *Aksy Baly* (NGO) Chairman: Arstanbai Shaidyldaev
31	**Creation of conditions for sustainable development of wood ecosystems in area of 55 hectares belonging to NGO**	2003	Restoration of biodiversity by planting nut woods on the hillsides around the Kara-kol settlement.	With the assistance and participation of the local population saplings of nuts, wild apple-trees and currants are planted. Sites are distributed among the local population.	Public eco-foundation "Chilten" NGO Chairman: Zulumbek Jamashev
32	**Capacity building of the non-governmental organisations -partners to the GEF/SGP programme in Kyrgyzstan**	2003	Improvement of professional skills of NGO employees in understanding the global environmental		Association of Local Initiatives for Sustainable Environment

№	Name of the projects	Duration of the project	Goal	Results	Contacts
			problems, improved project implementation management, capacity building in data collection as well as analysis, distribution, accumulation and replication of experience across Kyrgyzstan.		al and Community Development CEO: Talaibek Makeev

3) Public health

Title of the project/practice: Regional WHO project «Climate Change Adaptation to Protect Human Health» covering 7 countries: Albania, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Macedonia and Uzbekistan
Type of action on adaptation to climate change : Institutional and political
Project goal and objectives: Development of a national action plan on prevention and mitigation of the climate change impact on human health.
Project implementation organization: Ministry of Health of Kyrgyzstan **Partner organizations:** State Agency on Environment Protection and Forestry, Ministry of Emergency Situations, National Academy of Science, Universities, WHO European Office, National Health Service (NHS) ofGreat Britain **Donors:** The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Duration of the project: 2008 - 2010
Implementation stage of the project *(planning/initial/implementation/completion/completed):* completion
Activities and outcomes of the project: A draft national action plan on prevention and mitigation of climate change impact on human health is prepared.
Contact information: Elena Ten, PhD, Senior Researcher, Scientific and Production Centre for Preventive medicine of the Ministry of Health of the Kyrgyz Republic 34, Baitik Baatyr Street, , Bishkek 720005, Kyrgyzstan **Email:** elena_spcpm@yahoo.com **Website:**

4) Disasters and extreme events

1. **Title of the project/practice:** «Enhancing Disaster Risk Reduction Capacities in Central Asia»
Type of action on adaptation to climate change : Institutional and political
Project goal and objectives: The project is aimed at strengthening disaster response mechanisms and establishing a national platform for disaster risk reduction.
Project implementation organization: **Partner organizations:** State Agency on Environment Protection and Forestry **Donors:** UNDP, DIPECHO
Duration of the project: 17 March 2011 – 30 December 2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* completed
Activities and outcomes of the project:
Contact information: Mr. Kenesh Saynazarov **Email:** **Website:** http://www.undp.kg/ru/component/resource/article/1-projects/1440-enhancing-disaster-risk-reduction-capacities-in-central-asia

IV Tajikistan

1) Water resources and agriculture

Title of the project/practice:
«Land Registration and Cadastre System for Sustainable Agriculture»

Type of action on adaptation to climate change :
Technological
Educational and Awareness Raising

Project goal and objectives:
Consultation services in building capacity for environmentally sustainable land management in the 2009 local projects in the Republic of Tajikistan.
The tasks are:

- to work on mitigating the risks for the environment;
- to increase crop production productivity and livestock yield through capacity building of local experts in agriculture and preservation of the environment;
- to hold a training to exploit land and water resources with account of the environmental risks;
- to create correct use of farm irrigation system;
- to create a system of reward for the farmers; A training of beneficiaries applying the advanced management methods will be held on their plots; and
- to raise awareness of the stakeholders in the above-mentioned aspects.

Project implementation organization: Government of Tajikistan
Partner organizations: CAREC Tajikistan Country Office
Donors: International Development Association, World Bank

Duration of the project: 12 May 2009 - 15 July2010

Implementation stage of the project *(planning/initial/implementation/completion/completed):*
completed

Activities and outcomes of the project:

- Teaching materials for distribution in the pilot areas.
- Each area has a committee consisting of the **CAREC Tajikistan Country Office** representatives and regional experts in agriculture, irrigation and protection of plants. A esearch has been undertaken according to the adopted schedule.
- A number of training seminars with a total number of participants of 400.

Contact information:
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The GEF Small Grants Programme's projects

№	Name of the project	Duration of the project	Goal	Contacts
1	Conservation of agro-biodiversity through active involvement of local communities in 3Special Protected Nature Areas (SPNA) in Gissar area (TJK/SGP/OP4/ Y3/CORE/2010 /03)	June 2010 - June 2011	1) To demonstrate new methods through creation of · 3 community nurseries in 3 hectares of land; · Construction of 8 community dumps within the protected areas; and · Erection ofof 3 flood-protection facilities within the protected areas. 2) To build capacity and enhance knowledge of 15 local staff of SPNA Romit, nature reserve Almosi, historical natural park Shirkent and 120 community leaders on effective management and monitoring process of conservation of agro-biodiversity and forest ecosystems. 3) Civic awareness raising among the targeted community on environment protection and sustainable use of natural resources through provision of information campaigns, publications, leaflets, etc.	NGO - Jamoat Resource Centre ' Sabo ' - NGO-JRC ' Sabo ' (Community Based Organization)

USAID projects

№	Name of the project	Duration of the project	Description	Budget, Contacts, Implementer
1	Tajikistan Safe Drinking Water Project	September 2009 – September 2012	The project will work to increase access to potable water in the rural communities and decrease the incidence of water-related diseases through household hygiene interventions. The project will also improve the long-term technical and financial sustainability of potable water services and management of potable water quality and quantity in the target communities.	Contact at USAID: Malika Makhkambaeva (COTR) Implementing organisation: Mendez, England and Associates

Asian Development Bank projects

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
1	Water Resources Development	2 November 2005 - 22 April	The objective of the technical assistance (TA) is to prepare a feasibility study of a project to raise farm productivity and	Responsible ADB Officer: Plamen Bozakov

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
	and Rehabilitation	2010	rural household income and improve the environment in the project area through integrated assistance in rural infrastructure rehabilitation, institutional strengthening, and improvement of agricultural production technologies and marketing. The Project will complement the assistance to be provided under the Agriculture Rehabilitation Project supported by ADB, which will be implemented at the beginning of 2003. The tentative project scope encompasses (i) capacity building for proper operation, maintenance, and repair of irrigation and rural infrastructure; (ii) management of water resources; (iii) support of agricultural marketing; and (iv) enhanced farm management and technologies. Priority will be given to areas with higher incidence of poverty and areas where beneficial impacts will be sustainable. A grant which finances the TA will accompany the loan-funded investments to advance governmental policy formulation and investment programming in the agriculture and natural resources sectors.	Responsible ADB Department: East and Central Asia Department (ECRD) Responsible ADB Division: Agriculture, Environment and Natural Resources Division, ECRD Executing Agency: **Ministry of Water Resources and Land Reclamation**
2	**Support for Monitoring Policy Reforms and Improving Farm and Water Management**	2 November 2005 22 April 2010	The objectives of the TA are to (i) monitor progress in implementing policy reforms that would create a conducive environment for project implementation; (ii) promote competitive providers of farm inputs, technical advice, credit and marketing of produce in the project area; and (iii) assist the Government in establishing a WUAs support unit within the Ministry of Water Resources and Land Reclamation.	Responsible ADB Officer: Binsar P. Tambunan Responsible ADB Department: Central and West Asia Department (CWRD) Responsible ADB Division: Agriculture, Environment, and Natural Resources Division CWRD Executing Agencies: **Ministry of Water**

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
				Resources and Land Reclamation Mr. Abdukokhir Nazirov, Minister 14, Aini Street, Dushanbe 73042, Tajikistan
3	**Farm Analysis and Awareness Raising for Debt Resolution**	2 November 2005 22 April 2010	The impact of the TA is to ensure that farm the debt resolution successfully proceeds under the Government's Farm Debt Resolution Strategy (FDRS). The outcome of the TA is to ensure that the governing body for implementation of the FDRS, the independent commission, establishes fair, timely and systematic mechanisms for farm debt resolution on a per-farm basis. The TA is expected to result in farm analyses/farmer awareness processes being completed on a schedule agreed upon between farmers, creditors and the independent commission, and about 50 % of the indebted farms working out dept arrangements within 5 years of the TA completion.	Responsible ADB Officer: Betty Wilkinson Responsible ADB Department: Central and West Asia Department (CWRD) Responsible ADB Division Agriculture, Environment, and Natural Resources Division, CWRD Executing Agency: Office of the President Mr. Matlubhon S. Davlatov ADB Governor and State Adviser to the President on Economic Policy Office of the President, Dushanbe, Tajikistan
4	**Agricultural Rehabilitation Project**	5 December 2006 - 6 December 2010	The objective of the TA is to formulate a Project aimed at reducing poverty in the selected areas of the country by rehabilitating critically needed rural infrastructure, revitalising agricultural productivity, improving access to markets, expanding employment opportunities, and ultimately increasing incomes, while allowing the beneficiaries to be more self-reliant with food security. The TA will substantiate priority areas in	Responsible ADB Department: East and Central Asia Department (ECRD) Responsible ADB Division: Agriculture, Environment and Natural Resources Division, ECRD Executing Agency: **Ministry of Water Resources**

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
			Khatlon and Leninabad provinces for ADB assistance in (i) support for farm privatisation, including information and advisory services, and other initiatives aimed at easing the transition to private farming. (ii) cost-effective rehabilitation of selected irrigation and drainage systems, focusing on the most critical main and field-level infrastructure, with parallel establishment of Water Users Associations (WUAs). For the systems the requisites will be enabled for their operation and maintenance. Capacity development for monitoring environmental impacts will be initiated. (iii) rehabilitation and provision of water supply and sanitation facilities in selected locations, with parallel development of organizational arrangements and mechanisms for sustained operation and management of the facilities. The TA will prepare the proposed Project for possible ADB financing. In preparing the Project, the TA will provide recommendations to (i) overcome the critical constraints facing agricultural development; and (ii) improve the institutional arrangements and necessary enabling conditions at the national, regional and local levels. The TA is also expected to reach a consensus among the concerned stakeholders at the national, regional and local levels on the objectives, scope, and implementation arrangements of the proposed Project.	5/1 Shamci Street, Dushanbe, Republic of Tajikistan
5	**Agriculture Rehabilitation Project**	31 January 2002 15 November 2010	The Project's objectives are to (i) improve the living conditions of the project area farming communities; and (ii) institute measures to sustain benefits of improvements implemented under the Project.	Responsible ADB Officer: Zarrina Abdulalieva Responsible ADB Department: Central and West Asia Department

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
			The Project has the following components: (i) agriculture support services for Dehkan farms; (ii) rehabilitation of irrigation and drainage systems and related institutional support; (iii) Improvement of rural potable water supply systems; and (iv) project management, monitoring and evaluation. The Project was earlier listed as Agriculture Rehabilitation Sector Development Programme. In February 2006, at the request of the Government, the Project's scope was enhanced to finance the rehabilitation of the Pianj river protection works and the Dehkonobod canal which were damaged after a flood in June 2005.	Responsible ADB Division: Tajikistan Resident Mission Executing Agency: **Ministry of Water Resources and Land Reclamation** Mr. Rakhmat Bobokalonov Minister of Water Resources and Reclamation Dushabe, Republic of Tajikistan, Shamsi st. 5/1, fax 236 09 56, 235 35 66

2) Forestation, biodiversity and ecosystems

The GEF Small Grants Programm's projects

№	Name of the projects	Duration of the project	Goal	Results	Contacts
1	**Eco-Farmer: Demonstration of alternative, sustainable and effective land use and increasing land production(TJK/SGP/OP4/Y3/CORE/2010/02)**	June 2010 - June 2011	To build capacity of the local community (farmers and landowners) on sustainable land use and management through provision and exchange of best practices and lessons learnt on SLM, organic land farming, biological fertilization and bio-pest control management based on the demonstrational plots established within target communities of Nosiri Khisrav district.		Jamoat Resource Centre (NGO) ' Komsomol (Community Based Organization)
2	**Demonstrating rehabilitation of mountain**	June 2010 – May	· . To reate employment for rural households; ·To rehabilitate lost		Jamoat Resource Centre

№	Name of the projects	Duration of the project	Goal	Results	Contacts
	and forest ecosystems through plantation of pistachio trees in 12-hectare land in arid zone (TJK/SGP/OP4/Y3/CORE/2010/04)	2011	biodiversity and forest ecosystem in 12-hectare land; · To demonstrate importance and efficient use of desert areas on mountain slopes for improvement and rehabilitation of forest and mountain ecosystems and living conditions of rural community; and · Civic awareness raising among target community on environmental protection and sustainable use of natural resources through provision of information campaigns, publications, leaflets, etc.		(NGO)Sarmantoi ' (Community Based Organization)
3	Creating conditions for rehabilitation of wood areas and protecting lands from wind and sand erosions through plantation of Halaxyon in 60-hectare land in Shaartuz area, Tajikistan. (TJK/SGP/OP4/Y3/CORE/2010/01)	June 2010 – May 2011	To create conditions to rehabilitate deserted wood areas and ensure land protection of 1,795 hectares of arable lands, 1,050 hectares of kitchen-garden plots and 250 hectares of presidential lands.	· Some 50 people among community the residents are provided with employment; · At least 2 people per hectare are provided with self-employment, considering 3,000 hectares 2 people/hectares equals 6,000 people; · 60-hectare wood area is rehabilitated and maintained by the local community, thereby community stewardship and ownership are increased; · 20 seminars are provided for 500 women, including children and village leaders, on SLM, pasture rotation and	Jamoat Resource Centre (NGO)Jura-Nazarov (Community Based Organization)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
				management, etc; · Saxaul plantation are provided and becomes ideal inhabitation for various wild animals and birds; a number rare endemic species, which are recorded in the Red Book and are critically endangered are rehabilitated/increased and biodiversity restored. · Civic awareness is increased which enabled local community to directly participate in decision-making processes and contribute to the improvement/increase of land production and living conditions; · 100 brochures and information materials aredeveloped, published and distributed among 500 families/households; and h) Round table for 30 participants are organised and conducted;	
4	**Rehabiltating and conserving agro-biodiversity through increasing number of wild and**	June 2010 – December 2011		· Cessation of fauna degradation process and rehabilitation of its quantity and quality aspects through application of honey bee-keeping best practices; · Practical involvement of 50 farmers and local	NGO ' Subhi Tandurusti ' - NGO ' Subhi Tandurusti(NGO)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
	honey bee hives in mountain areas of Vakhsh and Hazrati-Shokh ridges (TJK/SGP/OP4/Y3/CORE/2010/05)			community in conservation of biodiversity; · Improvement of living conditions and creation of employment (for local farmers, youth and women committees, and fruits and vegetables associations) through promotion of new ecological technology for raising agricultural production and small entrepreneurship; and · Civic awareness raising among the target community on environmental protection and sustainable use of natural resources through provision of information campaigns, publications, leaflets, etc.	
5	Introducing effective use of degraded lands on hill slopes to protect arable lands downhill and rehabilitate mountain and forest ecosystems (TJK/SGP/OP4/Y3/CORE/2010/08)	June 2010 – June 2011	· Rehabilitation of and effectively use eroded hillslopes bymproving ecological and social-economical conditions in the rural area, through plantation of fruit, nut and timber trees in 10-hectare land of the eroded hillslopes to protect some 100 hectares of the arable land from further erosion; and · Civic awareness raising among the target community on environmental protection and sustainable use of natural resources through		Business Advisory Information Centre(NGO) Komron(Community Based Organization)

№	Name of the projects	Duration of the project	Goal	Results	Contacts
			provision of information campaigns, publications, leaflets, etc.		
6	**Reduction of mountain desertification and conservation of biodiversity (TJK/SGP/OP4/Y3/CORE/2010/06)**	June 2010 – May 2011	· To protect and conserve 100-hectare pasture lands on the mountain slopes through provision of irrigation water, application of organic fertilizers and bio-agro-techniques; · To improve 500-hectare degraded pasture lands and some 187 hectares of rain-fed arable lands condition and production; and · Civic awareness-raising among the target community on environmental protection and sustainable use of natural resources through provision of information campaigns, publications, leaflets, etc.		NGO - Jamoat Resource Centre ' Yangi-Shahr ' - NGO-JRC ' Yangi-Shahr (Community Based Organization)

Asian Development Bank's projects

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
1	**TA-7599 TAJ: Climate Resiliency for Natural Resources Investments**	7 July 2010 28 October 2010	The objective is to pilot and demonstrate ways to integrate the climate risks and resilience into core development planning, while complementing the other ongoing activities. The Pilot Programme for Climate Resilience (PPCR) has two Phases. Phase 1 will develop a common vision of climate resilience in the medium and long term and formulate a	Responsible ADB Officer: Ryutaro Takaku Responsible ADB Department: Central and West Asia Department (CWRD) Responsible ADB Division: Office of the Director General, CWRD Executing Agency: **ADB**

			Strategic Programme for Climate Resilience (SPCR), including an outline of an underlying investment programme. Phase 2 will implement the SPCR through support to policy reform, institutional capacity building and scaling-up of investments in key sectors.	

3) Public Health

Title of the project/practice: «Adaptive Public Health and Safety Measures in Tajikistan under Climate Change»
Type of action on adaptation to climate change : • Technological • Technical and infrastructural • Educational and Awareness raising
Project goal and objectives: • The project will build the capacity of the Government and the other participating institutes in providing the best possible assessments of various aspects of climate change and will propose alternative adaptive measures in order to consider some priority issues. For these purposes, the project will supply the country with the possibility to carry out negotiations on the issues of adaptation to climate change and evaluate the possibilities and obligations. • The project will promote introduction and embedding of the climate change and policy-making strategies in relevant plans and programmes on improvement of public health and environmental protection measures.
Contact information: **Malika Babadjanova, Country Office Director, CAREC Tajikistan** **Email:** babadjanmalik@yahoo.com **Website:**

4) Disasters and extreme events

Title of the project/practice: «Strategic Programme for Climate Resilience in Tajikistan»
Type of action on adaptation to climate change : • Institutional and political • Technological • Technical and infrastructural
Project goal and objectives: • The Project aims at becoming a template for tackling risks caused by climate change and building up a long-term institutional capacity.

• The specific objectives of the Project include: · building up both technical and institutional and organizational capacity for adaptation to climate change; · enhancing provision of services and data on weather forecast, climate and water; · conduct a joint survey of potential approaches to improvement of climate regulation and development of guidelines for climate data processing and application; · **increasing climate resilience in the energy sector; and** · assisting the local farmers and communities in tackling the current problems of vulnerability to climate change through improvement of local life support, poverty and famine reduction, and arable land reclamation.
Project implementation organization: Government of the Republic of Tajikistan: Deputy Prime Minister Office, State Administration for Hydrometeorology, Ministry of Energy and Industry **Partner organizations**: World Bank, EBRD, ADB **Donors:** Environment and Security (ENVSEC) Initiative of UNECE
Duration of the project: Launched in 2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Initial

Title of the project/practice: «Capacity Building for Disaster Management in Tajikistan»
Type of action on adaptation to climate change : • Technological • Technical and infrastructural • Awareness raising
Project goal and objectives: Build capacity in flood warning, protection and control, and managing other natural disasters in around 130 villages situated in flood-risk zones, in the regions of Hamadoni, Vose, Pyandj and Shurabad, Hatlon oblast, Tajikistan. **Objectives:** • **Community mobilization with a focus on natural disasters** Assisting the local households in introducing a comprehensive system of disaster risk assessment as well as creating ability for risk reduction, monitoring, reaction and tackling the aftermaths, in case of floods and other emergencies, andalso raising awareness of these risks • **Forestry intervention** Provision of forestry protection against floods through random restoration of natural ecosystems by mean of protecting river banks and household territories from floods and providing these households with additional sources of income.
Project implementation organization: Government of the Republic of Tajikistan, Agency for Technical Cooperation and

Development (ACTED) **Partner organizations:** Country Office of CAREC in Tajikistan **Donors:** ADB
Duration of the project: May 2009 – August 2012
Implementation stage of the project *(planning/initial/implementation/completion/completed):* On-going
Activities and outcomes of the project: • A series of awareness-raising trainings for the communities on risks and their mitigation, early warning systems, reaction to the risks and aftermath restoration; • Development and introduction of educational materials for school children and adults on (i) risk assessment; (ii) mitigation; (iii) early warning; (iv) flood and/or disaster preparedness; and (v) flood and/or disaster adaptation strategies, development and implementation of the action plans; • The local communities are involved in risk assessment activities and plans, and maps are developed. • Scheduled seasonal practical evacuation/reaction trainings are held on the basis of the monthly assessment results.
Contact information: **Malika Babadjanova, Director, CAREC Tajikistan Country Office** **Email:** babadjanmalik@yahoo.com **Website:**

Title of the project/practice: «Flood Management at the Level of communities» (JFPR 9126 – TAJ)
Type of action on adaptation to climate change : • Technological • Technical and infrastructural • Educational and Awareness raising
Project goal and objectives: Flood management and control to strengthen river banks and protect human settlements through selective restoration of natural ecosystems with the help of woods. Tasks: • To develop a Master Plan which will unite and establish efficient mechanisms of ecosystem restoration in the Hatlon region; and • To restore Tugai (flood-plain forest) in the project territory.
Project implementation organization: Government of Tajikistan, ACTED **Partner organizations: CAREC Tajikistan Country Office** **Donors:** ADB
Duration of the project: 18 May 2009 – 31 August 2012

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: The developed Master Plan which unites and establishes efficient mechanisms of ecosystem restoration in the Hatlon region.
Contact information: **Malika Babadjanova, Director, CAREC Tajikistan Country Office** **Email:** babadjanmalik@yahoo.com **Website:**

Asian Development Bank projects

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
1	**Community Participatory Flood Management**	5 October 2007	The Project is expected to reduce the socio-economic damages caused by floods in Kulyab, Vose, Farkhor and Hamadoni DistrictsThe outcome will be lessening of flood frequency from once in 10 years to once in 100 years for these flood-prone Districts The methods comprise of a balance of structural (hardware) measures such as flood embankments and non-structural (software) measures such as flood preparedness, forecasting and warning, also including strengthening of the institutional and legal setting taking full account of the social, environmental and economic factors. Another important outcome will be greater community participation in flood management including (i) voluntary workforces to ease the burden of flood infrastructure maintenance	Responsible ADB Officer: Ryutaro Takaku Responsible ADB Department: Central and West Asia Department (CWRD) Responsible ADB Division: Office of the Director General, CWRD Executing Agency: Ministry of Water Resources and Land Reclamation Mr. R. BarotovProject Director 5/1, Shamci Street, Dushanbe, Republic of Tajikistan irrigation@tjinter.com Focus Humanitarian

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
			on the Government; (ii) communal management; (iii) harvesting of forested riparian buffer zones which supplement the hard-flood defences and also yield significant local social and economic benefits; and (iv) participation in the design and testing of local emergency plans, in theoperation of local flood warning systems, in the post flood surveys and in the establishment of local flood defence committees.	Assistance Mr. Hadi Husani Chief of Mission Tajikmatlubot 4th Floor, 137, Rudaki Ave Dushanbe 734000, Tajikistan Agency for Technical Cooperation and Development (ACTED) Ms. Rano Mansurova Country Director 15, Rajabov Street, Dushanbe, Tajikistan dushanbe@acted.ord
2	**Khatlon Province Flood Management Project**	29 June 2006	The ultimate impact of the proposed Project will be an increased social and economic development and reduced risk of flooding to the lives and livelihoods of the people in the flood-prone areas of the country. The main outcome of the TA will be a comprehensive investment project proposal aimed at minimising the risks from flooding to the lives and livelihoods of the rural communities along the Pyanj River in Khatlon Province. The specific outcomes of the TA will be (i) a review, assessment and identification of cost-effective and sustainable flood protection works; (ii)	Responsible ADB Department: Central and West Asia Department (CWRD) Responsible ADB Division: Agriculture, Environment, and Natural Resources Division, CWRD Executing Agency: Ministry of Water Resources and Land Reclamation Mr. Abdukohir Nazirov, Minister 5/1, Shamci Street, Dushanbe, Republic of Tajikistan

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
			identification of effective flood preparedness and flood response strategies at the national level and in the project area; and (iii) formulation of a flood management investment project and institutional development components consistent with ADB's safeguard and sector policies.	

V Turkmenistan

1) Water resources and agriculture

On adaptation of water resources

1) National project *Turkmen Lake «Altyn Asyr»*. Started in 2009.

Population upsurge, high rates of industrial development, expansion of irrigation agriculture, climate change and other environmental issues – all these and a number of other factors urgently call for enhancement of water resources management and water use.

Construction of a lake building will allow solving a number of environmental problems, including deficiency of irrigation water by channeling salty waters randomly dumped in the distant pastures of Karakum and lost in the desert. In other words, to transform this stream into a reserve stock of water that can be used in agriculture and other sectors in the future. Besides, halting discharge of nutrient water from the fields to Amu Darya and Murghab will improve the environmental state in these rivers. The sanitary and environmental state of cities, villages, settlements and irrigated areas of all the districts of the country is sure to improve.

2) By the order of the President Saparmurat Turkmenbashi a Green Belt *Gok-gushak* was created around Ashgabat and all the regional centres. Millions of saplings are planted and grown annually with the use of drip irrigation. Green belts are forest-shelter belts against drought; they create microclimate, clean atmosphere and keep moisture in the top levels of soil.

2) Forestation, biodiversity and ecosystems

Title of the project/practice: «Turkmenistan: Initial National Communication to the UNFCCC»
Type of action on adaptation to climate change : • Institutional and political • Scientific and informational
Project goal and objectives: Preparation of the Initial National Communication of Turkmenistan on climate change for the Conference of the Parties according to article 12 of the UNFCCC
Project implementation organization: Ministry of Nature Protection of Turkmenistan **Partner organizations:** Environmental Monitoring Centre, National Institute of Statistics and Forecasting, etc. **Donors:** GEF, UNDP
Duration of the project: 1997-2000
Implementation stage of the project *(planning/initial/implementation/completion/completed):* completed
Activities and outcomes of the project: · National inventory of anthropogenic GHG emissions and sinks not monitored by the

Montreal Report for 1994 according to the IPCC methodology 1996;
· Analysis of vulnerability of the major sectors of economy and ecosystems and recommendations on preliminary measures of adaptation to possible climate change;
· Recommendations and action plan to limit anthropogenic GHG emissions in various sectors of economy;
· Assessment of the baseline of the National Action Plan on the UN FCCC.

Contact information: Ministry of Nature Protection of Turkmenistan
102, Kemine street, Ashgabat 744000, Turkmenistan
Email:
Website:

Title of the project/practice: «Accelerated Financing of Possible Actions on Climate Change. Phase 2», a component of the Initial National Communication on the UNFCCC

Type of action on adaptation to climate change :
· Institutional and political
· Scientific and informational

Project goal and objectives:
Goal: Capacity building to define priority technological needs of Turkmenistan's economy for GHG emissions reduction, and capacity building in climate observation.
Objectives:
· Defining technological needs;
· Defining key technologies;
· Developing medium- and long-term activities; and
· Overall assessment and development of recommendations for public-participation capacity building in the methodical observation networks.

Project implementation organization:
Partner organizations:
Donors: GEF, UNEP

Duration of the project: 2002-2003

Implementation stage of the project *(planning/initial/implementation/completion/completed):* ***completed***

Activities and outcomes of the project:
· The forecast of GHG emissions in the energy sector, including oil and gas and industrial sectors for 2002, 2005 and 2010;
· Evaluation of potential in CO_2 emissions reduction in the energy system of Turkmenistan, in the chemical industry and in production of condensed gas;
· Priority technological needs of the economy of Turkmenistan are defined in the sphere of GHG emissions reduction and mitigation of climate change;
· Additional vulnerability research is carried out and measures on adaptation to climate change were worked out;
· Recommendation on enhancing the system of regional monitoring and capacity building for participation in Global Climate Monitoring System;
· 27 project proposals for the energy sector are developed (for oil and gas, heat and power, and renewable energies).

Contact information: Ministry of Nature Protection of Turkmenistan 15, Bitarap, Turkmenistan street, Ashgabat 744000, Turkmenistan **Email:** **Website:**

Title of the project/practice: «Turkmenistan: Preparation of the Second National Communication to the UNFCCC»
Type of action on adaptation to climate change : · Institutional and political · Scientific and informational · Educational and awareness-raising
Project goal and objectives: **Goal:** Preparation and submission to the UNFCCC of the Second National Communication **Objectives:** · Improving the national GHG inventory in view of the obligations of the country, as a Party to the Convention; · Developing the National Strategy on GHG reduction and adaptation to climate change; · Continuing and expanding scientific research of all aspects of climate change, methodical observation and information exchange; · Submitting information on capacity building needs; and methodical Creating and strengthening institutional, scientific, technical, informational and human potentials.
Project implementation organization: **Partner organizations:** **Donors:** GEF, UNEP
Duration of the project: 2006-2009
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed
Activities and outcomes of the project: Preparation of the Second National Report of Turkmenistan on the UNFCCC: · National GHG Inventory · Vulnerability and adaptation assessment · Evaluation of climate change mitigation · Information on capacity building
Contact information: Ministry of Nature Protection of Turkmenistan 102 Kemine street, Ashgabat 744000, Turkmenistan

Title of the project/practice: «Capacity Building of the National Legislation in Adaptation to Climate Change in the Region»
Type of action on adaptation to climate change : · Institutional and political · Scientific and informational

· Educational and awareness raising
Project goal and objectives: **Goal:** To build the capacity of the Central Asian countries in strengthening the national legislation in the sphere of adaptation to climate change in order to mitigate the vulnerability to climate change and improve the national climate policy. **Objectives:** • To get a clear picture of the current legislation and legal base in the sphere of climate change in each Central Asian country that supports mitigation and adaptation measures, and to reveal the existing barriers and gaps in implementing the COP-15 resolutions in the future; • To define the need for amending of the current national legislation or inducing new laws and legal acts to promote decisions concerning climate change in the countries of the Central Asia; • To provide recommendations on improvement of the national legislation to enhance activities on adaptation and mitigation in the future, facilitate transfer of technologies and build the capacity in view of the UNFCCC COP-15 resolutions; and • To raise awareness of politicians, lawyers and decision makers in the Central Asian countries in the issues of improving further the national legislation for implementation of the new UNFCCC resolutions to enhance activities on adaptation, mitigation, transfer of technology and capacity building on climate change in the future.
Partners and financing sources: Asia Pacific Climate Change Adaptation Network (APAN), UNEP
Duration of the project: 2010-2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed

Title of the project/practice: «Sustainable Forestry in Turkmenistan»
Type of action on adaptation to climate change : · Institutional and political · Scientific and informational
Project goal and objectives: **Goal:** Sustainable Forestry in mountain and plain regions of Turkmenistan. **Objectives:** · Afforestation of the mountain areas and arid zones of Turkmenistan; Restoration of the degraded forest areas. The fforested areas will adapt to various natural and regional conditions, and will possess both protective and applicable functions, therefore will allow for climate change adaptation. · Consultations on the new version of the Forest Code of Turkmenistan, which will become a background of sustainable forestry at the community level. · Support to forestry management in creating efficient organizational structures. Their

specialists will receive trainings and consultations to build the capacity to create and use the system of GHG absorption monitoring.
Project implementation organization: Ministry of Nature Protection of Turkmenistan **Partner organizations:** · National CACILM Coordination Council and Parliamentary Working Group on Reforming the Forest Legislation · National Institute of Deserts, Flora and Fauna (NIDFF) · German University of Heidelberg, Institute of Geography **Donors:** Federal Ministry for Environment, Nature Conservation and Nuclear Safety (Germany)
Duration of the project: 2008 -
Implementation stage of the project *(planning/initial/implementation/completion/completed):* ***Completed***

Title of the project/practice: «Adaptation Strategies for Climate Change and Sustainable Land Use in Central Asia (Turkmenistan and Xinjiang, China)»
Type of action on adaptation to climate change : · Institutional and political · Scientific and informational
Project goal and objectives: The main objective of the research project is assessing water consumption and benefits from relevant artificial and natural coastal ecosystems in Central Asia and studying local species of plants in relation of their sustainable use potential. Project Objectives: • Quantitative assessment of water consumption in agriculture, and natural ecosystems; • Quantitative assessment of benefits from agriculture; • Characteristics of ecosystem services, natural ecosystems and monetary assessment of ecosystem services (main attention will be paid to CO_2 accumulation); • Comparison of current rural agriculture and natural ecosystems in relation to their economic or monetary benefit received from water consumption; and • Studying natural species of plants in relation of their potential for sustainable development.
Project implementation organization: Ministry of Nature Protection of Turkmenistan **Partner organizations:** **Donors:** German Foundation Bauer-Hollmann, Foundation Rudolf and Helene Glaser.
Duration of the project: 2009-2011
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed
Activities and outcomes of the project: • On the basis of efficiency assessment and evaluation of carbon emissions of the tugai forests, shrubs and reed (cane), and also Haloxylon woods, carbon accumulation in the natural ecosystems will be calculated in monetary equivalent

value.

- On the basis of profitability analysis the economic benefit of agriculture and other types of land use will be calculated.
- The results of the monetary assessment of the natural ecosystems and economic benefits of the agriculture will be linked to the data derived from remote sounding in order to count the vast territories in monetary equivalent value and economic benefit.
- The data from remote sounding will be used to assess water consumption on vast agricultural territories, and in Kabakly of Amudaria State Reserve and Haloxylon woods of Repetek Reserve.
- A map and scenarios of possible development of agriculture and natural ecosystems under the climate-induced conditions of scarce water resources will be created. These maps and scenarios will be submitted to the relevant departments as a guidance which can then be included in land-use management under the conditions of scarce water resources. These scenarios will be submitted and discussed during the project seminars with relevant administrative departments.

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On adaptation of land resources the following projects are implemented in the country:

1) Informational Systems on Sustainable Land Management. Terms: 01 October 2008 – 30 October 2009. Donor: ADB.

2) Within the framework of CACILM in the Central Asian countries execute both regional and national projects. For example, the National Framework Programme (NFP) of Turkmenistan on sustainable land management was developed. The NFP of Turkmenistan set national priorities in the sphere of sustainable land management, inter alia: salinization of soils; development of irrigated agriculture; restoration of degraded pastures and woods; and creation of the national natural, land and water resources monitoring system, and case studies in these directions.

- End of2007: A medium-scale project of the Ministry of Nature Protection of Turkmenistan and GEF and UNDP «Capacity Building and Investments into Local Activities on Integrated and Sustainable Land Management» within the framework of CACILM.
- October 2009: Regional CACILM (GEF, UNDP) project «Multi-Country Capacity Building». The project was focused on the problems of land resources under the arid climate conditions.

3) In 1996 a Governmental Committee was established for developing a concept, strategy of an action plan to combat desertification.

In 1997 the National Action Plan to Combat Desertification was developed.

Turkmenistan took an active part in development and adoption of the Sub-regional Action Plan to Combat Desertification in Central Asia (adopted in 2003).

Turkmenistan prepared 1st, 2nd, 3rd National Reports on implementation of activities to combat desertification.

On adaptation of biodiversity:

1) 2006-2010 implementation of GEF/UNDP project «Protection and sustainable use of valuable biodiversity in the Hazaria reserve, the Caspian Sea coast» aimed at protection of a unique and highly valuable biological diversity of Turkmenistan on the Caspian Sea, by strengthening the national system of protected natural territories.

2) Programme «Key ornithological territories of Turkmenistan». Terms – 2007-2010. Case studies on climate change impact on migrant birds' habitats.

<u>At the regional level</u>

Turkmenistan takes an active part in the regional activity on climate change. According to the decisions (November 2007, Bishkek and June 2008, Cholpon-Ata) of the Interstate Commission on Sustainable Development (ICSD) the countries of Central Asia delegated the responsibility of co-ordinating the regional activity in assessing the potential of the countries on adaptation to climate change to Turkmenistan.

Turkmenistan has also initiated hosting of the 2012 Asia and Pacific Ministerial Conference on Adaptation to Climate Change. In the ICSD session (26 May 2009 in Tashkent) the initiative of Turkmenistan was supported by the parties. The session made an important decision to create the Regional Knowledge Network on Climate Change (national experts, experts of the regional and international organisations, funds, etc.). This decision is being executed at the moment.

The Central Asian countries expect that the GEF will probably also organize consultations and provide other supports in launching this network in order to develop and implement the Regional Strategy of the Central Asian Countries on Vulnerability and Adaptation to Climate Change.

Within the framework of the Regional Knowledge Network 2 meetings were organised for representatives of the countries of the region to discuss the vision of the countries prior to UNFCCC COP-15 in Copenhagen.

- 1st Regional meeting – on 9-11 November 2009 in Ashgabat for climate change experts from the Central Asian countries (those who were going to Copenhagen), UNEP and CAREC experts, and other stakeholders.
- 2nd Regional meeting – on 25-27 November 2009 in Tashkent. A draft resolution was adopted on a shared vision of the Central Asian countries in Copenhagen for submission to the ICSD Members (MEPs of the countries) in the ICSD session in Tashkent on 30 November 2009.

VI Uzbekistan

1) Water resources and agriculture

Title of the project/practice: «National Integrated Water Resources Management and Water Efficiency Plan for Zarafshan River Basin» (Project ID: 00072626)
Type of action on adaptation to climate change : • Institutional • Technological
Project goal and objectives: The overall objective of the Project is to develop a National Integrated Water Resources Management and Water Efficiency Plan for the Zarafshan River Basin of Uzbekistan, to strengthen the legal and regulatory framework for the water sector, and to support the integration of water management issues into relevant intersectoral policy frameworks.
Project implementation organization: UNDP **Partner organizations:** Ministry of Agriculture and Water Resources of the Republic of Uzbekistan; Cabinet of Ministers of the Republic of Uzbekistan; State Committee for Nature Protection **Donors:** UNDP, Government (in-kind), Donor
Duration of the project: 4 January 2010 – 4 January 2013
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing
Activities and outcomes of the project: To achieve its objectives the IWRM project for Uzbekistan will promote implementation of the following tasks: 1. Reviewing the legislative and institutional structure for introduction of integrated water resources management in Uzbekistan. 2. Upgrading the municipal services in the Zarafshan River Basin. 3. Assistance in the development of the integrated water resources management and water use efficiency plan for the Zarafshan River Basin. Expected outcomes: • Outcome of activity 1: Adoption of the reviewed water legislation. • Outcome of activity 2: Integrated basin strategy in potable water supply and sanitation. • Outcome of activity 3: IWRM and Water Efficiency Plan for the Zarafshan River Basin.
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Title of the project/practice: «Support to Sustainable Development of the Livestock Sector in Uzbekistan» (Project ID: 00054878)
Type of action on adaptation to climate change : • Institutional • Technological

- Awareness raising

Project goal and objectives:

- Creation of improved legislative and institutional framework by means of entering necessary changes into the current legislation and livestock sector management policy, which is effectively functioning under the market conditions;
- Training farmers and dehkans through demonstration of best practices in breeding and livestock sector management; and
- Increase production efficiencyin the livestock sector through creation of intelligent services (artificial insemination and veterinary services) at the local level.

Project implementation organization: UNDP
Partner organizations: Ministry of Agriculture and Water Resources of the Republic of Uzbekistan; Israel's Agency for International Development Cooperation (MASHAV)
Donors: UNDP

Duration of the project: 15 February 2007 – 30 December 2011

Implementation stage of the project *(planning/initial/implementation/completion/completed):* ***Ongoing***

Activities and outcomes of the project:

- A case study to estimate the role of the livestock sector in implementing a wider complex of development measures with a proposal of recommendations on successful development of the livestock sector infrastructure and on how these recommendations can be implemented to tackle the problems of sustainable economic development;
- Improvement of the local institutional and legislative framework for efficient development of the livestock sector at the support of relevant legal instruments and competent human resources;
- Creation of pilot sites in the Tashkent area to test the integrated "know-how" including breeding, feeding and veterinary service for livestock.

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Title of the project/practice: Rural Enterprise Support Project, phase 2 (RESP-2)

Type of action on adaptation to climate change :

- nstitutional
- Financial and economic
- Technological
- Educational

Project goal and objectives:
To increase the productivity and financial and environmental sustainability of the

agriculture and the profitability of the agricultural business, contributing to further development of private farming, securer livelihoods, increased environmental security, greater social harmony and enhanced efficiency of water resources management.
Project implementation organization: Swiss Agency for Development and Co-operation (SDC) **Partner organizations:** Ministry of Agriculture and Water Resources of the Republic of Uzbekistan **Donors:** SDC, World Bank, Government of Uzbekistan
Duration of the project: Launched in 2009
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing
Activities and outcomes of the project: The project consists of three components financed by the Government of Uzbekistan, World Bank and SDC. The first component **«Financing of rural enterprises»** makes its primary emphasis on the lines of credit, allocation of loans and rendering of leasing services. The project activities will be carried out through the involved financial institutions. The financial resources will be invested in agricultural machinery, food processing equipment, food storage and packing, organising agricultural services and other investments. Besides, the component stipulates for technical assistance to enhance the capacity of the financial intermediaries and to provide an access to services in business planning for long-term borrowers. The second component of the project is **«Irrigation and Drainage»**. The objective of the Irrigation and Drainage component is to achieve improved irrigation water management and service delivery, through rehabilitation of critical inter-farm and on-farm irrigation and drainage infrastructure and through strengthening of Water users Associations (WUAs) and pilot demonstration of applied modern water management techniques in the seven districts chosen by the project. This component consists of three sub-components, two of which are financed by Switzerland. The third component of the project is «**Training and Advisory services**». The component is carried out in the 7 districts where RESP II works. Under the framework of the component the trainings and consultations are organised for the farmers of the districts. The topics of the trainings and consultations mainly concern entrepreneurship, i.e. legislation, bookkeeping, business, including technical issues - water management and agronomics. Besides, the farmers will be trained basic management skills. Training seminars are also planned for the farmers, trainings for the teachers and campaigns for the media. Switzerland participates in two sub-components of the component Irrigation and Drainage, namely in a sub-component «Strengthening of WUAs and the Capacity to Train and Strengthen WUAs» and a sub-component «Support for improved irrigation and drainage technology». In the sub-component «Strengthening of WUAs and the Capacity to Train and Strengthen WUAs» the greater part of the Swiss contribution is financing of technical

assistance to development of WUAs and water management. The assistance will mainly consist of provision of expert services at the national and regional levels, and of support and training under the guidance of a team of foreign experts. The Swiss contribution to these sub-components will be combined with the 2.72-million loan from the World Bank for the purchase of the capital equipment and execution of maintenance works on the irrigation and drainage infrastructure. The sub-component is closely connected with the IWRM and Water Efficiency Improvement projects.
«Support for Improved Irrigation and Drainage Technology» will be financed mainly by Switzerland. The sub-component pays special attention to awareness raising through the so-called training grounds and demonstration sites at each WUA in the chosen 7 districts. The sub-component is closely connected with the project, Water Efficiency Improvement.
The overall management of these two sub-components will be carried out by the Swiss Co-operation Office in Uzbekistan in close co-operation with the Agency for the Restructuring and Modernisation of Agriculture and the World Bank.

PROSPECT:

The Swiss participation in the RESP-II project will contribute to facilitation of efficiency of available means and resources. It is expected to contribute significantly to the agricultural sector.

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Title of the project/practice: «Water Supply and Sanitation in the Cities of Bukhara and Samarkand»

Type of action on adaptation to climate change :

- Institutional
- Financial and economic
- Technological
- Educational

Project goal and objectives:

The development objective of the project is to improve the life conditions for around 650,000 citizens. The direct benefit of the project is improvement of the quality of services by putting an end to destruction of the water supply infrastructure, increasing efficiency of the system and tackling the most urgent problems.

Project implementation organization: Bukhara and Samark and Water Utilities, private sector operator **Partner organizations:**
Donors: Swiss State Secretariat for Economic Affairs (SECO), World Bank

Duration of the project: Launched in 2003

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing

Activities and outcomes of the project: This is the first project in Uzbekistan to be implemented under the state and private sector partnership where the municipal system of water supply works in close co-operation and in one direction with the private sector operator. These parties will also coordinate their activity with the local municipal authorities, especially in the sphere of tariff policy (tax and payment).
Direct implementation of the project was entrusted to 2 Project Implementation Units (PIU) located in Samarkand and Bukhara, in close co-operation with an internationally experienced private water utility operator (Uzbek Water Management GmbH & CO KG, Austria/Sweden) selected by the results of the international tender. The PIUs have been created on the basis of the Samarkand and Bukhara city water utilities. The PIUs are working under the guidance of the Project Coordination Unit (PCU) located in Tashkent.

The project consists of four basic components:

1. The component Investment Fund will finance essential short-term expenditures, and a least-cost capital investment programme aimed at improving the operations of the water supply system and the services to the population.
2. The component of Service Contract will finance the costs related to the service contract, and these costs include a base fee and a performance-based fee to be paid to the private Operator.
3. The component of Consulting Services will provide necessary technical support to the PCU and PIUs;
4. The component financed by the Swiss party will supplement the investment fund and pay expenses on implementation of the financial management system as procurement assistance. Technical audit will be executed by Ernst Basler + Partners Ltd., financial audit by PriceWaterhouseCoopers Ltd.

Water utilities of Samarkand and Bukhara are the intermediate beneficiaries of the project implementation. Participation of an internationally experienced private water utility operator will improve management of certain water utilities operations, e.g. water supply services, financial, commercial and operational operations, and also a technical know-how. Most importantly, the success of the project will reveal and demonstrate the need for reforms in the urban sector of Uzbekistan.

PROSPECTS

Water policy and water supply institutional reforms which are the purposes of the project will help the water utilities of Bukhara and Samarkand make the first steps to achieve sustainability, technical efficiency and financial viability. Most importantly, the success of the project will reveal and demonstrate the need for reforms in the municipal sector of Uzbekistan, and show successful co-operation of the state and private organisations in the water use sector.

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Website:

Title of the project/practice: «Water Supply for Rural Areas»

Type of action on adaptation to climate change :

- Institutional
- Financial and economic
- Technological
- Educational

Project goal and objectives:

The project development objective is to improve the life and health conditions of the rural communities in the Ferghana Valley. The first phase of the project was implemented in Uzbekistan.

The project task is to solve the water crisis in the Ferghana Valley in the territories of Uzbekistan and Tajikistan where 60 to 70 per cent of the rural population have no access to clean potable water.

Project implementation organization: Global Water Partnership (GWP) Canada
Partner organizations:
Donors: Swiss Agency for Development and Cooperation (SDC)

Duration of the project: Launched in 2004.

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed

Activities and outcomes of the project:

During reconstruction of the existing or construction of the new water supply systems the priority was given to the issue of transparency of management and internal procedures at the local level. This was to provide sustainable operation and maintenance of the water supply systems. Another priority was strengthening the role of the population in the process of management and maintenance of their own water supply system in the Post-Soviet Uzbekistan.

In 2004-2007 during implementation of the first 2 stages of the project in the territories of Ferghana and Andizhan regions as a result of infrastructure development – reconstruction/construction of drinking water supply systems local residents of 10 rural settlements received access to potable water. In a few rural settlements works on construction of water supply systems are being finished.

Phase III was planned for 2007. However, the beginning of the work was postponed for a later term as there was preparation for signing agreements between Uzbekistan and Tajikistan. This resulted in extending the work to the Sogdi region of Tajikistan, and not only in the Ferghana and Andizhan regions of Uzbekistan. During the period of 2007 - 2009 the project created the systems of potable water supply in 14 rural settlements in Uzbekistan and 6 rural settlements in the territory of Tajikistan.

The important component of the project was introduction of new hygienic norms, and strengthening the role of Water Users Associations, encouragement of women and youth participation, public participation of users, and also accumulation of experience for its further dissemination.

The project was oriented not only at the construction of water supply systems, but also at the promotion of transparent management at the local level to ensure sustainable functioning and maintenance of the new or reconstructed systems.

PROSPECTS

During the three-year implementation of the third stage of the project the following outcomes were achieved:

- Transfer of water supply and sanitation systems to the communal property, and creation of rural committees of water users;
- Reconstruction and construction of new water supply systems in 20 rural settlements;
- Achievement of sustainable operation and maintenance of water supply systems;
- The population, especially children and young parents, were taught modern methods of hygiene;
- Participation of women and youth in the Water Users Associations, and active participation of youth in the water councils; and
- Experience of the project implementation was studied and transferred to the partners for improvement of their approaches for implementation of similar projects in the future.

Contact information:

Water supply for Rural Areas project

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Website:

Title of the project/practice: «Integrated Water Resources Management in Ferghana Valley»

Type of action on adaptation to climate change :

- Institutional
- Political
- Financial and economic
- Technological
- Technical
- Educational

Project goal and objectives:

Water resources management efficiency improvement through introduction of IWRM

principles in the Ferghana Valley.

Project implementation organization:
Partner organizations: Interstate Commission for Water Coordination (ICWC), ICWC Research Centre, International Water Management Institute (IWMI)
Donors: Swiss Agency for International Development and Cooperation (SDC)

Duration of the project: September 2001 - December 2010

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing

Activities and outcomes of the project:
The project consists of 4 phases.
Outcomes of phase I
Case study of:

- Legal;
- Institutional; and
- Financial and economic, and administrative problems.

The analysis and assessment has been carried out including of past experience, methodology and systems developed by other donors, and regional and national organisations in water resources management.
The necessary documents and organisational structures have been prepared to start phase II:

- Project structure;
- Agreements;
- Project document; and
- Loan offer.

Outcomes of phase II

- The concept of IWRM that took into account hydrographical borders, participation of all stakeholders and principles of democratic management has been developed and submitted to the state water management departments. On 16 May 2003 the Concept was approved and ratified by the water management departments in Uzbekistan, Kyrgyzstan and Tajikistan.
- A comprehensive approach to public participation (IWRM awareness-raising campaign) has been developed, i.e. a training programme for public participation and organisational development at the level of WUAs and the water utilities. Regular educational seminars and public opinion polls provide new opportunities for involving the wide public in reforming the water sector in the Ferghana Valley. The Project's efforts have resulted in creation of new associations of water users (WUA *Akbarabad*, Southern Ferghana Channel in Uzbekistan, WUA *Kerme-Too-Akbursay*, the Aravan-Akburin Canal in the Kyrgyz Republic and WUA *Obi-Zeravshan,* the Hojabikirgan Canal in, Tajikistan). The newly created WUAs were registered in conformity with the legislation, and the Boards of these WUAs signed joint management agreements with relevant authorities in the beginning of 2003. Besides, at the demand of the Ministries of Agriculture and Water Resources of Tajikistan and Uzbekistan the project organised a number of ad-hoc training seminars, Creating WUAs through Public Participation, at the regional level.

- A branch of ICWC training centre has been created in the city of Osh. The staff of the Centre received relevant training, and the modules were developed. Since July 2002, the branch has held monthly planned (under the project) and extra-planned educational seminars for workers of the water management organisations, and for water users and NGOs from the Ferghana Valley. Much attention is paid to promoting the ideology of IWRM. Thereby the communication network has been developed and launched in the form of e-mail between all key stakeholders of the project (ICWC Research Centre, state departments, regional water management organisations, pilot canals and WUAs). The project has created the Information System (including a Database, system of mathematical modeling and GIS), operating in the real-time mode, which is a powerful tool for planning, operative analysis and upgrading the process of water allocation and factual distribution of water.
- Alternatives of the water management structures for the WUAs and water utilities levels have been defined, discussed and endorsed by the project partners and other stakeholders. According to these endorsements the water management departments of Uzbekistan, Tajikistan and Kyrgyzstan have created new divisions - Canal Managements - at the Aravan-Akburin Canal in Kyrgyzstan, the Hojabakirgan Canal in Tajikistan and the South Ferghana in Uzbekistan. In December 2003 Constituent assemblies were held where Water Committees of the Canal (WCCs) for each of the 3 pilot canals were created. WCC proved essentially helpful in 2004. For further activities on organizational reforms there has to be an assessment of the relevancy of the intermediate bodies – a number of basin management and regional water management bodies. The first steps were made to review and set proper planning, accounting and reporting schemes, and control over the use of water at each level of the new water management hierarchy. The public participation in the process of management proves an efficient factor in transition to IWRM, and this should be vested. It is expected to be introduced in all levels of water management hierarchy – through creation of Water Committees (or Unions of water users). Many technical aspects depend on the public. To ensure a guaranteed and fair distribution of water along the whole water supply system is not an easy task. When water is supplied in a required amount, with observance of necessary quality standards and terms, then an increase in water and land resources efficiency becomes highly probable. Water users should participate in specifying the size of areas allotted to each canal, in estimating their needs for water and monitoring available additional sources of water (underground, returnable). Their responsibilities also include updating water use depending on weather and economic conditions, keeping a water turn, water allocation and water distribution order, upgrading hydraulic measurements and water metering at all levels of the water management system. In order to sort out the arising issues, creation of advisory services is required, which will assist water users in adopting new technologies, advanced methods of production, planning and tackling water distribution issues. The project has developed and provided for application Regulations on Water Utility Committee, and also recommendations on application of these regulations for each of the 3 pilot canals;

- Recommendations on the list of required changes were prepared and submitted to all water management bodies of the countries in the region. Laws should define the role and liability of the governments, water management organisations and water users concerning use, preservation and development of water resources. For the legislation there is an urgent need for an accurate definition of social, economic and environmental values of water, the right to water, roles of associations of water users and rules of coordination between the sectors. For example, there is a need to regulate communication of water management bodies with nature protection bodies, agriculture bodies and local authorities. The water sector's financial mechanism should also receive an accurate legal regulation. The project has paid much attention to tackling disputes at the level of WUAs and canals – public opinion polls were held and recommendations were prepared, which helped to organise a number of local seminars.
- Technical assistance was granted in assessing and providing additional equipment of water metering devices for the pilot canals, and much work was done to introduce the water metering system in the pilot WUAs. This has allowed arranging proper control over water distribution along the pilot canals and within the WUAs, and has made the whole process of water distribution more transparent. Water metering devices were produced and certified by the Regional Metrological Centre of ICWC in Bishkek at the assistance of the Central Asian Scientific Research Institute of Irrigation. The project started the real-time management of the water distribution process on the pilot canals and under the pilot WUAs in the form of a planned water distribution schedule based on the water users' demands and with account of climate conditions, and its monitoring during the period of vegetation. This is the first step to equal and fair water distribution, and at the same time an attempt to reduce losses of water.
- Demonstration fields within the pilot water management areas have been certified, which allowed creating an instrument to assess the farmers' capacity and potential to increase land and water efficiency. There is an on-going real-time testing of an instrument to estimate water consumption under specific weather conditions. It is expected to be introduced at a large scale during the next phases of the project. The case study shows that land and water efficiency has improved at 9 of 10 pilot sites. Efficiency decreased at the pilot site (South Ferghana Canal) where the farmer ignored the recommendations. In more detail the results are presented in Section 4 of this Report. More women are being involved in discussing land and water efficiency management and other problems of water resources management in the Ferghana Valley. For example, only in one of the water efficiency project seminars held in WUA *Akbarabad* on 15 September 2003 about 60 women took an active part. The outcomes of all these activities allowed creating a basis for a wide introduction of an advisory service for the farmers in the Ferghana Valley.
- A rather accurate system of management and control of the project activity by the partners have been developed with a regular coordination from SDC – since 2003 monthly coordination meetings of the project managers and SDC employees have been held. These meetings allowed prompt solution of all the arising organisational issues.

What is more important is that there was a consensus in methods and approaches to implementation of various aspects of IWRM. The project has paid much attention to periodic publication of materials and distribution of the project information through the media. It was a true achievement of the project that as a result of its activity and wide awareness-raising campaigns on the IWRM ideology, the Government of Uzbekistan has decided to alter water resources management according to the hydrographical principle, Decision of the Cabinet of the Republic of Uzbekistan on Improvement of Water Sector Management, No. 320, dated 21 July 2003.

Outcomes of phase III

- Pilot Canal Managements applied the principles of IWRM;
- WUAs are created to distribute and supply water on a fair and stable basis, using guiding principles of IWRM;
- Advanced agricultural technologies are introduced and distributed at the levels lower than WUAs;
- Improvements and changes in the national policies; and
- Sustainable water resources management of the transboundary small rivers (TSR) in a pilot zone of the project.

Outcomes of phase IV

For task A (pilot zones and selected TSR work according to IWRM principles), approaches are combined and ready for distribution to other areas of the region). The following outcomes are planned:

A1: Introduction and application of IWRM principles of water management and management procedures at the pilot canals and TSR.

A2: Joint commissions are created to implement IWRM in the pilot river basins under the Transboundary Management of River Basins (TMR) and the agreement is reached on the water resources principles and joint management mechanisms.

A3: Direct communication is built between the WC and WUAs (with a minimum of intermediary administrative organisations involved.

A4: IWRM instruments and management methods tested in the pilot areas are documented and ready for distribution.

A5: Water metering mechanisms are strengthened at the levels from WUAs to basin.

A6: Capacity-building and distribution strategies are developed and implemented, and their impact is assessed.

The accent should be put on the following: 1) Completing introduction of IWRM principles in water management and management procedures and combining experience and systems used at the pilot sites, including TSR. 2) The project on a hydrographical principlethat the WUAs work on, and distributing and delivering water on a fair and reliable basis following IWRM guidelines up to the level of sites. 3) The developed and tested institutional and organisational measures and technologies are published in the form of 'plug-and-play' packages of documents for wide distribution. 4) Creating a favourable environment for distribution of IWRM to transboundary regions and within the territory of the country.

The following outcomes are planned for task B (Governments and donors following the same principles concerning the roles and structure of IWRM organisations at the levels from WUAs to basin):
B1: Donors and Governments in each country have a common understanding of the roles, structure, tasks and responsibilities of all organisations at the levels from WUAs to basin.
B2: A national policy and legal framework on distribution of IWRM approaches.
Sustainability of the project achievements largely depends on a continuous progress in the same direction. This proves impossible unless the governments and supporting donors have a shared vision of the water organisations at the levels from WUAs to basin. In other words, a favourable environment is to be created that could influence the decision makers and policy to unite and disseminate the principles and mechanisms of IWRM.
The following outcomes are planned for task C (a clear picture of financial and economic aspects, and solvency at the different levels of implementation of the works and management):
C1: Assessment of financial and economic aspects and solvency at the different levels of implementation of the works and management.
C2: Project outcomes impact assessment (from the economic, social and environmental points of view).
So far there has been no economic analysis of financial and economic sustainability of IWRM organisations. It is rather important that the new IWRM organisations were financially and economically viable and independent. Moreover, for last 15-20 years there has been no or little account of deteriorating conditions of the inherited infrastructure which demands large investments right now and in the future. Can users incur responsibility for restoration of the infrastructure? If not, who should pay and how much? Solvency of users should be assessed and the governments and donors should be provided with relevant recommendations on low-budget, but efficient solutions. Moreover, it is necessary to define quantitative and qualitative indicators to assess social, economic and technical feasibility of the results and outcomes, and to have further public adoption of institutional changes. The environmental impacts of the amendments in the water policy will also be assessed.

Activities to achieve the expected outcomes
Achievement of the abovementioned outcomes is planned through execution of the following works:
A1: Complete introduction and application of IWRM principles of water management and management procedures at the pilot canals and TSR.
A1.1 Completion (to a certain degree) of hydrography and involving others stakeholders at the three pilot canals.
A1.2 Introduce IWRM guidelines on either side of the pilot TSR zones.
A1.3 Completion of all the works in the Akbura basin.
A1.4 Completion of the institutional activities on the two pilot canals (in Tajikistan and Uzbekistan).
A1.5 Enhanced systems of planning and management (water use, water metering, basin

planning, operation and maintenance, financial administration, etc.).
A1.6 Development of emergency strategies and management procedures.
A1.7 Development, testing and implementation of recommendations on tackling drainage problems on the pilot canals.
A1.8 Development, testing and implementation of recommendations on sustainable environment protection.

A2: Joint commissions are created. IWRM is implemented in the pilot TMR basins and the agreement is reached on the water resources principles and joint management mechanisms.
A2.1 Development and creation of institutional mechanisms for TSR (joint commissions).
A2.2 Draft agreement on a joint water resources management, and a list of the required constructions and equipment, alternative procedures, etc. for TSR.

A3: Direct communication is built between the WC and WUAs (with a minimum of intermediary administrative organisations involved).
A3.1 Defining the roles and responsibilities of the local agencies under the new conditions.
A3.2 Awareness raising among the local authorities.
A3.3 Development of procedures to conclude the direct agreements between the WUAs and WC.
A3.4 Obtaining approval of relevant authorities.

A4: IWRM instruments and management methods tested in the pilot areas are documented and ready for distribution.
A4.1 All instruments tested by the project and selected by the managements are published and are made absolutely comprehensible and most widespread for the public..
A4.2 Relevant awareness-raising materials are published.

A5: Water metering mechanisms are strengthened at the levels from WUAs to basin.
A5.1 These issues are solved completely: water distribution and supply planning, updating and monitoring methods, and increased water management efficiency at all levels of the hierarchy (WC – WUAs – GWP – farms – indicators).
A5.2 Updating the irrigation norms and drawing up the irrigation schedules for the pilot zones to improve water planning.
A5.3 Development and implementation of measures to improve management and control at the pump stations of the pilot canals, on *Hojabikirgan Canal* in particular.
A5.4 Completing equipping the pilot canals and basic WUAs with water metering devices.
A5.5 Introduction of information systems in the water management systems at all levels (WC, WCC, WUAs).
A5.6 Ensuring and promoting water distribution management on the basis of demand and required volume.

A6: Capacity-building and distribution strategies are developed and implemented, and their impact is assessed.

A6.1 Estimation of requirements in trainings and capacity building, and development of a capacity-building strategy with impact monitoring systems aimed at various target groups and levels.
A6.2 Development of training materials on the basis of the acquired experience and methods tested by the project.
A6.3 A wider and more consistent implementation of the IWRM principles in the region through the competent ad-hoc consultative groups that provide training support to the other IWRM projects.
A6.4 Merging the strategy of data transmission and impact monitoring.
A6.5 Making use of any mass media to promote/disseminate new water management and water distribution know-hows.

B1: Donors and Governments in each country have a common understanding of the roles, structure, tasks and responsibilities of all organisations at the levels from WUAs to basin.
B1.1 Creation of a 'common vision' of the IWRM organisations at all levels among the governments and the involved donors.
B1.2 Consolidation of approaches and achievement of the official agreements on co-operation with the other projects.
B1.3 Making use of co-operation potential with the UNDP on developing national IWRM plans in the three countries.

B2: National policy and legal framework on distribution of IWRM approaches.
B2.1 Strengthening a hierarchical model.
B2.2 Distributing roles and responsibilities between all the water managements and operating agencies.
B2.3 Strengthening the Coordination role of the National Support Groups.
B2.4 Creation of the nationally competent environment for IWRM implementation; preparation of official documents on reviewing the water management policy.
B2.5 Regular exchange of experience with the governments and the other projects.
B2.6 Dissemination of IWRM approaches to the river basin level, e.g. TSR.

C1: Assessment of financial and economic aspects and solvency at the different levels of implementation of the works and management.
C1.1 Detailed analysis of financial and economic practicability of IWRM organisations.
C1.2 Development of the principle of water users' solvency at all levels.
C1.3 Development of flexible tariff systems.
C1.4 Introduction of a fund management strategy and technology.
C1.5 Guidelines on principles and methods of sustainable financing for the IWRM organisations.

C2: Project outcomes impact assessment (from the economic, social and environmental points of view).
C2.1 Quantitative and qualitative assessment of social, economic and technical feasibility

of results and outcomes
Contact information: ICWC Research Centre **Website: http://sic.icwc-aral.uz** International Water Management Institute (IWMI) **Website: http://www.iwmi.cgiar.org**

Title of the project/practice: «Economic and Environmental Restructuring of Land and Water Use in the Region of Khorezm», Phase 2, project ID: 2168)
Type of action on adaptation to climate change : Institutional Financial and economic Technological Scientific Educational
Project goal and objectives: • To develop concepts for landscape restructuring in Khoresm, an intensively exploited agricultural region in the Aral Sea Basin. The concepts will promote a more efficient and at the same time environmentally sustainable land and water use. • In accordance with the concepts of sustainable management of natural resources to develop proposals on necessary actions, such as administrative, legal and environmental restructuring. • At the same time to establish close scientific partnership between Germany and Uzbekistan in the sphere of development research. Here special attention should be given to training young scientists.
Project implementation organization: **Partner organizations:** Zentrum für Entwicklungsforschung, Centre for Development Research., Universität Bonn (ZEF BONN), Tashkent Institute of Irrigation and Agricultural Mechanization, Uzbek Scientific Research Institute of Cotton, UNESCO, Ministry of Agriculture and Water Resources of the Republic of Uzbekistan **Donors:** Zentrum für Entwicklungsforschung, Centre for Development Research., Universität Bonn (ZEF BONN)
Duration of the project: 1 January 2001 – 1 January 2007
Implementation stage of the project *(planning/initial/implementation/completion/completed):* Completed
Activities and outcomes of the project:
Contact information: **Email:** **Website:**

USAID projects

№	Name of the projects	Duration of the project	Description	Budget, Contacts, Implementer
1	Agricultural Linkages (AgLinks)	August 2008-July 2011	To increase agricultural production and productivity in Uzbekistan, the project: · provides training to 5 agrifirms and 5 water users associations in Namangan, Ferghana, and Samarkand regions on agronomic issues, agribusiness management, post-harvest handling, fruit production, and processing and marketing; · strengthens the ability of agricultural enterprises, joint stock companies, leasehold farms to respond to specific market opportunities; and · helps public institutions with monitoring of quality standard, horticultural research and plant protection	Contact: USAID Alexander Kalashnikov Implementing organisation: Development Alternatives, Inc.

2) Forestation, biodiversity and ecosystems

Title of the project/practice: «Achieving ecosystem stability on degraded land in Karakalpakstan and Kyzyl-Kum Desert» (project ID: 00053510).
Type of action on adaptation to climate change : I • Institutional • Technological
Project goal and objectives: The Project goal is to achieve ecosystem sustainability in degraded lands of Karakalpakstan and Kyzyl-Kum Deserts through testing, evaluation and implementation of innovative solutions on experimental scale, within the vicinity of Kyzyl Ravat and Kazakhdarya rural settlements, as well as dissemination of the experience obtained in the other territories of Uzbekistan and the region. Th Project is planning to build on the outputs achieved, inter alia: (i) Defining types of plants which can give essential environmental and economic benefits for the chosen arid and semi-arid ecosystems and testing sustainable land management practices.

(ii) Stabilizing blown sands and rehabilitating degraded land through joint effort with local communities.
(iii) Strengthening institutional and legal bases for integrated land planning and management.
(iv) Monitoring and assessment, case studies and adaptive management.

Project implementation organization: UNDP
Partner organizations: Ministry of Agriculture and Water Resources, Uzbekistan
Donors: GEF, UNDP, Government (in-kind)

Duration of the project: 2 February 2008 - 31 January 2012

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing

Activities and outcomes of the project:
The project is expected to achieve the following results:

- To show that the degraded land of the arid and semi-arid zones can be improved, blown sands can be stabilized, bringing in environmental and economic benefits;
- to revive indigenous and to introduce innovative practices of sustainable land management, encouraging their use by the local population; and
- to support public agencies.

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Fax: + 998 71 2739089
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National project manager - Sabirjan Ergashev, Deputy Minister of Agriculture and Water Resources, Head of Main Forestry Department of Uzbekistan
Tel.: +99871 273 37 69
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Project manager - Irina Bekmirzaeva
Email: irina.bekmirzaeva@undpaffiliates.org
Contact person - Mahmud Shaumarov, Programme Expert
Email: makhmud.shaumarov@undp.org

Title of the project/practice: «Strengthening the Sustainability of National Protected Area System, with Special Attention to Reserves» (Project ID: 00060412)

Type of action on adaptation to climate change :

- Institutional
- Technological

Project goal and objectives:

The project aims at strengthening the natural protected area system in Uzbekistan. The project is to develop successful, profitable and reproducible approaches to efficient management of specially protected national parks of Uzbekistan. The project has three targets (one at the national level, another one on both national and local levels, and the other one at the local level with a certain extend to the national level). The 3 targets are as follows: (i) At the national level: more favourable conditions for management of nature preservation activities in the reserves.

(ii) At the national and local levels: enhanced management efficiency of reserves by demonstration of reforms.

(iii) At the local and national levels: the reserve is integrated into the local spatial development.

Project implementation organization: UNDP

Partner organizations: Ministry of Agriculture and Water Resources of the Republic of Uzbekistan

Donors: GEF, UNDP

Duration of the project: 1 July 2008 – 30 May 2012

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing

Activities and outcomes of the project:

The project is expected to have a positive impact on the global biological diversity through promotion of the national reserve system sustainability in Uzbekistan and increase in its efficiency in addressing the threats to biodiversity currently faced by the country. Capacity building in the national reserve system management will facilitate development and introduction of more efficient approaches to organizing the works of the reserves, including active management of buffer zones, training the personnel of the reserves in managing the nature preservation activity according to modern standards, raising their awareness and proficiency in the sphere of biodiversity and resource management, and building up relationship with the local communities. The project will focus on improving the national protected area system at the system level for its long-term sustainability.

The project is supposed to develop successful, profitable and reproducible approaches to efficient management of reserves and achieve its targets through implementation of 3 main goals:

1. Development of the Master Plan to expand the natural protected area system in Uzbekistan.
2. Strengthening institutional and human resources potential to ensure the aforementioned expansion and improvement of management efficiency.
3. Demonstration of new approaches to reserves management (new administrative approaches) in buffer zones of the reserves in Uzbekistan.

Contact information:

Tel.: +998 71 262-0333

Expert in environmental issues: **Farhod Maksudov**

Email: farhod.maksudov@undp.org
Website:

Title of the project/practice: «Conservation of Tugai Forest and Strengthening Protected Areas System in Amu Darya Delta of Karakalpakstan» (Project: ID 00046600)

Type of action on adaptation to climate change : Technological

Project goal and objectives:
Project goal: Conservation of the biodiversity in the Southern Aral Sea in Karakalpakstan.
Project objectives: Strengthening thenatural protected area system in the Republic of Karakalpakstan through creation of favourable environment and demo multi-region biosphere reserve to demonstrate joint effort.

Project implementation organization: UNDP
Partner organizations: State Committee for Nature Protection
Donors: GEF, UNDP, UK Embassy

Duration of the project: 30 August 2005 – 31 December 2011

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing

Activities and outcomes of the project:
On one hand, the project will promote expansion of protected natural area system in the region with inclusion of Tugai ecosystems. On the other hand, the project will show new approaches and a matrix of efficient protected natural area system by organizing biosphere reserve and creating conditions for sustainable management of natural resources and conservation of biodiversity in Karakalpakstan.

An enhanced system of protected natural areas of Karakalpakstan will be the main outcome of the project. A new protected territory – biosphere reserve – with various functional areas is created for the purpose. A multi-region biosphere reserve will allow binding wildlife management with local economy development.

With the assistance of the international nature protection organisations the activities are stipulated to create conditions to restore the population of rare and endangered species in the territory of Karakalpakstan, i.e. Bukhara deer.

The project is testing new and current approaches to sustainable use of wood, and land and water resources that ensure both decrease in adverse impacts on the environment and creation of guaranteed sources of income for the local population.

Pilot farms demonstrate advanced methods of land treatment: high accuracy field mappings with a laser- monitored travelling mole, zero-tillage crop sowing, advanced crop rotation, mulching soil surfaces, rational irrigation and bioorganic agriculture. Such technologies on degraded lands under recurrent water deficiency conditions and exhausted soil will promote gradual restoration of soil fertility. At the same time efficient use of irrigation water is provided. Finally, farmers are guaranteed to harvest

high-yielding crops.

In order to decrease extensiveness of livestock grazing in the Tugai woods the project develops and tests approaches directed at increase in livestock yield. These measures are expected to result in drop in the livestock population. Advantages of confinement are shown for the purpose, i.e. principles of rational feeding and fodder laying-in methods are being developed. Conditions are created to ensure high-quality and full-range veterinary services. Experts in the pilot area are trained to organise and carry out artificial insemination of cattle.

To restore the Tugai woods the project has successfully initiated and implements development of a communal forestry. At the support of the project the local population plants trees on the degraded land of timber enterprises, and cultivates plots to grow agricultural crops for their households. A small-scale organic agriculture is planned to be introduced.

In order to stop deforestation of the Tugai woods the project tests and proposes alternative types of fuel, alternative kinds of habitation, and methods of thermal protection of houses.

To ensure a long-term support to the protected natural area system the project organises awareness-raising campaigns to develop the level of understanding and comprehension for the decision makers, users of wood resources and the public in general on the problems of biodiversity conservation.

The know-how and best practice on conservation of biodiversity of the Tugai woods will be replicated through the whole system of protected areas of Karakalpakstan and Uzbekistan as a whole.

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National project coordinator – Parahut Aitmuratov
Expert in environmental issues – **Farhod Maksudov**
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Title of the project/practice: «Achieving Ecosystem Stability on Degraded Land in Karakalpakstan and Kyzyl-Kum Desert, and Improvement of Land Resources in Uzbekistan»

Type of action on adaptation to climate change :

- Institutional
- Technological

Project goal and objectives:

- Capacity-building for strengthening of favourable environment
- Capacity-building for land planning, management and integrated use
- Sustainable irrigated agriculture

- Sustainable management of woods and large forests
- Sustainable management of pastures
- Integrated resource management
- Preservation of biodiversity and management of protected areas
- Preservation of the Aral sea

Project implementation organization: CACILM
Partner organizations: GEF (Global Environmental Facility)
Donors: GEF, CACILM

Duration of the project: 2005 – 2015

Implementation stage of the project *(planning/initial implementation/completion/completed):* ongoing

Activities and outcomes of the project:

Contact information:
Email:
Website:

Title of the project/practice: «Enhancement of Living Standards in Ferghana Valley» (Project ID: 00063911)

Type of action on adaptation to climate change :
Institutional
Political
Educational
Financial and economic

Project goal and objectives:
The ELS Project aims at enhancing the living standards of the population by means of an integrated three-component approach:
1) Capacity building for local development planning
2) Ensuring better access to the basic services
3) Enhancing the choice of sources of income, which reinforces the outcomes and facilitates the implementation of the Strategy of Enhancement of Living Standards of the Population and the Millennium Development Goals (MDGS) in the regions of Uzbekistan.

The first component will build the capacity of the local and regional authorities in strategic local development planning and ensure a wider public involvement and independence of the local population. It will also promote a good practice exchange between 3 areas of the Ferghana Valley.

The second component is the largest and most significant part of the project in view of its social coverage and the outcomes of the previous ELS projects. Besides, the component supplements the policy of the government on providing a better access of the population to social infrastructure in the Ferghana Valley, which has given successful results within the previous ELS projects. This component is a practical implementation of the first one in the form of real actions executed together with the local authorities and the population to increase their standard of living.

The third component expands the range of services in development of agriculture, agricultural technologies and business for poor communities and households that were involved within the framework of the second component. Being backed by the ELS project this approach will provide a wide choice of social benefits due to mechanisms of creating new sources of income/business. The project will also show alternative small-scale technologies and approaches to create business possibilities for the local population.

Project implementation organization: UNDP
Partner organizations: Municipalities of the Namangan, Andizhan and Ferghana regions
Donors:

Duration of the project: 1 February 2009 – 31 December 2010

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Ongoing

Activities and outcomes of the project:

The preliminary list of indicators according to the outcomes of Component 1

- Enhanced capacity of the regional and local authorities in backing the local development plans.
- More accessible regional and local data on the social and economic parameters, better understanding and conformity of the local development plans and MDGs during their implementation and monitoring.
- A more significant impact and coherence of the actions implemented in the Ferghana Valley.

The preliminary list of indicators according to the outcomes of Component 2

- Raised capacity of the local authorities, local committees and communities, in backing the mutual assistance schemes via shared participation.
- Access to basic services is increased by 20-30 % of the base level.
- Not less than 200 new communities of the three regions of the Ferghana Valley are chosen to implement and co-finance infrastructural projects together with the old communities and local authorities. The quantity of new infrastructural projects and their allocation by regions will be defined during the initial stage of the project. Their exact sites will be specified in the quarterly accounts.
- The MDGs are better known as a tool to develop communities and set development goals.

The preliminary list of indicators according to the outcomes of Component 3

- Members of small-family businesses are better aware of business management practices.
- There are more registered small enterprises that are capable of developing business plans to apply for bank loans and business planning (by gender).
- There are a number of business centres and implementation centres created at the support of the local authorities.
- There are a number of experts who provide information and advisory services, and are capable of developing a network within the community, and organising

mechanisms of experience exchange and transfer (by gender).
Contact information: 5, Usmon Nosir str, dead-end siding 1 Tel.: +998 97 150 02 02 **Email:** **Website:** http://www.els.uz PR Specialist – Laylo Zokirova **Email:** laylo.zokirova@undp.org

3) Public health

Title of the project/practice: «Climate Change Adaptation to Protect Human Health»
Type of action on adaptation to climate change : • Institutional • Financial and economic • Technological • Scientific • Educational
Project goal and objectives: Reduce negative impacts of climatic drivers by equipping health care personnel and the wider population with essential tools and knowledge to prevent detrimental effects of climate on human health. **Objectives:** • **Knowledge**: The level of knowledge and skills to prevent diseases connected with climatic factors are limited among the general population. • **Capacity**: Health care system personnel are not fully aware of the relationship between climate change and variability and health impacts. There has been no specific training of the personnel in regard to adaptation to climate change and preventing its negative health impacts. • **Monitoring and surveillance**: The climate and health-monitoring and surveillance systems are not conducted at the right geographical and temporal scales that would allow observations of the trends and make advanced forecasts of direct interventions against climate-sensitive diseases. • **Research**: No mechanism currently exists to give early warning to the health system and undertake preventive measures. No research is currently conducted to observe the trends and the health system does not have clearly developed indicators that would give a chance to react. Thus no early warning system has been developed.
Partner organizations: Uzbekistan Government Ministries, UZhydromet, Tashkent Province Government **Donors:** GEF Special Climate Change Fund (SCCF)
Duration of the project: 2010—2014

Implementation stage of the project *(planning/initial/implementation/completion/completed):* Implementation
Activities and outcomes of the project: **1. An early warning system that provides reliable information on likely incidence of climate-sensitive health risks is established:** 1.1 Co-operation agreement on information flow sharing between governmental agencies is reached. 1.2 Computer-based information system established to share climate change and health information to the Government decision makers in the two pilot states. 1.3 An early warning system of potential health impacts of climate events on vulnerable groups will be designed and tested. 1.4 Contingency plans for health care system developed in the event of adverse climate variation. **2. Skills and knowledge of health care personnel to cope with climate-sensitive diseases are enhanced and awareness of the population to take self-preventive measures for climate-induced diseases are increased:** 2.1 Capacity building training programmes for medical personnel and primary care workers on the relationship between diseases and climate are developed and introduced. 2.2 Increased awareness among the local population on the health risks associated with climate change and how to take self-preventive measures against climate-sensitive diseases. **3. Action plans to address climate-sensitive diseases are successfully implemented within the 2 study provinces:** 3.1 Intervention plans for climate-sensitive health outcomes implemented within the study regions. 3.2 Effectiveness of interventions will be monitored.
Contact information: Natalia Sharipova, Ministry of Health **WHO contact** - Dr Michel Louis Marie Tailhades, Head of WHO Country Office **Email:** yrl@who.ccc.uz; office@who.uz **Website:** http://www.who.int/globalchange/projects/adaptation/en/index7.htm

4) Disasters and extreme events

Title of the project/practice: «Global Environment Facilities' Small Grants Programme»
Type of action on adaptation to climate change : Technological
Project goal and objectives: Key issues of SGP: • At the local communities level there will be development of a strategy and to implement mechanisms which will facilitate drop in risks to global environment, and can be replicated. • To acquire a know-how of the executing activities at the level of local communities and to initiate transfer of successful strategies to other environmental non-governmental and community-based organizations (CBOs), to

the local governments, development agencies, GEF and other partners working in sphere of environment at the regional and global levels. • To create a partnership and a network of stakeholders to build the capacity of local communities, NGOs and national governments in tackling the global environmental problems and to promote sustainable development. • To provide a practice when the environmental and sustainable development strategy and projects are understood and being practised by communities locally and by other stakeholders.
Project implementation organization: UNDP with assistance of the United Nations Office for Project Services (UNOPS)
Duration of the project: 1 January 2008 – 1 January 2010
Implementation stage of the project *(planning/initial/ implementation/completion/completed):* ***Ongoing***
Activities and outcomes of the project: SGP supports activitiesof non-governmental organisations (NGOs) and community-based organizations (CBOs) in developing countries in the sphere of mitigation and prevention of climate change impacts, conservation of biodiversity, protection of transboundary waters, nutrient reduction, and also prevention of land degradation, parallel to creation of sustainable sources of livelihood for local communities, i.e. in those operational programmes for implementation of which GEF is responsible.
Contact information: UNDP Representative Office in Uzbekistan 4 Shevchenko street, Tashkent 100029, Uzbekistan Tel. +998 (71) 1203450, Fax: +998(71) 1203485 **Email:** registry.uz@undp.org **Website:** undp.uz

Title of the project/practice: «Programme of Assistance and Advice to the Government of Uzbekistan for Development» (Project ID 1955)
Type of action on adaptation to climate change : Technological
Project goal and objectives: The main objective of the programme is "assistance for development", i.e. to provide a flexible and operative implementation mechanism based on an UNDP pragmatic approach and potential in giving strategic recommendations and inprogramme management. In detail: 1. To develop a mechanism of prompt provision of strategic recommendations directed at promotion of development and implementation of priority reforms. 2. To create a sustainable coordination and management mechanism of assistance. 3. To popularize a planning approach that is built upon the priority of human development and to support the government in the course of introducing this concept into the ongoing and new strategic activities.

4. To strengthen the potential of public agencies at the national and regional levels to develop and implement the strategy directed at fast response and mitigation of natural disasters, such as drought and other catastrophes.
Project implementation organization: TACIS **Partner organizations:** Cabinet of Ministers' Department for Coordination of Foreign Economic Activity **Donors:** UNDP
Duration of the project: 1 February 2002 – 30 December 2004
Implementation stage of the project *(planning/initial/ implementation/completion/completed):* Completed
Activities and outcomes of the project: The general outcomes are included in: • The information page on the website www.dssp.uz containing information on the activity which is being carried out during the implementation phrase of the programme. • The booklet containing brief information on the activity which is being carried out during the implementation phrase of the programme.
Website: http://www.tacis.uz

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