



## Central Asia Energy-Water Development Program

### *Energy Development*

### Looking Beyond the Horizon: How Climate Change Impacts and Adaptation Responses Will Reshape Agriculture in Eastern Europe and Central Asia

#### Background and Context

Agricultural production is inextricably tied to climate, making agriculture one of the most climate-sensitive of all economic sectors (IPCC 2007). Various projections suggest that food production must increase by a staggering 70-100 percent by 2050 to meet the demands of a world with nine billion people and changing diets. Experts look to the production potential of Eastern European and Central Asia (ECA) countries – particularly Kazakhstan, Russia and Ukraine – to help provide the necessary response for cereals. Other countries in the region contain large populations that depend on agriculture for subsistence. Climate change and its impacts on agricultural systems and rural economies are already evident throughout the ECA region. Current adaptation measures will be insufficient to prevent future agricultural impacts. While interest is growing in understanding the exposure, sensitivities, and impacts of climate change, as well as developing and prioritizing adaptation measures to build resilience to the potentially adverse consequences, little satisfactory work had been done in the region to date.

#### Purpose of Document

The risks of climate change can neither be effectively dealt with nor the opportunities effectively exploited without a clear plan for aligning agricultural policies with climate change, developing key agricultural institution capabilities, and making needed infrastructure and on-farm investments. The newly-released book, *Looking Beyond the Horizon: How Climate Change Impacts and Adaptation Responses Will Reshape Agriculture in Eastern Europe and Central Asia*, analyzes four ECA countries – Albania, the Former Yugoslav Republic (FYR) of Macedonia, Moldova, and Uzbekistan – to demonstrate that developing such a plan to meet these objectives can be comprehensive, empirically driven, consultative and quick to develop. The approach centers on four clear objectives: (1) Raising awareness about the threat of climate change; (2) Analyzing potential impacts on the agricultural sector and assessing adaptive capacity; (3) Identifying practical adaptation and mitigation responses, and (4) Building national capacity to assess the impacts of climate change and developing adaptation measures in the agricultural sector. This work represents a pioneering program to develop practical solutions for a “climate-smart” approach to agriculture—defined as farming that contributes to the “triple win” of increasing productivity in today’s climate, building resilience to climate change, and reducing greenhouse

gas emissions. The World Bank's experiences in applying this innovative approach to these four ECA nations can help other ECA countries gauge the risks and opportunities posed by a changing climate to their own farming systems. Moreover, it can be used to define and prioritize practical adaptation options.

### Major Findings/Outcomes

*Projecting the Exposure of Agricultural Systems to Climate Change* – modeling was conducted for all four countries with low-, medium- and high-impact climate change scenarios. Trends were found to be generally similar: temperatures are forecast to increase (approximately 1.5-2.0°C by 2050; somewhat higher in Moldova and slightly lower in coastal Albania). Precipitation levels differed more substantively. However, national averages for agricultural production are less important than the seasonal distribution of temperature and precipitation, and temperature increases are likely to be higher and precipitation declines greater during the primary summer growing season in all four countries. Another key finding was the modeling of changes in water supply and demand under climate change, which found a likelihood of significant shortfalls in irrigation water availability in all of the countries except Albania.

*Assessing the Adaptive Capacity of Agricultural Systems* – The resilience of farmers in the four countries is clearly stressed by climate change, and they do not have the capacity to adequately adapt on their own. In some cases investments in infrastructure (water storage, drainage, and irrigation systems) are needed, but irrigation infrastructure is not a panacea. Infrastructure investments should be complemented by improvements in farmers' access to agricultural technologies and information, financing, and improved crop varieties. A key finding of the study was that, for most crops in the countries studied, farming practices are poorly adapted to the current climate. Linked to that, many of the identified high-priority measures for adapting to future changes can also provide benefits in the short term by helping close the existing "adaptation deficit" where it is already in evidence, such as shifts in the growing season.

*Measuring the Sensitivity and Vulnerability of Agricultural Systems to Climate Change* – While the impact assessment results varied by country, most crops are generally expected to experience declines in yield, with those affected most severely typically being rainfed crops grown in the traditional summer season. Crops grown in winter or year-round, however, may benefit on a net basis from a longer, warmer growing season. Assumptions of irrigation water availability were critical to the crop modeling results: where the supply of water for irrigation is expected to fall short of demand as a result of climate change, irrigated crops are more vulnerable than rainfed crops because they are more dependent on water.


*Prioritizing Adaptation Options* – A key finding in all four countries is that enabling policies are urgently needed to provide farmers better access to inter-regional and global technology in a locally-accessible format. The analysis also supports a range of agronomic practice improvements, on-farm equipment investments, and regional or basin-scale irrigation and drainage infrastructure improvements.

*The Central Asia Energy Water Development Program (CAEWDP) is a donor-supported technical assistance program with the objective of building energy and water security for the five countries of Central Asia and Afghanistan. Divided into three main objectives: energy development, energy-water linkages, and water productivity, the program balances national and regional activities, recognizing that both are necessary for effective regional dialogue and national prosperity.*

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