

Central Asia

Energy-Water Development Program

Working Regionally for National Shared Prosperity

Development Aspirations of Central Asia



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Central Asia is a dynamic and geographically diverse region enjoying steady economic growth and new development opportunities. A key element in the continued growth, prosperity, stability, and well-being of the population is the smart management of the region's energy and water resources.

Although Central Asia is increasingly globalized, national aspirations, such as food security and reliable energy services, still drive development decisions. The competition for energy markets and the anticipated

scarcity of water resources have strained relations among the countries of the region. Climate change and population growth have the potential to strain resources and relations further.

The Central Asia Energy-Water Development Program (CAEWDP) recognizes that strengthened cooperation at the national and regional levels can lead to increased incomes, poverty reduction, sustainable development, shared prosperity, and political stability across the region.



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The Benefits of Smart Management of Natural Resources

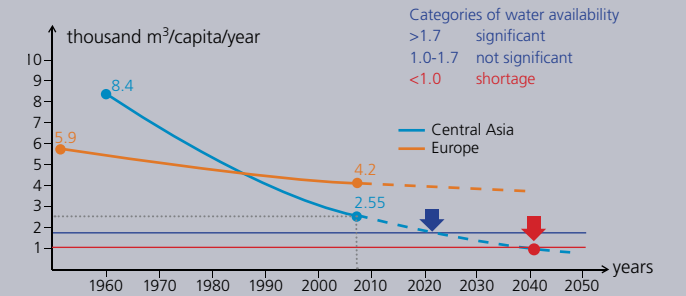
Central Asia is endowed with water and an abundance of rich and varied energy resources—hydropower, oil, gas, and coal. These resources can support increased agricultural production and have the potential to exceed domestic energy demand to supply export markets.

However, water and energy resources across the region are highly unbalanced and access to them is uneven. In some cases there is a lack of physical infrastructure and the outdated systems that exist are unreliable and inefficient. Some communities cannot meet citizens' electricity needs during certain times of the year, while others lack adequate water supply.

Working at the national and regional levels to manage water and energy resources can bring:

- Reliable energy supply and reduced winter energy shortages
- Higher earnings generated by exporting and trading energy
- Greater agricultural productivity through more reliable access to water
- Improved water quality and reduced land degradation
- Better adaptation to climate change and water/hydrological variability
- Cost-effective infrastructure development
- Enhanced environment for international and private investment for both water and energy

Change of Water Availability in Central Asia



Over the past 40 years, water supply in Central Asia declined from 8.4 th. m³/person/year to 2.5 th. m³/person/year. By 2030, at the current rate of population growth in Central Asia, this reduction will reach a critical value of less than 1.7 th. m³/year. And it is still necessary to annually provide an additional 500-700 million m³ of water to sustain the population of Central Asia even at very low levels of consumption.

Source: EC IFAS



Source: Energy Supply/Demand balances and Infrastructure Constraints in Central Asia. Asian Development Bank. 2009

Water

Melting snow from the high peaks of the Himalayan water tower and precipitation provide the seasonal flows to the two major rivers that feed the Aral Sea Basin: the Amu Darya and the Syr Darya. The origins of the Syr Darya are the snow-covered slopes of the Tien Shan Mountains in Kyrgyz Republic. The Amu Darya originates from the glaciated northern slopes of the Hindu Kush and from Wakhan in the Pamir Highlands in Afghanistan and the Pamirs in Tajikistan.

Water Resources in Central Asia

Water is a vital but disparate resource across the basin. In the summer, both the Syr Darya and the Amu Darya rivers have the potential to provide abundant low-carbon hydropower for the mountainous Kyrgyz Republic and Tajikistan. Downstream, these rivers are vital arteries for livelihoods—providing water for agriculture and local fisheries, and sustaining environmental ecosystems, human health, and electricity generation across Central Asia.

However, the water sector faces many challenges: 50 percent of irrigated lands are affected by salinization and waterlogging as a result of poor irrigation and drainage systems. In Turkmenistan that number is 96 percent, compromising both agricultural productivity and water quality.

Improvements to Increase Efficiency

National governments are struggling to rehabilitate aging irrigation and drainage infrastructure and implement innovative irrigation technologies to address these problems and improve food security and resilience to hydrologic variability. Looking ahead, population growth and the need for increased agricultural production will continue to strain the region's water resources, making smart water management both nationally and regionally a key factor for the livelihoods of farmers and agriculture. Across Kazakhstan, Turkmenistan, and Uzbekistan, over 10 million hectares of agricultural land depend on these waters



for irrigation, where agriculture on average contributes 11 percent to these economies' GDP. Proposed improvements in irrigation efficiency could begin to alleviate the problem. For example, in Uzbekistan, a 1 percent increase in water pumping efficiency would result in savings of \$10 million per year; and a 10 percent increase in water pumping efficiency would result in regional savings of \$188 million per year.



Kazakhstan

Population (millions) **16.8**
 GNI per capita (US\$) **\$9,780**
 GDP (billions US\$) **\$203.5**
 % rural population w/access to an improved water source (2010) **86%**
 Land area (1,000 sq. km) **2,699**



Kyrgyz Republic

Population (millions) **5.6**
 GNI per capita (US\$) **\$990**
 GDP (billions US\$) **\$6.5**
 % rural population w/access to an improved water source (2010) **82%**
 Land area (1,000 sq. km) **192**



Tajikistan

Population (millions) **8**
 GNI per capita (US\$) **\$880**
 GDP (billions US\$) **\$7.6**
 % rural population w/access to an improved water source (2010) **64%**
 Land area (1,000 sq. km) **140**



Turkmenistan

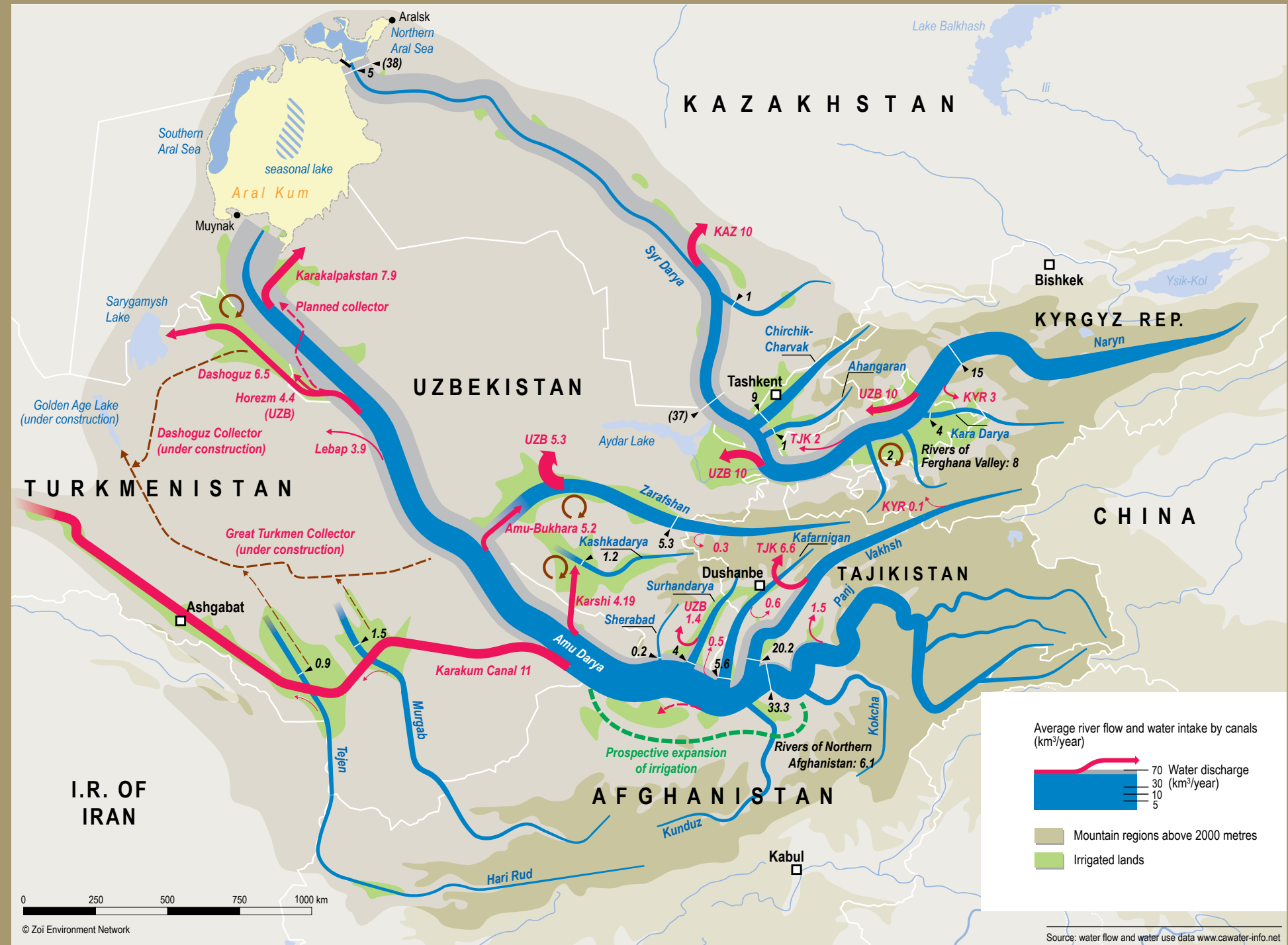
Population (millions) **5.2**
 GNI per capita (US\$) **\$5,410**
 GDP (billions US\$) **\$35.2**
 % rural population w/access to an improved water source (2010) **54%**
 Land area (1,000 sq. km) **470**



Uzbekistan

Population (millions) **29.8**
 GNI per capita (US\$) **\$1,720**
 GDP (billions US\$) **\$51.1**
 % rural population w/access to an improved water source (2010) **81%**
 Land area (1,000 sq. km) **425**

Source: World Bank 2012



Energy

Central Asia is rich with diverse energy resources. In the downstream countries of Kazakhstan, Uzbekistan, and Turkmenistan there are significant reserves of oil, gas, and coal. The upstream countries, Tajikistan and Kyrgyz Republic, are rich in undeveloped hydropower potential. The diversity of such a mixed energy system offers an opportunity to meet all countries' electricity

needs on a seasonal basis in the most cost-effective and environmentally friendly manner—taking maximum advantage of abundant low-cost hydropower in the summer, and having the reliability of thermal resources in winter when the cold climate limits hydropower supplies.

Updating Infrastructure to Meet Needs

Current energy systems are becoming less reliable as the Central Asia power system deteriorates. The region is trading 90 percent less energy than in the early 1990s. Although new transmission lines linking north and south in Kazakhstan and Tajikistan improve the distribution situation, these plentiful resources do not meet domestic needs and 2 million households across the region are affected by winter heat and power shortages per year.

The challenges are to maintain and rehabilitate infrastructure, provide new generation infrastructure for energy-hungry, growing economies, and explore new models for energy trade—both within and outside the five-country community.



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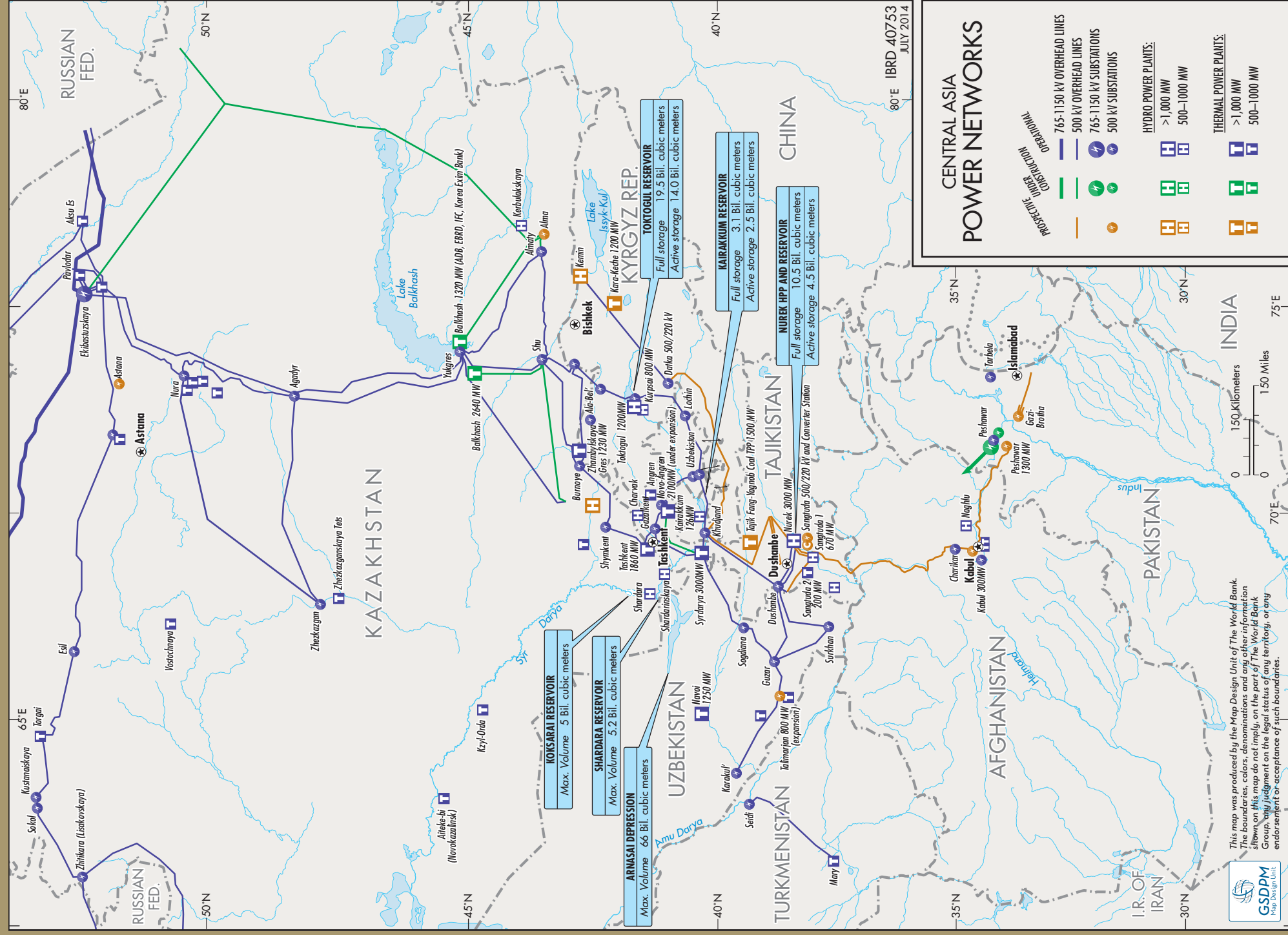
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CENTRAL ASIA ENERGY INFRASTRUCTURE

More effective energy and water management, including at the regional level, could accelerate investment, promote economic growth and stable livelihoods and improve environmental quality:

- \$2 billion savings are available over 3 years from re-storing energy trade within Central Asia and added environmental benefits in reduced greenhouse gas emissions.
- \$200 million per year in new revenues from energy exports to South Asia from the initial phases of the CASA 1000 project.
- In one Central Asian country, comprehensive energy efficiency measures could reduce energy costs by \$12.3 billion by 2030, avoiding investments in new generating plants and reducing fuel consumption.

Source: World Bank 2014



Climate Change in Central Asia

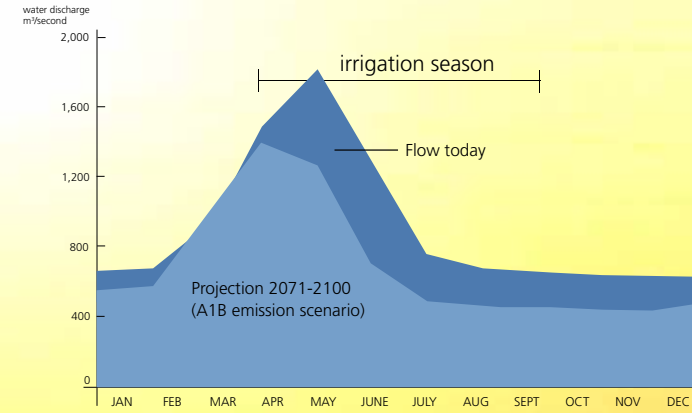
Central Asia is one of the most vulnerable regions to climate change. The World Bank's 2009 report, *Adapting to Climate Change in Central Asia*, notes that average temperatures in the region have already increased by 0.5°C and are projected to increase by 1.6° to 2.6°C by 2030-50. Regionally, climate change is projected to lead to higher temperatures, changes in precipitation, increased incidents of flooding and more severe and prolonged droughts, with corresponding variable water availability. The region's vulnerability to climate change is exacerbated by inefficient resource use and aging infrastructure, limited enforcement of regulations, and an inherited severely degraded environment.

Climate change affects all sectors vital to economic growth and development in the region, not least of which are energy, agriculture, and disaster risk management that also cut across national borders. Weather-related disasters are currently estimated at 1% of GDP per year in Tajikistan and Kyrgyz Republic. Adaptation will be a requirement, rather than an option, for the region.

Policies and interventions to address climate change vulnerabilities have the potential to drive innovation, open up new areas of investment and private sector activity, as well as promote plant-level efficiencies and economic savings. For example, a clear plan to align agricultural policies, develop capabilities of key agricultural institutions, and make needed investments

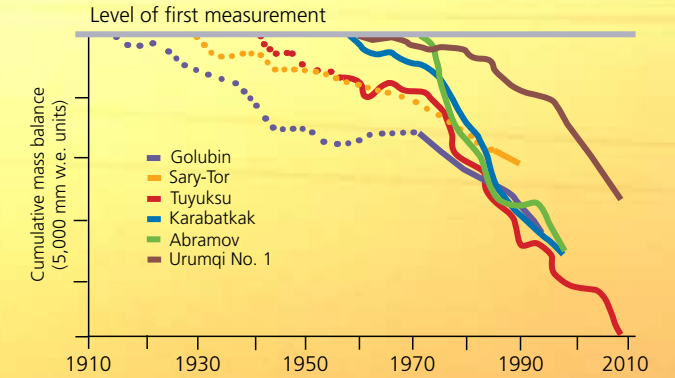
in infrastructure and on-farm improvements can help offset risks. In the energy sector, energy efficiency and diversification provide both immediate economic benefits and help build long-term climate resilience. Water demand in both sectors will emphasize the need for effective national and transboundary water management.

Seasonal Flow of the Syr Darya Projected to Decrease?



Source: Shiklomanov 2009

Glacial Melting Accelerating in Central Asia?



Source: *Nature Climate Change*, DOI:10.1038/NCLIMATE1592

Central Asia Energy-Water Development Program

The Central Asia Energy-Water Development Program (CAEWDP) is building energy and water security by leveraging the benefits of enhanced cooperation. It aims to strengthen security through partnerships with all five Central Asian countries plus Afghanistan in regional initiatives and with development partners in the context of a changing global environment. The program delivers substantial technical expertise, analytics, and diagnostics for informed

decision making and smart investments. Global experience in transboundary water management encourages cross-border dialogue on coordinated management of energy and water resources while strengthening the institutions that manage these resources. Regional dialogue has been significantly bolstered by the transparent knowledge platform the program provides.

With initial activities successfully underway, the CAEWDP has established several important “building blocks.” These activities identified critical infrastructure, institutional and analytical constraints, and helped establish long-term priorities for the program.

The Three Pillars of the Central Asia Energy-Water Development Program (CAEWDP)



Energy Development

Promote and study high-value energy investments that focus on winter energy security, energy efficiency, trade and accountability, infrastructure planning and institutional development.

Focus

- ⚡ Winter energy security including infrastructure planning
- ⚡ Energy trade
- ⚡ Energy accountability
- ⚡ Energy efficiency



Water Productivity

Enhance the productive and efficient use of water in agriculture and energy sectors through capacity strengthening, institutional strengthening, and investment planning.

Focus

- 💧 3rd Aral Sea Basin Management Program
- 💧 National investment plans for new and rehabilitated infrastructure for irrigation efficiency
- 💧 Introduction of new technologies, and efficient delivery of water supply services



Energy-Water Linkages

Improve the understanding of linkages between energy and water at the national and regional levels through dialogue, energy-water modeling, regional hydrometeorology and exploring the future impact of climate change.

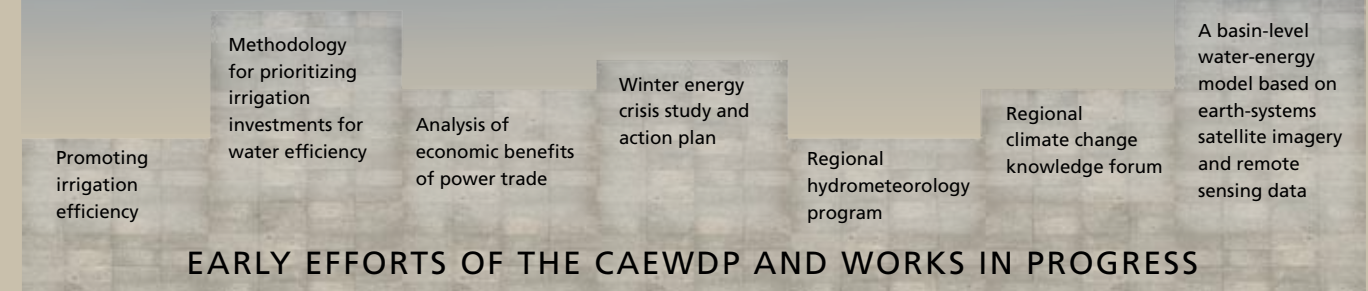
Focus

- ⚡💧 Energy-water modeling
- ⚡💧 Regional hydrometeorology
- ⚡💧 Climate vulnerability
- ⚡💧 Energy-water dialogue
- ⚡💧 Knowledge portal (web-based open access data)

In upstream countries (Kyrgyz Republic and Tajikistan), the focus will be to identify and secure new sources of winter energy supply and manage current shortages to reduce the burden on households and associated economic impacts on small business, commercial enterprises, and industry.



In downstream countries (Kazakhstan, Uzbekistan, Turkmenistan), the focus will be to improve the productivity and efficiency of irrigation systems, address impacts of climate change, and help build resilience to hydrologic variability.



“Regional programs offer substantial potential to achieve results on development issues.... Regional projects have successfully built new assets and protected existing ones in ways expected to benefit all participating countries.”

World Bank Group Independent Evaluation

Partnerships are critical to the rational use of water and energy in Central Asia

Regional dialogue and cooperation are necessary to manage energy and water resources in Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan as well as Afghanistan. The CAEWDP brings together national and regional governments, civil society organizations, an engaged international panel of advisors, donors and development partners, and international financial institutions such as the World Bank.

The program is founded on partnerships with governments so that program activities reflect national aspirations and priorities. CAEWDP also partners with regional organizations whose mandates are to convene discussions on regional issues, such as the International Fund for Saving the Aral Sea (IFAS). Cooperation from the development and financing communities assists the CAEWDP to meet program goals, collaborate on methodologies, provide technical assistance, or contribute funds for core program activities.

A Multi-Donor Trust Fund has been established with cumulative contributions of over US\$10 million, including contributions from Switzerland (\$3.71 million), the United Kingdom (\$5.27 million) and the European Commission (\$1.35 million). The trust fund's Donor Advisory Committee provides strategic guidance to the CAEWDP. The CAEWDP has worked jointly with other development partners on specific activities and projects, in both water and energy, including the Swiss Development Corporation (SDC), the United Nations Centre for Preventive Diplomacy (UNRCCA), the Asian Development Bank (ADB), the Islamic Development Bank (IsDB), the United Nations Development Programme (UNDP), the United Nations Economic Commission for Europe (UNECE), Germany (GIZ), the United States (USAID), and the Aga Khan Foundation.

The World Bank welcomes other potential partners to support livelihoods, economic growth, peace, and security in this important region of the world.

For further information, please contact:

Daryl Fields, CAEWDP Program Manager, World Bank, dfields@worldbank.org
Abena Akuffo-Akoto, CAEWDP Partnership Specialist, World Bank, aakuffoakoto@worldbank.org