



## Tajikistan: Economic and Distributional Impact of Climate Change

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### Key Messages<sup>1</sup>

- Tajikistan is highly vulnerable to the adverse impacts of global climate change, as it already suffers from low agricultural productivity, water stress, and high losses from disasters.
- Public awareness of the multiple consequences of climate change is high, with possible impacts on health, natural disasters, and agriculture of greatest public concern.
- Climate change can potentially deepen poverty by lowering agricultural yields, raising food prices, and increasing the spread of water-borne diseases as well as the frequency and severity of disasters.
- Regions with greater dependence on agriculture and lower socioeconomic indicators, particularly the east mountain area of the Region of Republican Subordination (RRS), the Southern Sughd hills, and Khatlon hills and lowlands, are most vulnerable to climate change, with rural areas more at risk than urban locations.
- Faster socioeconomic development is the best tool for adaptation, since greater income diversification, improved health and education, and better access to services and infrastructure enhance the capacity of households, particularly the poor, for autonomous adaptation.

### Tajikistan's Vulnerability to Climate Change

Tajikistan is highly vulnerable to the adverse impacts of global climate change. In fact, a recent World Bank report, "Adapting to Climate Change in Europe and Central Asia,"

<sup>1</sup> The Knowledge Brief is based on the report "Tajikistan: Economic and Distributional Impact of Climate Change" (Washington, DC: World Bank, 2011).

identifies Tajikistan as the most vulnerable country in the Europe and Central Asia (ECA) region, due to its relatively weak social and productive structures and very low adaptive capacity. Indeed, the country already suffers from land degradation, water scarcity, and a high frequency of disasters, at significant human and material costs. Two-thirds of the population lives in rural areas and depends on agriculture, a sector characterized by inefficient water use and low productivity. Government policies that continue to favor water-intensive cotton cultivation at the expense of other crops heighten water scarcity problems. In the absence of effective safety nets, the poor (over half of Tajikistan's population) are particularly vulnerable to adverse climate events and other shocks.

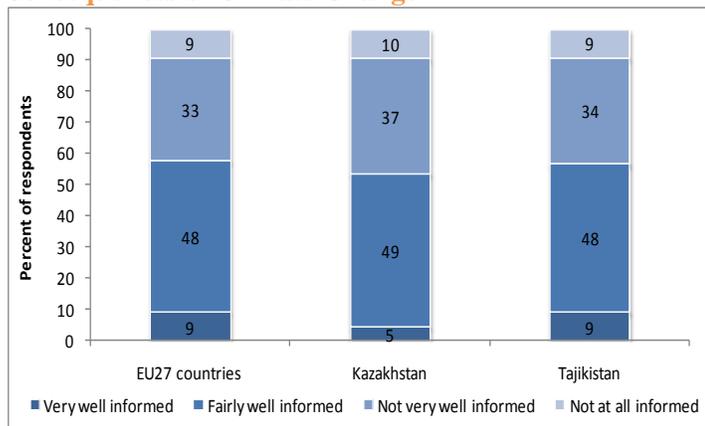
### Public Perceptions of Climate Change

The findings of a nationally representative household survey commissioned for this study (P-LITS) show that public awareness of the different consequences of climate change is high and comparable to that in much richer countries (figure 1). A majority of respondents (57 percent) felt they were either "very well informed" or "fairly well informed" about the various potential climate change effects. When presented with a list of several possible adverse impacts of climate change (figure 2), "dangers posed by extreme hot/cold seasons that are harmful for health" were cited as the most important concern by the highest share of respondents (30 percent), followed by "increase in natural disasters" (25 percent), and "unpredictable/extreme weather that harms agricultural production" (20 percent).

### Transmission Channels and Distributional Impacts

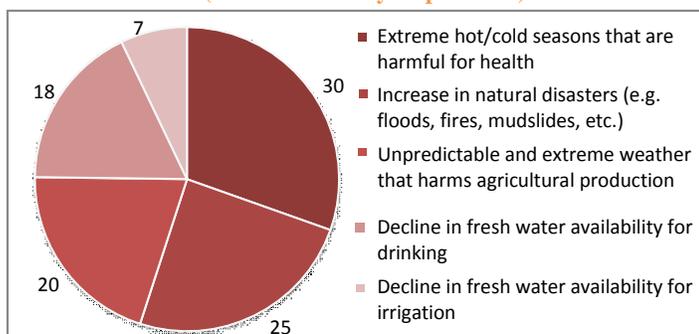
According to the Second National communication of Tajikistan under the United Nations Framework Convention on Climate Change (UNFCCC), the primary impact of climate change on the livelihoods of people in Tajikistan

**Figure 1. Public Awareness of the Different Consequences of Climate Change**



Source: World Bank staff estimates based on 2010 P-LITS. Data for the 27 European Union member countries are from *Europeans' Attitude towards Climate Change* Special Eurobarometer 300, Wave 69.2, September 2008.

**Figure 2. Potential Climate Change Impacts of Greatest Public Concern (Percent of survey respondents)**



Source: 2010 P-LITS

will be observed through 1) reduced water quantity and quality, affecting agriculture and health (by increasing water-borne diseases) and 2) increased frequency and severity of disasters: mudflows, floods, and droughts. These physical impacts can potentially deepen poverty and increase the possibility of permanent poverty traps. Poor people already struggle with a number of stresses, such as malnutrition, inadequate housing and sanitation, and lack of productive employment opportunities. They thus have limited resources and a low capacity to adapt their livelihoods to changing conditions.

**Agriculture.** Adverse climate conditions can affect people's livelihoods through the following three channels:

- *Decline in agricultural productivity (yields).* Simulations based on household data show that a 20 percent decline in agricultural productivity can increase the national poverty rate by 13 percent and the poverty gap by 24 percent.

- *Increase in relative food prices.* A 20 percent increase in relative food prices can increase the poverty rate by 16 percent and the poverty gap by 25 percent.
- *Reduction in agricultural wages.* A 20 percent drop in agricultural wages raises poverty by 2 percent and the poverty gap by 7 percent. This channel has a smaller impact on poverty than the previous two because the share of agricultural wages in the total income of most households is insignificant.

All of these effects will have a stronger impact in rural areas than in urban locations. This is because rural areas have a much greater concentration of the population around the poverty line, so that even a modest decline in income or purchasing power will have a significant impact on poverty.

**Health.** The major health impacts of climate change in Tajikistan will come from increased thermal stress, water-borne diseases, and disaster effects. The poor are more likely to suffer from the increased health risks due to (1) inability to cover out-of-pocket expenditures for medical services, (2) higher susceptibility for water-borne diseases, and (3) weaker immune systems stemming from malnutrition and adverse living conditions. Analysis of the 2007 Tajikistan Living Standards Survey data shows that 46 percent in the poorest quintile of households found it impossible or very difficult to pay for health care, compared to 27 percent in the richest quintile. The incidence of diarrhea is 1.4 times higher among the poorest quintile of households than in the richest. There are also pronounced differences in calorie intake by welfare status. Children in the poorest quintile are almost twice as likely to be severely underweight as those in the richest.

**Disasters.** While there is insufficient survey data in Tajikistan to quantify the impact of disasters by welfare status, evidence from global studies shows that the poor tend to be disproportionately affected by disasters, as their housing is of inferior quality and often constructed in hazardous locations. They also cannot afford the costs of migration to less hazard-prone locations, and after disasters occur, it takes them longer to restore their livelihoods because they tend to have nondiversified incomes and little savings.

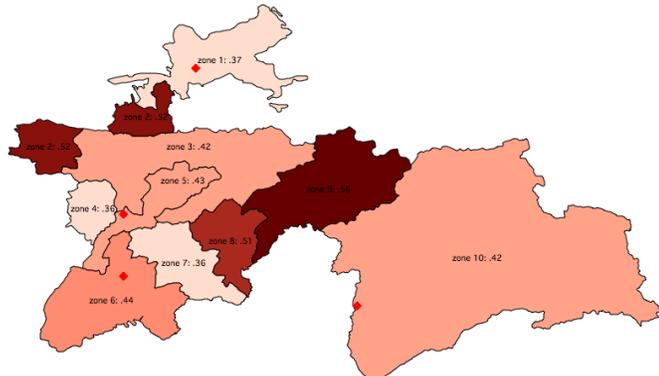
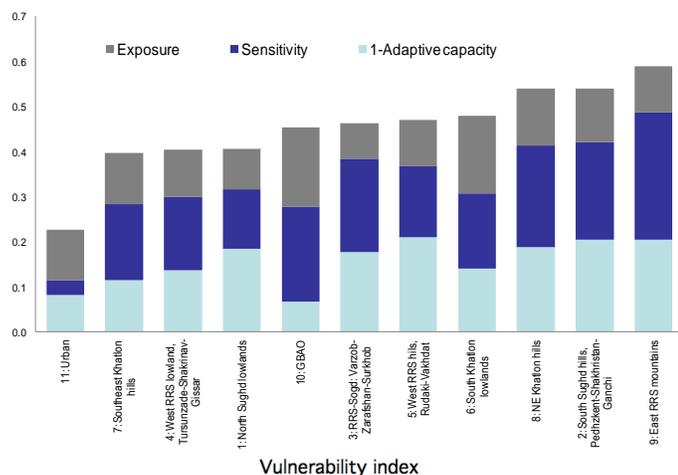
## Regional Vulnerability Index

A geographically disaggregated picture of vulnerability to climate change (figure 3) is helpful for developing climate change adaptation strategies and identifying the localities most in need of resources for adaptation. Vulnerability can be understood as a function of (1) exposure to climate change and variability, (2) sensitivity to impacts of that exposure, and (3) ability to adapt to ongoing and future

changes. The assessment of vulnerability considers a range of factors beyond the geophysical impacts of climate change, including its effects on assets and livelihoods, and the social, economic, and institutional factors that are likely to shape adaptive capacity. The results are presented below.

- **Exposure** to climate change and variability is highest in Gorno-Badakhshan Autonomous Oblast (GBAO) and the South Khatlon lowlands because of the high frequency of extreme temperatures and broad range of intra-monthly temperature fluctuations.
- **Sensitivity** is highest in the east mountain area of the RRS because of its reliance on agriculture, high sensitivity to disasters, and widespread food insecurity. Sensitivity is also high in South Sughd, North-East Khatlon hills, Varzob-Zarafshan, and GBAO.
- **Adaptive capacity** varies substantially. It is highest in GBAO because of its high levels of education and income diversification. It is also good in the Southeast Khatlon hills, the West RRS lowlands, and the South Khatlon area - locations with above-average income levels and education.

**Figure 3. Vulnerability Map for Tajikistan: 10 Rural Agro-Ecological Zones and One Composite Urban Area**



Source: World Bank staff estimates based on data from several sources. Darker areas on the map represent locations with the highest vulnerability.

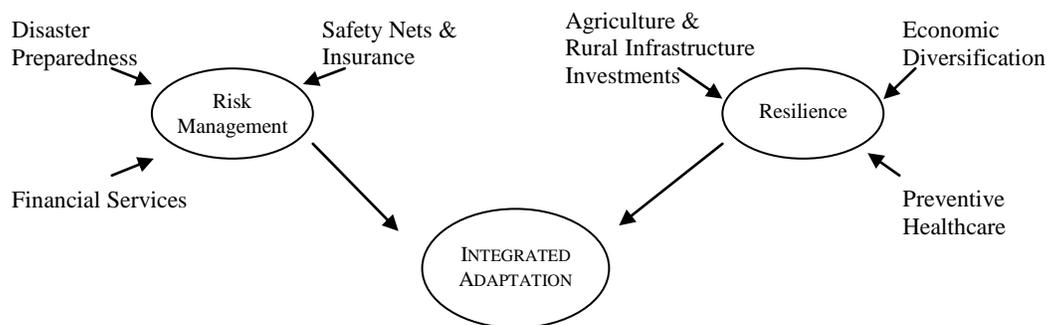
The regional index of vulnerability for Tajikistan is based on the simple average of the exposure, sensitivity, and adaptive capacity subindices. Indicators of past climate variability and the frequency of disasters are used to assess exposure to climate change; health, livelihood, food security, and demographic characteristics are used to determine sensitivity to climate impacts; and social, economic, and institutional characteristics are used to assess adaptive capacity. The results show that vulnerability varies across different regions of Tajikistan according to socioeconomic and institutional factors, while exposure and elevation exert smaller influences - geography is not destiny. Urban areas are by far the least vulnerable, while RRS oblast, particularly its eastern mountainous areas, is the most vulnerable. Some of Tajikistan's sparsely populated high altitude mountain zones are the least vulnerable, while the populated South Khatlon valley is among the four most vulnerable areas, implying that relatively vulnerable geographic areas can overlap with centers of population and economic activity. Adaptation planners thus do not necessarily face a trade-off between protecting the most vulnerable or the most economically important areas from the effects of climate change.

To the extent that policy makers in the country wish to direct funding toward areas with the highest vulnerability to climate change, they should focus on rural areas, in particular the eastern RRS mountains, Southern Sughd hills, and Khatlon hills and lowlands. Although these zones are vulnerable for somewhat different reasons, they share a high degree of sensitivity to climate change, particularly food insecurity, disaster sensitivity, and reliance on agriculture. They also have weak adaptive capacity, in part from low income and education levels, and although their exposure is only moderate, their high sensitivity and fairly modest adaptive capacity make them vulnerable. By contrast, urban areas as a composite group have the lowest vulnerability, mainly because they have the lowest sensitivity, high adaptive capacity, and average exposure.

### Adaptation Priorities: Strategies for the Future

Climate change adaptation strategies for Tajikistan conform closely to its general poverty reduction and development objectives. In fact, development is the most important tool for adaptation, because greater income diversification and improved health and education, as well as better access to information, services, resources, and infrastructure, enhance the adaptation capacity of households, particularly for the poor.

**Figure 4: Basic Elements of an Integrated Climate Change Adaptation Strategy**



Source: Adapted from L. Cord et al., “Climate Change and Poverty: Towards an Integrated Policy Framework for Adaptation,” PREM Economics of Climate Change, Discussion Papers (Washington, DC: World Bank, 2008).

The findings of the P-LITS survey also reflect the close connection between adaptation and development spending. Over half of respondents identified improved extension services, the provision of more resilient seeds and clean drinking water, and investment in the increased availability of electricity as key priorities for government spending on adaptation. These priorities are also in line with the latest Poverty Reduction Strategy for Tajikistan.

Devising an effective adaptation strategy requires that adequate attention be directed towards two main areas: (1) building resilience to strengthen the ability of households and communities, as well as local and national governments, to withstand negative climate impacts and (2) improving the risk management capacity of households, particularly the poor, to cope with the increased risks associated with climate change (figure 4).

**Building greater resilience** will require investments in agriculture and rural infrastructure, economic diversification, and preventive health care. Agricultural reforms should focus on removing constraints that tie farmers to cotton cultivation, creating incentives for efficient water management, and ensuring secure land titles. The development of extension services will also be necessary to promote sustainable land management, facilitate diversification towards less water-dependent crops, and increase agricultural productivity. Building greater resilience to climate change will also entail more off-farm livelihood opportunities to reduce dependence on climate-sensitive activities like agriculture. This will necessitate improvements in the business climate, skill building efforts, and infrastructure strengthening. Lastly, health reforms should emphasize preventive measures, improvements in hygiene, and strengthening disaster

preparedness in the health sector. It will also be important to increase access to clean drinking water to reduce the incidence of water-borne diseases.

**Strengthening risk management** will require greater improvements in disaster management, enhanced access to financial services (particularly in rural areas), and expanded safety nets and insurance products. Improving early warning systems, strengthening public infrastructure (e.g., river bank dikes and levees), constructing shelters, and working with communities to build their capacity to prevent and respond to disasters are good examples of disaster management activities that have already been undertaken in Tajikistan. Significant investment will be needed to scale up such initiatives to all vulnerable locations. It is also important to improve the regulatory framework of the banking sector and support the development of microfinance institutions to help households and small businesses accumulate assets, diversify livelihoods/production, and develop coping mechanisms that will make them less vulnerable to climate variability and extremes. Furthermore, flexible safety net programs should be developed that address the needs of the chronic poor and that can be scaled up in case of a disaster or other shock.

### About the Authors

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