

CLIMATE CHANGE ASSESSMENT

1. Background

1. Despite having one of the lowest greenhouse gas (GHG) emission per capita in the world, the Kyrgyz Republic is one of the most climate vulnerable countries in Central Asia. As a landlocked mountainous country—with approximately 94% of its territory located at more than 1,000 meters above sea level (masl) and about 42% higher than 3,000 masl—the Kyrgyz Republic faces unique challenges. Because of its geography and topography, the Kyrgyz Republic's climate induced disasters is estimated to reach up to 1–1.5% of GDP.¹

2. Over the last few decades the Kyrgyz Republic has experienced an increase in climate induced disasters and this trend is likely to continue as the consequences of climate change—particularly increases in temperature and the reduction of snowfall—will likely increase the frequency and severity of floods and droughts. Temperatures are rising fastest at the highest altitudes, affecting glaciers, snow and ice, and threatening the communities that depend upon them. Retreating glaciers and changes in seasonal snow fall and melt will lead to greater uncertainty about water discharge patterns and may threaten hydropower generation, domestic water supply, agriculture production and infrastructure. The very low capacity of institutions and individuals to anticipate and manage these risks prevents the Kyrgyz Republic from implementing measures to increase its resilience.² To achieve the country's goal of reducing poverty and accelerating economic growth, the country will need to chart a climate resilient development path.

2. Greenhouse Gas Emissions Profile

3. Total emissions of greenhouse gases (GHGs)³ were 9.3 million metric tons of carbon dioxide equivalent (tCO₂e) in 2005.⁴ The energy sector registered a 13% increase in emissions for all GHGs from 2000 to 2005. Within the energy sector, the subsectors of electricity and heat showed a decline of 25% in the same period. There were also significant increases in the emissions of manufacturing and construction (78%), transportation (80%) and industrial processes (67%). A detailed breakdown of GHG emissions by sector is provided in Appendix 1, Table A1.

4. Of the six GHGs, carbon dioxide (CO₂) was the largest at 5.5 million tons (58.9%), followed by methane (CH₄) at 3.7 million tons (39.5%), and Nitrous Oxide (N₂O) at 0.1 million (1.2%). Emissions of other GHGs were insignificant. CO₂ emission increased to 6.7 million metric tons in 2009, with CO₂ emissions per capita reaching 1.2 tons.⁵

5. GHG emissions from energy, the transport, agriculture and municipal solid waste are expected to increase and peak at 30 million tCO₂e in 2100 under a business as usual scenarios.

¹ Global Facility for Disaster Reduction and Recovery. 2011. *GFDRR Disaster Risk Management Programs for Priority Countries*. http://www.unisdr.org/files/14757_6thCGDRMPProgramsforPriorityCountrye.pdf

² The capacity of institutions, communities, and individuals to adapt to climate change is rated low, based on the Human Development Index and the Global Adaptation Index. The Kyrgyz Republic ranked 126 out of 179 countries in the UNDP's 2011 Human Development Index Report and 69 out of 161 countries in the 2010 Global Adaptation Index.

³ Emissions data are presented for six main greenhouse gases, i.e. carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbon (HFC), perfluorocarbon (PFC) and sulphur hexafluoride (SF₆).

⁴ World Resources Institute. Climate Analysis Indicators Tool (CAIT). <http://www.wri.org/tools/cait/?guest=1> (accessed 2 April 2013)

⁵ World Bank. Climate Change Data. <http://data.worldbank.org/indicator> (accessed 2 April 2013)

If mitigation measures are implemented, GHG emissions may stabilize at a level below 25 million tCO₂e by 2100.⁶

3. Climate Change Profile

6. Average annual temperature has risen by 0.8°C over the 21st century in the Kyrgyz Republic, and the average annual precipitation has increased by 6% over the same time period (see footnote 5). However, in the high altitude zone, precipitation decreased leading to increased aridity. Over the same period, one third of glacier volume has been lost.⁷

7. Climate change scenarios indicate a 2°C increase in annual temperature by 2050 compared to the base period 1960–1990 (see footnote 5). Changes in precipitation show a less clear trend, with likely increase in precipitation in the Northern part of the country and decrease in the Southern part of the country. As a result of the increase in temperature, more precipitation will fall as rain and glaciers and snowfields will shrink, with annual river run-off peaking approximately in 2020 and then dropping significantly to levels as low as one half of current levels by the end of the century. The seasonal distribution of water flows will change considerably, affecting hydropower generation potential, water supply for human consumption and irrigation, and crop yields.

8. A detailed assessment of the impacts of climate variability and change, and estimates of associated costs are lacking. However, the water resources, energy, agriculture and infrastructure sectors are expected to be the hardest hit. Preliminary results of an ongoing study carried out by ADB indicate that changes in river run off seasonality will affect hydropower generation and water resources availability for domestic use.⁸ Increase in temperature and evapotranspiration will result in higher water demand for irrigation, affect the agro-climatic zones and result in a decrease in arable land. Intensity and frequency of landslides, mudslides, floods and outbursts of highland lakes will cause damage to transport and other infrastructure. These adverse effects will be compounded by underlying socioeconomic and environmental constraints, such as land degradation, crumbling infrastructure, and limited institutional and financial capacity. In addition to posing national challenges, the negative effects of climate change in the Kyrgyz Republic will have implications for water resource management in the Central Asia region. The discharge in the Syr Darya river basin, one of the two main rivers in the region, will decrease as a result of snow and glacial melt and lead to diminished flows in downstream regions.

4. Institutional, Technical and Financial Capacity for Climate Change

9. The coping capacity of institutions and communities is significantly hindered by the limited knowledge and awareness of climate change risks, and the lack of appropriate mechanisms to address them. Data and information on current climate variability, future climate change, and its impacts on economic growth and human development are insufficient to inform decision making. Monitoring systems are inadequate for predicting the likelihood of extreme events and assessing possible changes in weather patterns. Limited resources for acquiring and maintaining equipment restrain the ability of responsible agencies to generate, store, and analyze climate data, and produce information for decision makers.

⁶ Government of the Kyrgyz Republic. 2009. *Second National Communication of the Kyrgyz Republic to the United Nations Framework Convention on Climate Change*. Bishkek.

⁷ Aizen, V. B. et al. 2007. Glacier changes in the Tien Shan as determined from topographic and remotely sensed data. *Global and Planetary Change*. 56(3-4). pp. 328-340.

⁸ ADB. 2011. *Technical Assistance for Water and Adaptation Interventions in Central and West Asia*. Manila.

10. Education and training on how to use the available data are insufficient to provide a sustained skill pool for weather forecasting and modeling. As a result, development plans and projects cannot be formulated to consider design and engineering features that respond to climate change risks. Public awareness of climate change is increasing but remains low in local government agencies, and vulnerable groups, particularly among women. No clear plans with clear targets and sources of funding exist to address these shortfalls. Monitoring and evaluation of current climate change policies and projects are absent.

11. Institutional capacity for climate change mitigation is also inadequate. No assessment has been made of policy and technology options that can be promoted to reduce GHG emissions from key sectors. Technical capacity for emissions monitoring, reporting and verification is limited.

12. Estimates indicate that climate induced extreme events caused economic losses totaling \$80,000,000 over the last decade.⁹ However, estimates of the costs associated with future impacts of climate change are not available. The government's estimates indicate that cost of GHG emissions reduction measures total \$17.6 billion.¹⁰ Both public and private financing will be needed and climate finance can play a significant contribution. The Kyrgyz Republic has leveraged small amounts of climate financing from the Global Environmental Facility (GEF) for initiatives that contribute to the country's climate resilience and from Liechtenstein for climate mitigation.¹¹ No Clean Development Mechanism (CDM) projects have been registered or are undergoing validation. The country's capacity to access and absorb climate finance needs to be significantly increased to meet its climate change adaptation and mitigation challenges.

A. Climate Change Policies and Strategies

13. The Kyrgyz Republic ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 2000 and the Kyoto Protocol in 2003. Between 2001 and 2005, an inventory of anthropogenic GHG emissions was conducted among the eight administrative units of the Kyrgyz Republic (oblasts). The First National Communication and the Second National Communication were submitted to the UNFCCC in 2003 and 2009 respectively. The State Agency on Environmental Protection and Forestry was established in 2005 and nominated as the Designated National Authority (DNA) for climate change.

14. Several environmental and legal frameworks, plans and strategies have already been initiated in support of GHG emissions reduction commitments (see footnote 5). The Law on the State Regulation and Policy of GHG Emissions and Absorption (25 May 2007) establishes the legal basis for national policies on climate change mitigation in the country. Other laws, strategies and policies on renewable energy, energy and fuel efficiency, carbon sequestration, and methane avoidance have been developed by the Kyrgyz Republic in cooperation with development agencies. Relevant legal and environmental documents are described in Appendix 1, Table A2 .

⁹ ADB estimates. Based on GFDRR. 2011. Vulnerability, Risk Reduction, and Adaptation to Climate Change: Kyrgyz Republic Climate Risk and Adaptation Country Profile and the International Disaster Database. www.emdat.be

¹⁰ Government of the Kyrgyz Republic. 2009. *Second National Communication of the Kyrgyz Republic to the United Nations Framework Convention on Climate Change*. Bishkek.

¹¹ United Nations Framework Convention on Climate Change. Finance Portal for Climate Change. <http://www3.unfccc.int/pls/apex/f?p=116:3:4327145159551103::NO:RP::> (accessed 24 May 2013).

15. The Kyrgyz Republic has also made progress in dealing with extreme events and managing natural resources, as demonstrated by the following strategies:

- i. The 2001-2010 Comprehensive Development Framework, establishing strategic socioeconomic development goals and focusing on sustainable management of natural resources;¹²
- ii. The National Framework Program on Land Resources Management for 2006-2016 (NFP) drafted under the Central Asian Countries Initiative on Sustainable Land Management (CACILM), focusing on land degradation and sustainable land and water resource management;¹³
- iii. The Package of Measures to Ensure Environmental Security of Kyrgyz Republic, which indicate the need for research on the condition of glaciers, the development of the draft Climate Profile of Kyrgyz Republic and the development of a national Climate Strategy as the country's priorities;
- iv. The Law on Protection of the Population and Territories from Natural and Man-caused Emergency situations, focusing on efforts to reduce the loss of life and injuries, and the economic and social impacts of future events.

16. While these policies address some of the environmental challenges that the country phases, they make little reference to additional risks resulting from climate variability and change and do not address national priorities to strengthen the country's resilience to climate change and promote GHG emission reduction. A full list of priorities is enclosed in Appendix 2.¹⁴

B. Ongoing Support from Development Partners

17. ADB is providing assistance to the Kyrgyz Republic to adapt to the adverse effects of climate change and promote GHG emission reduction measures through two regional TA projects. A regional TA is assessing the impacts of climate change on the runoff of the Syr Darya and the Amu Darya river basins (see footnote 7). Another regional TA is developing GIS-based hazards atlas and solar and wind energy potential maps in ten Central and West Asian countries.¹⁵

18. Other climate change initiatives are being supported primarily by UNDP, the European Bank for Reconstruction and Development (EBRD), the Japan International Cooperation Agency (JICA), the Food and Agricultural Organization (FAO) and the World Bank. Support to enhance the national hydrometeorological service (Kyrgyzhydromet) is being provided by the World Bank.¹⁶ The country's capacity to perform obligations under the UNFCCC and the Kyoto Protocol¹⁷ and for risk management¹⁸ is being supported by the UNDP.

¹² State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic and the United Nations Development Program in the Kyrgyz Republic, 2007. *Kyrgyzstan: Environment and Natural Resources for Sustainable Development*.

¹³ Global Facility for Disaster Reduction and Recovery. 2011. *Vulnerability, Risk Reduction, and Adaptation to Climate Change: Kyrgyz Republic Climate Risk and Adaptation Country Profile*. <http://www.gfdr.org>

¹⁴ Consultations were held with government ministries (Ministry of Energy, Ministry of Water Resources, State Agency for Environmental Protection and Forestry), international organizations and nongovernment organizations during and ADB mission fielded in February 2012.

¹⁵ ADB. 2009. *Technical Assistance for Enabling Climate Change Interventions in Central and West Asia*. Manila.

¹⁶ World Bank. 2011. *Improvement of Weather, Climate and Hydrological Service Delivery under the Central Asia Hydrometeorology Modernization Program*. Washington DC.

¹⁷ UNDP. 2011. *Environment Protection for Sustainable Development*. Bishkek.

¹⁸ UNDP. 2010. *Climate Risk Management Project*. Bishkek.

19. Support to create an enabling environment for comprehensive disaster risk reduction, including both climate-induced and geophysical risks, at the national and sub-national level is being provided by UNDP.¹⁹

20. Projects aimed at strengthening land management and forest management are being supported by UNDP,²⁰ JICA²¹ and FAO.²² Energy efficiency, small hydropower and cleaner modes of transport are being supported by UNDP²³ and EBRD.²⁴

C. ADB Future Assistance Program on Climate Change

21. ADB has identified at least three areas for support: (i) significantly enhance the scant evidence base on climate change in the country; (ii) integrate climate change in the design of infrastructure projects in the energy, transport and water resources sectors to strengthen the sustainability of investments and increase the country's resilience; and (iii) address specific climate vulnerabilities and greenhouse gas emission reduction opportunities with dedicated stand-alone projects.

22. ADB will provide the two-year regional technical assistance 'Economics of Climate Change in Central and West Asia' to assess the impacts of climate change and the potential for greenhouse gas emission reduction, and evaluate associated costs in priority sectors.²⁵ In the Kyrgyz Republic, this TA will support the formulation of a National Adaptation Plan, estimate the cost of a range of adaptation options in the water resources and energy sectors, prioritize climate change adaptation investment needs, and strengthen the country's readiness to access international climate finance such as the recently established Green Climate Fund.

23. ADB and the government are seeking financial support from the Strategic Climate Change Fund of the Global Environmental Facility (GEF) to climate proof the Power Sector Rehabilitation Project.²⁶ The GEF funded component 'Improving the Climate Resilience of the Hydropower Sector' will reduce the adverse effects of climate variability and change in the Naryn River hydropower cascade. This will be achieved by assessing the impacts of climate variability and change on energy production in the Naryn Cascade; identifying physical and nonphysical measures required to reduce the vulnerability of the Naryn Cascade; and formulating a climate resilience strategy for the hydropower generation sector.

24. ADB is considering the opportunity to integrate climate-proofing measures in the design of the CAREC Corridor (Bishkek-Osh) Improvement Project Phase 4. A climate change risk assessment may be considered to identify risks resulting from higher temperature, changes in precipitation patterns and increased frequency of extreme events. An assessment of measures to quantify the sector GHG emissions baseline, future projections and measures to reduce GHG

¹⁹ UNDP. 2012. *Effective Disaster Risk Management for Sustainable Development and Human Security*. Bishkek.

²⁰ UNDP. 2012. *The Sustainable Management of Mountainous Forest and Land Resources under Climate Change Conditions*. Bishkek. UNDP. 2011. *Rehabilitation Riparian Forests of Kyrgyzstan*. Bishkek.

²¹ JICA. 2009. *Support for Joint Forest Management in Kyrgyz Republic*. Bishkek.

²² FAO and GEF. 2011. *Sustainable Management of Mountainous Forest and Land Resources under Climate Change Conditions*.

²³ UNDP. 2010. *Small Hydropower Development Project*. Bishkek. UNDP. 2009. *Improving Energy Efficiency in Buildings*. Bishkek.

²⁴ EBRD. 2011. *Bishkek Public Transport Project*. London.

²⁵ ADB. 2012. *Technical Assistance for the Economics of Climate Change in Central and West Asia*. Manila.

²⁶ ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Grant to the Kyrgyz Republic for the Power Sector Rehabilitation Project*. Manila.

emissions associated with the project may also be considered. Based on the assessments, climate proofing options may be integrated in the project design and standards.

25. Finally, ADB will consider dedicated stand-alone technical assistance and investment projects aimed at increasing climate resilience in the energy, transport and water resources sectors, which will be identified in the regional technical assistance for the Economics of Climate Change, as well as technical assistance projects aimed at strengthening the ability to access international climate funds such as the Global Environmental Facility, the Adaptation Fund, the newly established Green Climate Fund, and the carbon market.

Table A1. Sector-based total GHG Emissions (CO₂, CH₄, N₂O, HFC, PFC and SF₆), 2000–2005

Sectors and Subsectors	Emissions in 2000		Emissions in 2005		Change in	
	million tCO ₂ e	% contribution to total emissions	million tCO ₂ e	% contribution to total emissions	millions tCO ₂ e	% change
A. Energy						
1. Electricity and Heat	2.0	24.1	1.5	16.0	(0.5)	(25.0)
2. Manufacturing and Construction	0.9	10.8	1.6	17.0	0.7	77.8
3. Transportation	0.5	6.0	0.9	9.6	0.4	80.0
4. Other Fuel Combustion	1.1	13.3	1.2	12.8	0.1	9.1
5. Fugitive Emissions ¹	0.2	2.4	0.2	2.1	0.0	0.0
Subtotal (A)	4.7	56.6	5.4	57.4	0.7	14.9
B. Industrial Process ^{2,3}	0.3	3.6	0.5	5.3	0.2	66.7
C. Agriculture	2.0	24.1	2.1	22.3	0.1	5.0
D. Waste	1.3	15.7	1.4	14.9	0.1	7.7
Total (A+B+C+D)	8.3	100.0	9.4	100.0	1.1	13.3

() = negative; CH₄ = methane; CO₂ = carbon dioxide; GHG = greenhouse gas; N₂O = nitrous oxide; HFC = hydrofluorocarbons; PFC = perfluorocarbon; SF₆ = sulphur hexafluoride; tCO₂e = metric tons of carbon dioxide equivalent.

¹ N₂O data not available.

² CH₄ & N₂O data not available.

³ Industrial Processes pertain to emissions from Metallurgy Production (i.e. cast iron, steel, aluminium, stibium, mercury, lead, copper and blasts works), Food and Beverage, Chemicals, Minerals, HFC.

Source: World Resources Institute. Climate Analysis Indicators Tool. <http://www.wri.org/tools/cait/?guest=1> (accessed 2 April 2013)

Table A2: Relevant frameworks, laws and Initiatives

Relevant Environmental and Legal Documents which Supports Climate Mitigation in Kyrgyz Republic¹	Description/remarks
Law on the State Regulation and Policy of GHG Emissions and Absorption (25 May 2007)	Defines basic of state regulation, procedures, rights, responsibilities of public bodies, local self - governance bodies, individuals, and legal entities, in the field of GHG emission and absorption on the territory of the Kyrgyz Republic (legal basis for state climate change related policies in the Kyrgyz Republic)
Country Development Strategy (2009–2011)	Included adaptation, mitigation and capacity building related issues
Concept of Environmental Security of the Kyrgyz Republic until 2020 Adopted by the Act of the Government of the Kyrgyz Republic #469 as of October 16, 2007 and by the Presidential Decree UP#506 as of November 23, 2007	Defines priority of climate change problems for the republic
National Energy Program of the Kyrgyz Republic for 2008–2010, approved on 13 February 2008 (Exec Branch), April 2008	Has climate mitigation elements
Strategy of Fuel and Energy Complex Development until 2025	Has climate mitigation elements
National Forestation Program for 2005–2015, 25 November 2004	Has climate mitigation elements
State Program of Industrial and Domestic Waste Disposal, 19 August 2005	Has climate mitigation elements
Program of Oil and Gas Industry Development on Kyrgyz Republic until 2010, 5 December 2001	Has climate mitigation elements
Agrarian Policy Concept of the Kyrgyz Republic until 2010, 22 June 2004	Has climate mitigation elements
Mid Term Industry Program of Industry Development of Kyrgyzstan, 16 May 2002	Has climate mitigation elements
Other Climate Mitigation Friendly Laws and Programs Initiated	
Law on Energy Efficiency, 2007 ²	
Law on Renewable Energy, 31 December 2008 (footnote 33)	
Rules for Connecting Small Hydropower Stations to the Transmission Network, 2008 (footnote 33)	
Past and Present Climate Related Initiatives in the Kyrgyz Republic by the Government or in Partnership with other International Development Institutions	
Enabling Activities for the Preparation of the Kyrgyz Republic's Second National Communications to the UNFCCC, GEF, UNDP	Establishing GHG inventories and projections
Bishkek - Clean Air	Demand side fuel management; 15% GHG reduction via installation of electronic car ignition devices (UNDP/GEF)
Improving the Efficiency of Stoves in Combination with Biogas Equipments and Warming of Buildings	Energy efficient heating systems and improved building insulations; Liechtenstein provided Fast Track finance on House Insulation and Efficient Stove construction, amounting to CHF146,000.(see footnote 11)
Introduction of Solar Technologies in Rural Areas of Kyrgyzstan	Replacement of diesel pumps with solar technology in water supply

Relevant Environmental and Legal Documents which Supports Climate Mitigation in Kyrgyz Republic¹	Description/remarks
Establishment of Centre on Problems on Using Renewable Energy Resources (CPURER) (see footnote 33)	Technical advice and support facility for renewable technology development
Kyrgyz Association of Renewable Energy Resources	
Directorate for Small and Medium Size Power Facilities, 2008 (see footnote 33)	The directorate is responsible for the working out and realization of suggestions concerning the power industry's improvement. Realization of these measures would allow for the relief of the energy crisis and create acceptable conditions for the regulation of the production process and energy distribution in the country, particular in the remote mountainous and rural districts.
Capture and Utilization of Biogas at Sanctioned Municipal and Solid Waste Landfills of Bishkek	Methane emissions reduction efforts
Promoting Renewable Energy Sources (RES) for the Development of Remote Regions of the Kyrgyz Republic	Use of micro, small, solar and biogas, on supply side power generation
Small Hydro Power Development, GEF/UNDP, April 2009 ³	Under implementation
Capacity Building for Implementation of Sustainable Waste Management (SWM) Principles in the Kyrgyz Republic	Development of national strategy for SWM; PPP angle included. UNDP project
Tien Shan Ecosystem Development, World Bank, 2009	Carbon sequestration via reforestation and biodiversity conservation in 18 hectares of land in Tien Shan; other outputs include carbon trading from forestry projects
Energy Efficiency in Buildings, January 2008 (see footnote 40)	Demand Side Management efforts to reduce 30–40% of GHG emissions from buildings. GEF/UNDP project.
Other International Efforts indirectly supporting Climate Change Efforts in the Kyrgyz Republic	
Kyrgyz Republic Power Rehabilitation Project, especially rehabilitation of the hydro power plant, 15 December 2010	
ADB. 2011. Kyrgyz Republic: Country Operations Business Plan (2011–2012). Manila.	
United Nations Development Assistance Framework (UNDAF) for the Kyrgyz Republic (2012–2016), Bishkek, March 2011	

¹ Government of Tajikistan. 2009. *Second National Communication of the Kyrgyz Republic to the United Nations Framework Convention on Climate Change*. Bishkek.

² Renewable Energy & Energy Efficiency Partnership. Clean Energy Information Portal. http://www.reegle.info/countries/kyrgyzstan-energy-profile/KG#regulatory_framework (accessed 2 April 2013)

³ Global Environment Facility. Country Profile for Kyrgyzstan. Approved National Projects. http://www.thegef.org/gef/country_profile/KG?countryCode=KG&op=Browse&form_build_id=form-0ef953b051f8b402354f2df863b1bd30&form_id=selectcountry_form (accessed 24 May 2013).

Source: ADB

Climate Change Priority Areas¹

Adaptation Priorities

Infrastructure/urban

- Modification of standard design criteria for infrastructure in the energy, transport and water supply and sanitation sectors, as well as operating and maintenance procedures;
- Development of resilient infrastructure plans to accommodate shifts in climate;
- Improve drainage systems and slope stability for road construction;
- Improve land use planning in hazard prone areas.

Water resources

- Mapping areas likely to experience increased flooding and devising appropriate protection measures;
- Construction of early warning systems;
- Incorporating climate change considerations in planning and design of water-related infrastructure, as well as repair and rehabilitation of existing infrastructure.

Agriculture & food security

- Research on drought, flood and saline tolerant crops and livestock;
- Change of planting season dates to accommodate shifts in climate patterns and agricultural advisory services;
- Agricultural and weather insurance systems;
- Development of more sustainable soil, water, and crop management practices, including rehabilitation of degraded areas;
- Use of better spatial planning, such as drought maps, and early warning systems.

Forestry/biodiversity

- Forestation of mountain slopes, using community participation;
- Monitoring and research on the impacts of climate change on forests and biodiversity;
- Mapping vulnerable eco-regions and hotspots;
- Management and improvement of riparian vegetation along rivers and other water bodies; and
- Improved watershed management, rehabilitation and reforestation.

Health/disaster risk reduction

- Research linkages between climate change and health, to identify most effective interventions;
- Increase resilience of vulnerable groups, through community-based adaptation, livelihood diversification, access to social services and basic infrastructure, and social safety nets, like insurance schemes;
- Implement surveillance systems for existing and new disease risks as a result of climate change, to gear up health systems to meet future needs;
- Implement safe drinking water and sanitation programs in at-risk areas (like coastal zones, flood-prone, and drought-prone areas);

¹ Based on the Kyrgyz Republic's Second National Communication to the United Nations Framework Convention on Climate Change. 2009, and consultations held by ADB with government and non-government agencies.

- Strengthen flood early warning systems; and
- Strengthen government and civil society capacity to manage natural disasters.

Capacity building

- Strengthen technical capacity for weather forecast, climate modeling and integrated impact assessment;
- Strengthen the capacity for economic analysis of adaptation options;
- Integrate future climate change and its impacts in government policies;
- Mainstream climate change into national, sectoral, and spatial development planning;
- Build the understanding, competence and copying capacity of key government agencies;
- Improve the capacity of governments and communities to access climate funds.

Mitigation priorities

- Increase the use of renewable energy (i.e. hydro, solar, wind, geothermal) and alternative energy resources;
- Promote fuel switching measures (e.g. use of hydrogen in internal combustion engines, use of alternative fuel resources (i.e. biogas, biofuel));
- Increase energy efficiency measures on demand side;
- Reduce methane emissions and develop capture and use, including the processing of municipal solid wastes for biogas and use of waste as organic fertilizers;
- Promote fuel efficiency in transport, including the development of public transportation, traffic optimization, road network rehabilitation and multi level road junctions; and
- Increase the country's carbon sequestration capacity through reforestation.