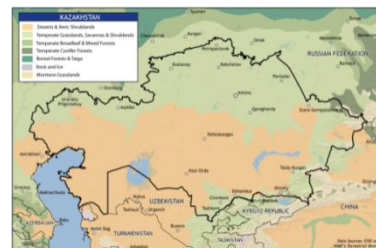




Kazakhstan

Overview of Climate Change Activities

October 2013



This **Overview of Climate Change Activities in Kazakhstan*** is part of a series of country notes for five Central Asian countries that summarize climate portfolio of the major development partners in a number of climate-sensitive sectors, namely energy, agriculture, forestry and natural resources, water, health, and transport. Recognizing the nature and significance of climate change contribution to an increase in disaster risk, the note also looks into the development partners' approaches and measures in this area. The note further provides a brief overview of Kazakhstan's climate context in terms of observed impacts and historical trends as well as climate projections specific to sectors that are considered to be essential to the country's economic development. Finally, the note assesses national policy and institutional context related to climate change and suggests potential ways forward that could help Kazakhstan mainstream low-carbon, climate-resilient development.

**This note draws upon publicly available Web information and publications, including the World Bank Climate Change Knowledge Portal, and is intended to provide an overview of development partners' climate portfolio over the past five years.*

Fact Sheet: Climate Change Exposure in Kazakhstan

- Projections suggest an increase of the average expected mean annual temperature of 1.4°C by 2030, 2.7°C by 2050, and 4.6°C by 2085.
- By mid-century, winter and spring precipitation is projected to increase by 9 percent and 5 percent, respectively.
- While overall precipitation in Kazakhstan is forecast to increase, which could mean greater agricultural opportunities, a projected northward shift of the humid zone may mean that all the northern areas will be in a semi-drought zone by 2085.
- Degradation of the mountain glaciation is expected to impact resources of the river flowing in the Lake Balhash Basin, one of the largest and the most densely populated areas of Kazakhstan.
- Parts of Kazakhstan (higher latitudes) could benefit from improved climatic conditions for agriculture. However, the potential for gain is unclear, since it could be offset by increased variability and extreme events.
- The frequency of forest and steppe fires is expected to increase due to global warming. These fires could damage considerable areas of agricultural lands and also would have an indirect impact on population health by raising smoke concentrations in the air.
- Climate change is projected to significantly influence Kazakhstan's water resources, exacerbating existing water shortages and placing greater pressures on agricultural activity.

Looking Ahead

Based on the review of national climate context, related challenges, and existing programs and policies, the following areas have been identified for urgent initial actions:

- **Improve** science-based understanding of the nature and magnitude of physical and biophysical climate change impacts under differing scenarios. This will be important in order to gain a better understanding of the timing and magnitude of incidence of several important indicators of climate change in the future, as well as the key vulnerabilities, development impact, and possible adaptation responses.
- **Estimate** cost of inaction as well as key actions across water resources, energy, agriculture, forestry, transport, and health sectors to provide compelling economic arguments and a broad-brush "road map" and the next steps for climate-smart actions
- **Design** and implement climate-smart solutions across sectors at the national and subnational levels as well as for the regional-scale cooperation among countries in Central Asia and emphasize the benefits of collaboration and institution building in the region.
- **Reinforce** the mission and strengthen the existing Climate Change Coordination Center (CCCC) to ensure better integration of low-carbon, climate-resilient considerations into development planning, and establish a cross-sectoral technical working group that would ensure the implementation of policies and actions on the ground.
- **Establish** (or use an existing mechanism) a Regional Central Asian Steering Committee on Climate Change, comprising high-level representatives from the five Central Asian countries. The committee's main responsibilities would be to provide overall guidance, political support, and leadership and to serve as a platform for continuous coordination of regional efforts to address and adapt to climate change.

Kazakhstan at a Glance**

Population (million): 16.8 million (2012)
GDP (current US\$ billion): 200.48 (2012)
GDP per capita (current US\$ / GDP growth (%): 12,116 / 5 (2012)
CO₂ emissions (kt): 248,729 (2010)
CO₂ emissions (% of world CO₂ emissions): 2.64 (2010)

**Based on World Development Indicators, World Bank
(<http://data.worldbank.org>)

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I Climate Context: Understanding the Implications

Overview and Historical Trends

Kazakhstan is a landlocked country, located at the center of the Eurasian continent, strategically linking the huge and fast-growing markets of China, South Asia, the Russian Federation, and Western Europe. It is the ninth largest country in the world, with a total area of 2.72 million square kilometers. It borders five countries: Russia, the Republic of Uzbekistan, the People’s Republic of China, the Kyrgyz Republic, and Turkmenistan. More than half of Kazakhstan’s population of 16.8 million lives in urban areas and the country’s population density (5.6 people per 1 square kilometer) is one of the lowest in the world.¹

Most of Kazakhstan lies in the arid zone, represented by steppe (vast territory in the north of the country), semidesert (arid steppes occupying central Kazakhstan), and desert landscapes (occupying most of the country’s plain). The average temperature in January ranges from -18°C in the north to -3°C in the south, and in July from 19°C in the north to 29°C in the south. The daily temperature difference reaches 20–30°C. Warming rates observed since 1936 show that the climate of Kazakhstan is becoming warmer, with temperature rise recorded practically everywhere, in all seasons. Between 1936 and 2005, the average annual air temperature increased by 0.31°C for every 10 years.²

Kazakhstan’s remoteness from the ocean creates a sharp continental climate with a lack of rainfall nearly everywhere. The foothill areas receive 500 to 1,600 millimeters precipitation per year; the steppe, 200 to 500 millimeters; and the desert, 100 to 200 millimeters. Observed changes between 1936 and 2005 do not show a well-defined trend in the regime of annual and seasonal precipitation. For most of the country’s regions, annual precipitations were increasing, more significantly so in the south mountainside of the Urals, in the valley of the Yesil River, on the windward sides of Kazakh Upland (Saryarka), and on the foothills and mountains of southern Kazakhstan. In winter, almost all of Kazakhstan experienced an increase in daily maximum amount of rain. Practically all of Kazakhstan experienced a decrease in the maximum duration of the rainless period, most significantly in the northern and southeastern parts of Kazakhstan.³

¹ World Development Indicators and Country Partnership Strategy for the Republic of Kazakhstan for the period FY12–FY17 (March 30, 2012).

² Second National Communication of the Republic of Kazakhstan to the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC), 2009.

³ Ibid.

Climate Projections

While projected climate change impacts are mixed in Kazakhstan, serious risks are already in evidence. Warmer summers, with periods of intense heat, have strained the transmission networks of Kazakhstan, for instance, and extreme weather threatens the ability of networks to function as intended—especially aging and poorly maintained facilities.⁴ Climate change will also place greater stress on Kazakhstan’s natural ecosystems. An important issue will be the deficit of water resources and the impact on the agriculture industry. Climate change will also impact human health.⁵ The summary of climate trends and projections for Kazakhstan is as follows:

- Temperature increase in Kazakhstan is projected to continue and median scenarios forecast a rise in the average mean annual temperature of 1.4°C by 2030, 2.7°C by 2050, and 4.6°C by 2085. A decrease in frost days is expected. Uncertainty in climate change scenarios follows from the uncertainty in the scenarios of greenhouse gas (GHG) concentration changes and limitations in climate models. What is important to note is that climate change scenarios give reasons to believe that the expected weather conditions will be unfavorable for grain production, particularly growing spring wheat, in some oblast of Kazakhstan (Kostanaiskaya, Akmolinskaya, and Pavlodarskaya). Impacts on pastures and sheep breeding are mixed, with potential negative consequences, such as reduced pastures productivity due to an increase of anomalous cold winters and hot summers.⁶
- By mid-century, an increase in winter (9 percent) and spring (5 percent) precipitation is projected in Kazakhstan and intensity of rainfall and variability is expected to increase. While some models project the annual quantity of rainfalls to increase by 2 percent to 2030, by 4 percent to 2050, and by 5 percent to 2085, other estimations forecast an averaged decrease of precipitation by 11 percent by 2085. Under a scenario with extremely high GHG emissions, a shift of the humid zone to 250–300 kilometers northward is projected by 2085. In the latter case, all of the northern areas of Kazakhstan are expected to become a semi-drought zone.⁷
- Climate change is expected to lead to an increase in water resources in the mountain areas and a decrease in the plain areas of Kazakhstan, with potentially negative consequences on already scarce water resources. Degradation of the mountain glaciers is expected to impact resources of the river flowing in the Lake Balhash Basin, one of the largest and the most densely populated areas of Kazakhstan. While research showed that the flow of mountain rivers will be significantly decreased due to glacier degradation, transient additional water flow is expected into some rivers due to rapid glacier melt. Glacier melt in the north Tian-Shan, having started in the 19th and 20th century, will continue due to climate change.⁸

⁴ Marianne Fay, Rachel Block, and Jane Ebinger, *Adapting to Climate Change in Eastern Europe and Central Asia* (Washington, DC: World Bank, 2009).

⁵ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

⁶ Ibid.

⁷ Ibid.

⁸ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

II National Policy and Institutional Context for Addressing and Adapting to Climate Change

Policies

Kazakhstan has a number of key strategies, concepts, and related action plans that outline strategic directions for national climate change mitigation and adaptation actions. The government recently adopted the **Kazakhstan 2050 Strategy**, which includes a focus on the energy sector and a recognition that the country must develop alternative energy sources (notably solar and wind power) with the goal that by 2050 alternative and renewable energy sources must account for at least half of the country's total energy consumption.⁹

Kazakhstan's 2009 Second National Communication to the United Nations Framework Convention on Climate Change is a key document that reflects the climate change situation in Kazakhstan. Following the 1998 First National Communication, it was prepared by expert groups comprising professionals from the Republican state-owned enterprises (RSE), Kazakh Research Institute of Ecology and Climate (KazNIIIEK, currently JSC "Zhasyl Damu"), Kazhydromet, Geography Institute, Climate Change Coordination Center, KazMehanObr, Al-Farabi University, Health Security Center, Kazakh Forest Enterprise, and other research organizations. The Second Communication looks at the influence of climate change on forests and human health, as well as data on mudflow activity and changes in glaciers. It contains detailed analysis of the possible reduction of anthropogenic GHG emissions in different economic sectors by introducing mitigation mechanisms and using the best available technologies.

Legal Basis for Implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol in Kazakhstan

Kazakhstan signed the UNFCCC in 1992 as a non-Annex I Party and ratified the Kyoto Protocol in 2009. The government delegated responsibilities and obligations related to UNFCCC implementation in Kazakhstan to the Ministry of Environment Protection.

Upon ratification of the Kyoto Protocol, Kazakhstan became an Annex I Party for the purposes of the Kyoto Protocol (in accordance with Article 1, paragraph 7, of the Kyoto Protocol), but not for the purposes of the Convention. As an Annex I Party for the purposes of the Kyoto Protocol, Kazakhstan submitted a quantified economy-wide emissions target of 15 percent by 2020 relative to the base year 1992. Kazakhstan does not have a designated national authority under the Kyoto Protocol.

Source: Second National Communication of the Republic of Kazakhstan to the UNFCCC, 2009.

⁹ Green Economy Concept for the Republic of Kazakhstan, Astana, May 2013.

The **Green Economy Concept for the Republic of Kazakhstan** (endorsed/approved in 2013) presents a vision for a transition to a green economy and sets priority goals, including (a) increased resource productivity, including water, land, biological resources, and resource management efficiency; (b) modernization of existing and development of new infrastructure; (c) increased population well-being and quality of environment, achieved by profitable measures of reducing environmental footprint; and (d) increased national security, including water supply.¹⁰ The concept outlines main principles and general approaches of a transition to a green economy, and is accompanied by an Action Plan to Implement the Concept of Transition of the Republic of Kazakhstan to Green Economy 2013–20, which includes 191 measures and pilot projects on such as the following:

- Regulatory and legal, institutional support
- Water resources sustainable use
- Developing sustainable and high-efficiency agriculture
- Conserving energy and improve energy efficiency
- Developing electric power industry
- Improving Waste Management System
- Reducing air pollution
- Ensuring development, preservation and sustainable use of biological resources
- Developing hydrometeorological services

The **“Green Bridge” Partnership Program** on the implementation of the Astana Initiative for 2011–20 aims to promote partnership between Europe, Asia, and the Pacific for the implementation of “green growth” plans and programs. The Green Bridge Partnership overall is a mechanism for the promotion of the “green economy,” which integrates actions and programs for sustainable economy that separately exist in various sectors and organizations.¹¹ The program provides measures to create conditions and infrastructure to improve access to green technology and investment, and the transfer of practical and successful management experience to interested countries and organizations. The main directions and sectors include the following:

- Strengthening governance: national and international
- Informational infrastructure, outreach, and education
- Green business and technologies
- Financial and economic mechanisms
- Standards for green economy
- Conservation of mountain, water, and other ecosystems
- Sustainable energy, its availability and efficiency
- Food security
- Urban infrastructure and transport
- Adaptation to climate change and natural disasters¹²

¹⁰ Green Economy Concept for the Republic of Kazakhstan.

¹¹ Ministry of Environment Protection, Adaptation to Climate Change, Kazakhstan’s Green Growth Strategy – Astana “Green Bridge” Initiative, <http://www.adbi.org/files/2011.12.14.cpp.day2.sess2.16.country.presentation.kazakhstan.pdf>.

¹² United Nations Sustainable Development Knowledge Platform. <http://sustainabledevelopment.un.org>.

A draft **National Concept on Adaptation to Climate Change** was developed within the framework of the joint United Nations Development Programme and Ministry of Environment and Water Resources Project “Strengthening the capacity in the field of sustainable development through integration of climate change issues into strategic planning in the Republic of Kazakhstan.” The objectives and tasks under the concept are to reduce the vulnerability of the population, economy, and natural resources to existing climate variability and forecasted climate change, and to reduce the most probable disaster risks that may lead to considerable humanitarian, economic, and environmental damages. A number of policies exist for the agriculture sector, including the State Program of Rural Territory Development 2004–2015; the Potable Water Program 2002–10; “Ak bulak” Program 2011-20; “Agrobusiness – 2020” Program; and “Zhasyl Damu” Program 2010-14. In 2013, a draft State Program on Water Resource Management (2014-40) was developed, with water security as a main goal.

Institutions

Institutional Framework for Mitigation. In terms of the institutional context related to climate change mitigation, the Ministry of Environment and Water Resources (MEWR) is the central executive body coordinating and leading the development and implementation of government policies on environmental protection and management, including climate change issues. Its units—the Republican state-owned enterprises (RSE), JSC “Zhasyl Damu” (former Kazakh Research Institute of Ecology and Climate or KazNIEK) and Kazhydromet - are responsible for preparing the annual GHG emissions inventory and climate change impact assessment and mitigation research.¹³ Also under the MEWR are the Department of Low Carbon Development and the Department of Environmental Agreements.

In 2013, Kazakhstan introduced an emission trading scheme (ETS) as one of the key instruments to pursue its strategy on green growth and low-carbon economy. The legal foundation for the ETS was established in December 2011, followed by the adoption of secondary legislation to regulate the governance and operational framework of the ETS, as well as to establish a domestic offset program. Over the past two years, the MEWR and its operating arm, “Zhasyl Damu,” have carried out intensive preparations to develop the ETS along with technical infrastructure for monitoring, reporting, and verification of GHG emissions and GHG data gathering and registry. In 2013, about 178 companies (from energy, oil and gas, and industry) participated in the one-year pilot phase. The next two phases are expected to cover 2014–15 and 2016–20.

Climate change issues are addressed through the Climate Change Coordination Center (CCCC), the first nongovernmental organization in Kazakhstan. The CCCC aims to coordinate and implement the provisions of the Kyoto Protocol, and has a memorandum of understanding with the finance, energy and resources, and environment protection ministries to (a) work toward a greater understanding, (b) reduce the effects of global warming, and (c) undertake measures to mitigate climate change.

Institutional Framework for Adaptation. Regarding the institutional framework related to adaptation to climate change in Kazakhstan, there is still no effective overall intersectoral entity to provide overall policy guidelines, determine priority measures and resource allocation, and monitor results and that

¹³ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

would ensure that adaptation and mitigation policies, programs, and investments are undertaken in a coordinated and systematic way.

In terms of sectoral authorities, the Committee for Water Resources, the Forestry and Hunting Committee, and the Fishery Committee of the MEWR (formerly under the Ministry of Agriculture) are responsible for fisheries and water conservancy, reproduction and use of flora and fauna as well as protected areas. The Ministry of Emergency Situations is the central executive body carrying out state policy formation in the prevention and elimination of natural and man-made emergency situations, maintenance and further development of public warning systems and disaster management, and organization of prevention and suppression of fires. Greater coordination among these sectoral ministries would help integrate explicit adaptation considerations into Kazakhstan's policies for addressing and adapting to climate change.

III Overview of Development Partners' Engagement in Climate-Sensitive Sectors

International development partners have an extensive portfolio of adaptation and mitigation projects in a number of climate-sensitive sectors in Kazakhstan. These, to some extent uncoordinated efforts, do not necessarily address all the challenges that the country is facing on its path to low-carbon, climate-resilient development. In this regard, an additional level of screening of the climate portfolio, which will include the identification of gaps, outline future national and regional actions, and estimate the investment resources, is needed.

In the following sections, a brief overview of the development partners' major projects and activities is presented.¹⁴

Energy

Kazakhstan has been an oil producer since 1911 and, after Russia, has the second largest oil reserves as well as the second largest oil production among the former Soviet republics. The country's energy sector (is dominated by hydrocarbon, with 84 percent of total generation dominated by coal-fired power..¹⁵ The country is the largest producer of electricity in the region. Kazakhstan's rapid economic growth in the past decade has led to a sharp upswing in electricity consumption. Power shortages, especially in the booming regions of southern Kazakhstan (including the Almaty region), have resurfaced in the winter periods of maximum electric loads, necessitating some restrictions on consumption that have had an adverse impact on regional economic development. The deteriorating state of regional electricity cooperation in Central Asia has further aggravated the supply deficit.¹⁶ Inefficient use of resources is

¹⁴ The overview of development partners' climate portfolio in Kazakhstan is based on publicly available Web information and is not meant to be comprehensive. It is intended to provide an overview of the main climate-related activities that have been supported by the development partners over the past five years. For more information on the specific projects, refer to respective institutional websites.

¹⁵ World Bank Group – Kazakhstan Partnership Program Snapshot, October 2013. .

¹⁶ World Bank Group – Kazakhstan Partnership Program Snapshot.

currently observed in every sector, and the potential for energy saving amounts to US\$3–4 billion per year, which may grow up to US\$6–10 billion per year by 2030.¹⁷

The **World Bank Group** is currently supporting Kazakhstan through the Energy Efficiency Project, which aims to improve energy efficiency in public and social facilities and to create the enabling environment for sustainable energy financing, and the Alma Electricity Transmission Project, which aims to improve the reliability and quality of electricity supply to consumers in the Almaty region in an environmentally responsible and financially sustainable manner. Under the Electricity Transmission Rehabilitation Project and the North-South Electricity Transmission Project (both now closed), major transmission sector reforms were successfully carried out, including transmission tariff rationalization, the adoption of a modern grid code, and the establishment of an organized spot market. Meanwhile, the state-owned Kazakhstan Electricity Grid Operating Company has become a financially strong company as a result of a series of institutional capacity-building measures introduced with assistance from the World Bank.

The **European Bank for Reconstruction and Development** (EBRD) has been providing support to Kazakhstan's energy sector through a number of projects on energy efficiency, rehabilitation of transmission lines, and upgrading of district heating networks (for example, in Aktobe and Aktau districts), as well as policy dialogue and institutional capacity building to create a more favorable environment for renewable energy. The **European Union** (EU) supported an energy saving initiative in the building sector to ensure improved control of energy consumption. The **United Nations Development Programme** (UNDP) is active in promoting energy-efficient lighting in Kazakhstan as well as energy-efficient design and construction of residential buildings, while the **U.S. Agency for International Development** (USAID) is working with the government of Kazakhstan to improve energy efficiency and increase the supply of renewable energy.

Agriculture

The agricultural sector accounts for only 5 percent of gross domestic product (GDP), but the sector continues to employ almost a third (28.5 percent) of the working population and is therefore critical to addressing poverty and food security as well as to providing an important avenue for the diversification of the economy. Sector growth averaged 6 percent in 2001–11. Although slower than the rest of the economy and uneven from year to year, the growth is robust. The sector is highly heterogeneous in terms of farm structure and productivity: in the northern region, larger farms specializing in crop production dominate, whereas in the south, smaller mixed farms, which include substantial meat and dairy production for the domestic market, predominate. The majority of labor is concentrated in the small farm sector, which produces 46 percent of agricultural output, including over 80 percent of livestock output.¹⁸ Ownership of land is private, and urban land markets are active, but land use planning and approval is cumbersome and non-transparent. The state dominates the provision of services and finance for agriculture. Important reforms such as the strengthening of farmer organizations, agricultural small and medium enterprises development, rural credit and agricultural

¹⁷ Green Economy Concept for the Republic of Kazakhstan.

¹⁸ World Bank Group – Kazakhstan Partnership Program Snapshot, April 2013.

insurance, veterinary and advisory service, and improved irrigation infrastructure are needed to unlock the rich potential of agriculture.

Desertification is a severe concern and may affect as much as 66 percent of the land area of Kazakhstan, contributing to low yields (for example, wheat yields are lower than in the vast majority of other countries).¹⁹ Agricultural irrigation needs for water-intensive agricultural products (cotton and rice) could lead to critical water scarcity, particularly in the southern regions of Kazakhstan where the majority of water is taken from.²⁰ Parts of Kazakhstan (higher latitudes) could benefit from improved climatic conditions for agriculture. However, the potential for gain is unclear, since it could be offset by increased variability and extreme events. Kazakhstan will likely face a mix of losses and gains. The inability of Kazakhstan to close the existing productivity gap in the agriculture sector or respond to crop price increases does not bode well for its capacity to adapt to and benefit from climate change.²¹

Key **World Bank Group** contributions in Kazakhstan include (a) the Irrigation and Drainage Improvement Project that helped rehabilitate the irrigation infrastructure; (b) the Agricultural Post-Privatization Assistance Project (Phases I and II, both completed) that supported the inflow of financial resources to the sector, and provided technical assistance to the financial advisory network in the country and risk management to the agricultural sector; and (c) the Agricultural Competitiveness Project (completed) that facilitated farmers' access to knowledge and markets. The Bank conducted a Public Expenditure and Institutional Review of the agricultural sector in 2009, which highlighted the fact that government support to the sector is adequate. The report also stated that there is a need for a reallocation of resources to provide essential public services, including advisory services, research and extension, market information, sanitary and phytosanitary inspections, and veterinary services. Currently under the Joint Economic Research Program (JERP), the Bank is assisting the Ministry of Agriculture to improve its approach to formulating an agricultural strategy, policy, and budget.²²

In addition, a number of other development partners are supporting Kazakhstan's agriculture sector, primarily through capacity development at the national and local levels. The **German Federal Enterprise for International Cooperation** (GIZ) (formerly GTZ) has focused almost exclusively on pastoral development, while the **Food and Agriculture Organization** (FAO) is currently focused on sustainable livestock production. Support by both the **U.S. Agency for International Development** and the **United Nations Development Programme** focuses on crop resiliency at the national level while simultaneously promoting regional dialogue on the effects of climate change on food security. USAID is also working with the government of Kazakhstan and the private sector to strengthen the climate resiliency of the wheat sector, while also working with importing countries to identify strategies to reduce their risk exposure. For UNDP, agricultural projects are generally folded into environmental projects, specifically those pertaining to desertification and the effects of climate change. The Global Environment Facility (GEF) supported the Kazakhstan Drylands Management project, which promoted sustainable land uses in the marginal dryland ecosystem of a pilot area in the Shetsky rayon. In addition, the Consultative

¹⁹ Green Economy Concept for the Republic of Kazakhstan.

²⁰ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

²¹ Fay, Block, and Ebinger, *Adapting to Climate Change in Eastern Europe and Central Asia*.

²² World Bank Group – Kazakhstan Partnership Program Snapshot, April 2013.

Group on International Agricultural Research (CGAIR) has worked on sustainable agriculture development in Kazakhstan. Under the Technological Needs Assessment (TNAs) framework, the **United Nations Environment Programme (UNEP)** provided support for the identification of the country's mitigation and adaptation technology priorities.

Forestry

Forests in Kazakhstan are concentrated in the mountains in the eastern, southeastern, and moisture plain area in the northern regions and occupy around 1.2 percent of the land area.²³ The role of forests is important above all for environmental protection, notably soil and water protection (the latter particularly in the watershed areas that feed the Syr Darya, which flows into the Aral Sea),²⁴ but also for climate-regulating functions and as a source for raw wood, food and medicinal products. Factors threatening the forests and their biological diversity include fires, unauthorized logging, and livestock grazing. Climate conditions of the last decade have led to many forest fires. During 2000–06, there were 6,415 forest fire cases recorded, resulting in 160 thousand hectares burnt. The frequency of forest and steppe fires is expected to increase due to global warming. These fires could damage considerable areas of agricultural lands and also would have an indirect impact on population health by raising smoke concentrations in the air.²⁵

The **World Bank Group's** FY2012–17 Country Partnership Strategy for Kazakhstan supports addressing climate change and efforts for reforestation. The Forest Protection and Reforestation Project in Kazakhstan, including a Global Environment Facility grant, is working to develop cost-effective and sustainable environmental rehabilitation and management of forest landscapes and rangelands. The project has both adaptation and mitigation components and focuses on reforestation, environmental amelioration, and capacity building of national institutions.²⁶

Other development partners active in forestry activities in Kazakhstan include the **European Union**, which supported the strengthening of regional environmental governance capacity; the **German Federal Ministry for Economic Cooperation and Development** through the **German Federal Enterprise for International Cooperation (GIZ)**, which is assisting in the development of new, regionally adapted approaches for sustainable management of pasture, forest, and wildlife resources; and the **U.S. Agency for International Development**, which is promoting the long-term sustainable management of the Ustyurt landscape, with a focus on developing the capacity of the state nature protection agencies.

²³ Second National Communication of the Republic of Kazakhstan to the UNFCCC and World Development Indicators.

²⁴ FAO. <http://www.fao.org/forestry/country/57478/en/kaz/>.

²⁵ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

²⁶ World Bank, "Project Appraisal Document on a Proposed Grant from the GEF for a Forest Protection and Reforestation Project."

Water

Water resources in Kazakhstan come mainly from surface water sources. Four major hydrologic regions can be identified based on the final destination of water: (1) the Arctic Ocean through the Ob River, (2) the Caspian Sea, (3) the Aral Sea, and (4) internal lakes, depressions, or deserts. Water scarcity and water pollution are significant environmental concerns in Kazakhstan, as are water allocation issues with neighboring countries.²⁷ The water dependency of Kazakhstan on these countries accounts for almost 50 percent. As a result of glacier degradation, there will inevitably be significant changes in water flows from the mountain rivers. These changes can seriously challenge agricultural activity in irrigated crop areas.²⁸ For agriculture irrigation needs (particularly water-intensive products such as cotton and rice), the majority of water is used in the southern regions. In the arid climate conditions, the water deficit and inefficiencies of the irrigation system infrastructure could lead to critical water scarcity in southern Kazakhstan.²⁹ One example is the desiccation of the Aral Sea during the past 40 years due to the rapid irrigation developments in Kazakhstan and Uzbekistan, which resulted in serious economic, social, and environmental damage in and around the sea.³⁰ Kazakhstan's water efficiency is very low due to outdated irrigation technology and poor practices. Some basins in Kazakhstan already face significant water shortages and much of Kazakhstan's arable land is subject to drought. Over the next two decades the water shortage is expected to increase dramatically, putting all water-inefficient agriculture out of business.³¹ Climate change is projected to significantly influence Kazakhstan's water resources, and the climate in the agricultural regions will become more arid. The demand for water will grow from both Kazakhstan's population and industry as well as from neighboring countries.

The **World Bank Group** has supported the Nura River Clean-up Project, which helped provide access to safe, reliable, and affordable water by cleaning up the mercury pollution in the river-adjacent areas, and the ongoing Ust-Kamenogorsk Environmental Remediation Project, which addresses groundwater pollution and strengthens institutional mechanisms for groundwater quality monitoring, as well as provides technical assistance on reducing gas flaring. The Bank also assists Kazakhstan to improve the timely availability of water for productive purposes, including irrigated agriculture, fisheries, and industry, while at the same time reviving the northern Aral Sea (NAS) through the Syr Darya Control and Northern Aral Sea Project Phase I (SYNAS-I). SYNAS-I focused on the most urgent investments needed to reduce water losses in the Kazakh part of the basin and to capture that water in the NAS, with impressive results.

The **United Nations Development Programme** has undertaken a comprehensive review of water resources in Kazakhstan and their use, summarized in the 2010 report "Water as a Key Factor of Human Development in Kazakhstan." The report highlights the challenges of uneven water distribution in Kazakhstan, with central parts of the country having access to only 3 percent of the country's water. In addition, the report highlights that the water that is available is not always fit for human consumption. About 50 percent of the population uses drinking water which doesn't meet international standards,

²⁷ World Bank, "Kazakhstan Overview."

²⁸ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

²⁹ Ibid.

³⁰ World Bank Group – Kazakhstan Partnership Program Snapshot, April 2013.

³¹ Green Economy Concept for the Republic of Kazakhstan.

indicating that poor sanitary conditions in the water supply system could have the potential to contribute to epidemics. Other development partners are active in Kazakhstan's water sector as well, including the **United Nations Economic Forum for Europe (UNECE)**, which is promoting improved cooperation and understanding of water issues in Kazakhstan and Central Asia more widely, and **German Federal Enterprise for International Cooperation (GIZ)**, which is supporting transboundary water management in Central Asia, including Kazakhstan. The **United Nations Environment Programme** has conducted a review of the vulnerability of the water sector, including identifying priority sub-sectors for the deployment of new technologies to reduce climate vulnerability and enhance efficiency in the use of natural resources.

Health

Kazakhstan is facing challenges in restructuring its health care system. The country's health outcomes are lagging behind its rapidly increasing income. At 69.6 years, its life expectancy is at the level of the EU-15 countries in 1950, and lower compared to other countries with similar incomes in 2012. The new State Health Care Development Program recognizes health as one of the country's major priorities and a prerequisite to sustainable socioeconomic development.³² However, climate change considerations are not yet explicitly part of the aims of the program.

Predicted climate warming will have both a direct and mediated influence on the population's health. The direct influence is an increase in morbidity, and even death, as a result of dangerous weather phenomena, for example, extreme high temperatures, floods, mudflows, and landslides. The indirect climate change impact may affect people's health by increasing the number of infection carriers (mosquitoes, piners, and others), lengthening the danger period of potentially infectious diseases, and disrupting water supplies (affecting quality and availability of drinking water).³³

The **World Bank Group** supports health care system reform through a comprehensive Health Sector Technology Transfer and Institutional Reform Project. The project helps introduce international standards into the health sector and build long-term institutional capacity in the Ministry of Health and related health institutions. It deals with all aspects of health sector reform, including (a) health financing, budgeting, planning, and management; (b) health care quality improvement; (c) reform of medical education and medical science; (d) health information system development; (e) pharmaceutical policy reform; and (f) food safety and World Trade Organization accession.

A few other development partners are also involved in health-related activities in Kazakhstan. For example, both the **European Union** and the **World Health Organization (WHO)** strive to improve maternal and child health in Kazakhstan, and assist the Kazakh Ministry of Health in achieving the Millennium Development Goals.³⁴

³² World Bank Group – Kazakhstan Partnership Program Snapshot, April 2013.

³³ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

³⁴ World Health Organization, "Support for Maternal and Child Health in Kazakhstan." http://www.euro.who.int/_data/assets/pdf_file/0007/136456/e94885.pdf.

Transport

The transport sector of Kazakhstan includes roads and railways, which make up the bulk of land networks (around 88.4 and 14.0 thousand kilometers respectively, 2009), as well as river transport.³⁵ Road infrastructure does not encourage the use of public transportation, electric cars, walking, and biking, and in major cities over 70 percent of the traffic is covered by private motorized vehicles. Eighty percent of the road transportation vehicles are more than 10 years old. Transport (along with industry, buildings, and power supply) will remain the leading sectors in terms of energy consumption. The energy savings potential in the transport sector, through fuel efficiency increase (for example, fleet update, transport infrastructure development), is estimated to be 11 percent by 2050, which could contribute to mitigate climate change.³⁶ In terms of climate change impact, more extreme temperatures will add to road deterioration, which has already happened in Kazakhstan, where truck travel has to be limited on hot summer days when the asphalt softens.³⁷

The **World Bank Group** has an active portfolio in the transport sector, including the East-West Roads Project: Western Europe–Western China International Transit Corridor (US\$1.07 billion) and the South-West Roads: Western Europe–Western China International Transit Corridor (US\$2.13 billion). Both projects aim to increase transport efficiency along the section of the Western Europe–Western China road corridor within Almaty Oblast and to modernize highway management on sections of the Western Europe–Western China road corridor as well as increase transport efficiency along the road sections between Aktobe/Kyzylorda Oblast border and Shymkent and to improve road management and traffic safety in Kazakhstan.

Among the development partners, the **Asian Development Bank** (ADB) is providing technical assistance to increase transport connectivity and efficiency through road development, strengthen capacity building, rehabilitate cross-border road infrastructure, and promote urban mobility in fast-growing cities like Astana through projects including the CAREC (Central Asia Regional Economic Cooperation) Corridor 2 (Mangystau Oblast Section). The **European Bank for Reconstruction and Development** is considering providing support to the government of Kazakhstan for reconstruction and upgrading of a road section as part of the South-West international transport corridor linking Europe with China. Once upgraded, this road will help to accelerate development of regional trade by facilitating the transit of goods and passengers from Uzbekistan and Tajikistan to Kazakhstan, Russia, and Western Europe. The **United Nations Development Programme** has active projects to reduce the growth of transport-related GHG emissions in Almaty, which simultaneously is improving urban environmental conditions.

³⁵ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

³⁶ Green Economy Concept for the Republic of Kazakhstan.

³⁷ Fay, Block, and Ebinger, *Adapting to Climate Change in Eastern Europe and Central Asia*..

Disaster Risk Reduction

Kazakhstan's geographical location determines the country's high exposure to various natural disasters—like earthquakes, floods, droughts, and debris flows—that constrain people's livelihoods, including their access to proper alimentation and drinking water. About 75 percent of the country's area falls under this category.³⁸ The extreme weather conditions of Kazakhstan have business and economic implications for the country. The frequent heavy blizzards disrupt transport and hinder work. Severe frosts result in the re-planting of grains and crops. Mudflows present a danger to residents of rural and urban areas, particularly in the foothills located in the 10-kilometer zone of Ili Valley, adjacent to the low zone Zaili Alatau. Mudflows are usually more prone to be formed in the low zones, also called the zone of so-called stalls. Mudflows in the counter zones are formed after heavy rainfall and bring tangible damage (including human loss) even under present-day climatic conditions. Flooding has caused widespread displacement. Kazakhstan's significant risks to natural disasters are likely to be augmented by climate change.³⁹

Within the context of the Global Facility for Disaster Reduction and Recovery, the **World Bank Group** and the **United Nations Office for Disaster Risk Reduction (UNISDR)** in partnership with other international partners under the umbrella of the Central Asia Regional Economic Cooperation (CAREC) have initiated the Central Asia and Caucasus Disaster Risk Management Initiative, which is in line with the Hyogo Framework for Action 2005–15 and aims to reduce the vulnerability of Kazakhstan to risks imposed by disasters. Specifically, the initiative incorporates three focus areas: (1) coordination of disaster mitigation, preparedness and response; (2) financing of disaster losses, and (3) hydrometeorological forecasting, data sharing, and early warning.

IV Conclusions

Kazakhstan is significantly threatened by climate change, with serious risks already in evidence. The trend of temperature increase in Kazakhstan is expected to continue, leading to drier conditions that will be unfavorable for grain production in some parts of the country. Water scarcity is expected to worsen due to increased variability in precipitation patterns and a northward shift of the humid zone. This is likely to create unfavorable conditions for the agriculture sector as well as pastures and sheep breeding, which are important sectors of the economy, negatively affecting the livelihoods of people. Risk reduction strategies are needed to address these challenges. The Green Growth Concept provides a new lens for shaping the overall development agenda in Kazakhstan and transitioning to a low-carbon economy. In addition, there are several national development and environmental policies and programs related to climate change mitigation and adaptation, which seek to address current risks.

³⁸ United Nations Development Assistance Framework (UNDAF) for the Republic of Kazakhstan 2010–2015 (March 2009).

³⁹ Second National Communication of the Republic of Kazakhstan to the UNFCCC.

Looking Ahead

Kazakhstan, in collaboration with international development partners, is implementing several adaptation and mitigation projects in a number of climate-sensitive sectors. Based on the review of national climate context, related challenges, and existing programs and policies, several areas have been identified for urgent initial actions that could help Kazakhstan mainstream climate considerations into development activities and planning as well as create public demand for climate actions.

Improving Science-Based Understanding of Climate Change Impacts

In order to initiate and strengthen an evidence-based dialogue on climate action among key stakeholders, further science-based analysis of the nature and magnitude of physical and biophysical climate change impacts under different scenarios is needed. Such analysis will provide a better understanding of the timing and magnitude of incidence of several important indicators of climate change in the future, as well as identify the key vulnerabilities, development impacts, and possible adaptation responses. Finally, the scientific analysis will also serve as a basis for further identification of development responses at the national and regional levels as well as for institution building, priority setting, implementation, and results monitoring.

Estimating Cost of Inaction

The analysis of climate change impacts and associated economic costs across water, energy, agriculture, forestry, transport, and health sectors is necessary in order to provide compelling economic arguments in favor of climate action. Furthermore, such analysis is needed in order to inform the national and regional planning on appropriate policy responses that are likely to reduce GHG emissions as well as strengthen local adaptive capacity needed to improve climate resilience. Finally, the economic analysis of cost of inaction is also needed to form a basis for a broad-brush “road map” and the next steps for climate-smart actions.

Designing and Implementing Climate-Smart Solutions

Meeting the challenges of climate change offers numerous “no regrets” sectoral, climate-conscious strategies that can enhance climate resilience while generating immediate development benefits. An identification and effective implementation of climate-smart solutions (such as those related to improved disaster risk management, quality of hydromet services, climate risk assessments, water resource management, performance of water utilities and energy systems, and others) also have significant global co-benefits, such as contributing to global efforts to reduce GHG emissions. Finally, such solutions form a necessary basis for enhanced regional collaboration and a foundation for national and regional institution building.

A Case for Strengthening the Climate Change Coordination Committee

Even though the emerging climate change impacts in Kazakhstan are well recognized and the country, with support from development partners, is implementing a number of activities aimed at reducing vulnerability and mitigating climate change impacts, these issues do not yet receive the priority they

need within the existing policy and institutional contexts. In order to integrate and effectively implement low carbon climate resilient considerations into development planning, national coalition building efforts and cross-sectoral participation among relevant stakeholders would need to be strengthened and scaled up. Such efforts would in turn improve the country's institution readiness and associated capacity.

To support and facilitate such process, there is a need to enhance the role of the existing **Climate Change Coordination Center**. Given the cross-sectoral nature of this issue, international experience has indicated that such a coordination center would best function if chaired by the Ministry of Finance or Ministry of Economy and comprising high-level representatives from concerned line ministries and agencies. The main responsibilities of the Coordination Center would need to be strengthened and expanded to include considerations of climate change adaptation within Kazakhstan's policy context and to enhance its role in facilitating interministerial coordination. The Coordination Center would provide overall guidance, garner political support and leadership to ensure adequate resource allocation, and monitor the results related to the national efforts to address and adapt to climate change.

Enhancing Regional Coordination Mechanism on Climate Change

Climate change poses a common challenge to all countries in Central Asia, making regional and international collaboration essential to achieving low-carbon, climate-resilient growth in each of them. Despite a number of important national-level adaptation and mitigation actions that Kazakhstan is undertaking, the country will be better equipped to address climate change impacts within a framework for scaled-up regional collaboration on climate-related data sharing, disaster risk management systems and crisis responses, development of climate-resilient infrastructure, technology transfer, and others. As a result, regional programs would be leveraged for effective implementation of national actions.

In order to enable such processes, a **Regional Central Asian Steering Committee on Climate Change** would need to be established. The committee would comprise high-level representatives from the five Central Asian countries and international development partners as its members. The committee's main responsibilities would be to provide overall guidance, political support, and leadership and to serve as a vehicle for continuous coordination of regional efforts to address and adapt to climate change.

In order for the broad policy directions to be implemented, such regional committee would need to be supported by a **Regional Central Asian Secretariat on Climate Change**, which would be jointly established by the five Central Asian countries and international development partners. The secretariat would be headquartered in a given Central Asian country (to be determined by the countries themselves) and function either as an independent unit or within an existing regional institution. It would serve as a facilitation unit and support governance bodies of the committee, carry out regional communication and resource mobilization efforts, help establish or host regional centers of excellence, and work with the national-level committees.

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