

Kazakhstan | Impacts of Climate Change and Adaptation in Agriculture



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Find the underlying analysis in [the sectoral policy brief "Kazakhstan: Economy-wide Effects of Adaptation in Agriculture"](#) and in the report ["Supporting climate resilient economic development in Kazakhstan"](#)

Kazakhstan's agriculture is vulnerable to climate change



Lower productivity and livestock production may result from **droughts and heatwaves**.



Wheat yield losses induced by water scarcity can be a consequence of **droughts and heatwaves**.



The **productivity of people working outside** as e.g. in the agriculture sector may decrease during **heatwaves**.



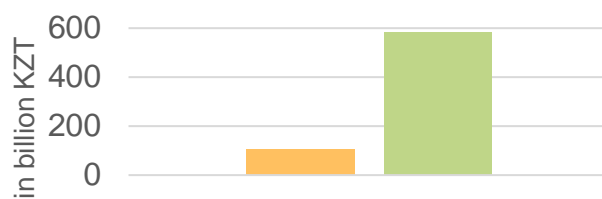
Negative impacts on agriculture can lead to **lower growth in other sectors, GDP and employment**.

Exemplary adaptation measure for reducing vulnerability to droughts: Irrigation Systems



Rehabilitating and expanding the water infrastructure and the use of water-efficient drip **irrigation systems** are key responses to reduce water scarcity and to improve agricultural productivity. The irrigated area could be increased by one million hectares without a significant increase in water consumption (Kazakh Government, 2020).

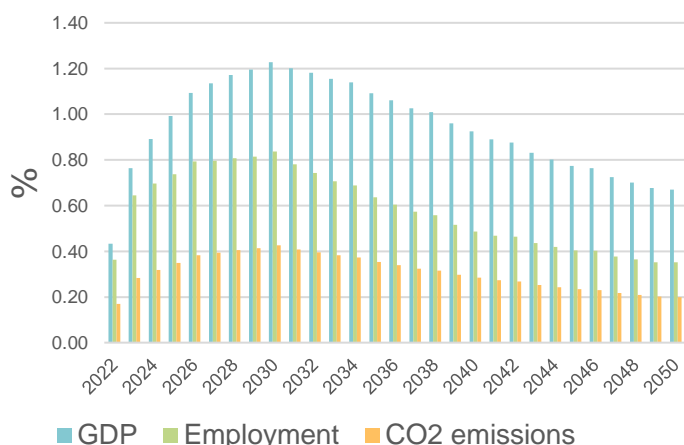
Costs and benefits of investments in drip irrigation & reconstruction of canals and reservoirs



- Average annual investments (2022-2050)
- Average annual adaptation benefit (2022-2050)

Economy-wide impacts of investments in irrigation systems

Economy-wide impacts of irrigations measures (SCCA compared to SCC)



Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

- Investments in the agricultural water infrastructure result per year in a maximum **1.2% higher GDP (resp. KZT 833 bn.)** and **up to 0.8% higher employment corresponding to up to 78,000 additional jobs** (SCCA compared to SCC).
- Investments in **irrigation systems increase agricultural output – also in years without droughts occurring**. Other sectors along the value chain are **indirectly, positively affected e.g., food producers** (SCCA compared to SCC). Positive effects can be expected in the construction sector which profits from the rehabilitation and expansion of water canals and reservoirs.
- A higher growth path without further climate protection measures leads to annual increases of energy demand and energy-related CO₂ emissions of up to 0.4%.

References

Kazakh Government (2020): Eighty-eight thousand jobs to be created during modernization of irrigation infrastructure in Kazakhstan. URL: [Eighty-eight thousand jobs to be created during modernization of irrigation infrastructure in Kazakhstan - Official Information Source of the Prime Minister of the Republic of Kazakhstan](#)

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