Learnings from a Climate Risk and Vulnerability Assessment (CRVA) in a mountainous district in Northern Tajikistan

Marc Zebisch, Kathrin Renner, Eurac Research, Bolzano, Italy

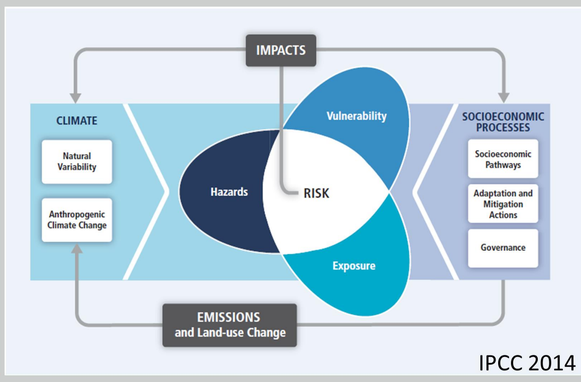
❶ OBJECTIVE: CLIMATE RISK ASSESSMENT IN NORTHERN TAJIKISTAN

In this poster we present the results from a Climate Risk and Vulnerability Assessment (CRVA) for a mountainous district in Northern Tajikistan conducted for the German "Gesellschaft für Internationale Zusammenarbeit" (GIZ). The main objectives were a) to identify the most important climate and climate change related risks and the contribution of natural and socio-economic factors and b) to understand the benefits and limitations of quantitative as well as qualitative CRVA approaches in the context of an assessment at the local scale. A special focus has been set on the relation between Ecosystem services (ESS) and climate risks.

Landscape in Northern Tajikistan with erosion gullies and mud flow channels.

❷ THE METHOD: CLIMATE RISK ASSESSMENT WITH IMPACT CHAINS

- **Hazard**: "The **potential occurrence** of a **physical event** or **trend** or physical **impact** that may cause harm: loss of life, injury, health impacts, damage and losses of property, infrastructure, livelihoods, ecosystems and environmental resources."



IPCC 2014

- **Vulnerability**: "The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including **sensitivity** or **susceptibility** to harm and **lack of capacity to cope and adapt**".
- **Exposure**: "The presence of people, livelihoods, species or ecosystems, environmental functions, services and resources, infrastructure or economic, social, or cultural assets in places and settings that could be adversely affected"
- **Risk**: "The **potential for consequences** where something of **value** is at stake and where the outcome is **uncertain (...)**. Risk results from the interaction of **vulnerability, exposure, and hazard**"

Our approach followed the well-established concept of a CRVA developed by Eurac Research, based on so-called impact chains and the IPCC AR5 approach of climate risk (see figure above). The method is published in the GIZ "Vulnerability Sourcebook" and several supplements (see below). A core aspect of the assessment methodology is the integration of quantitative and qualitative information in a participatory approach (workshops, consultations).

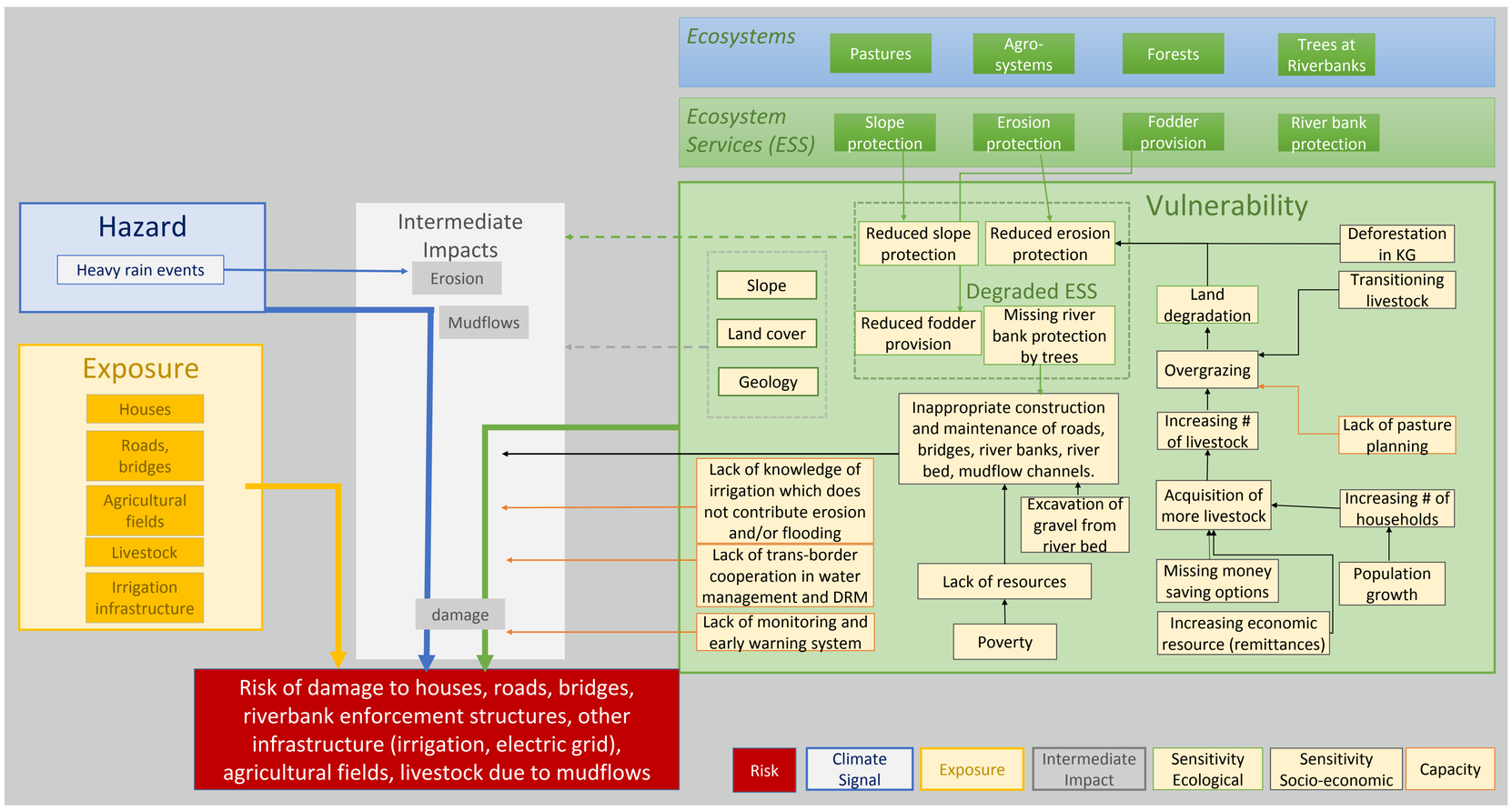
The Vulnerability Sourcebook and Supplements
www.adaptationcommunity.net/vulnerability-assessment/

Workshop to identify root-causes of risks and hotspots

❸ RESULT AND CONCLUSIONS

Three main climate risks and underlying root causes were identified for the region:

- Risk of damage to houses, roads, bridges, riverbank enforcement structures, other infrastructure (irrigation, electric grid), agricultural fields and livestock due to mudflows triggered by heavy rain events (see impact chain on the right)
- Risk of loss of agricultural yield, decreased crop quality, decreased grassland and livestock productivity, soil salinity, lack of drinking water due to droughts and high temperatures
- Risk of damage to houses, infrastructure (electricity lines), trees (orchards), agricultural fields (soil erosion, damage to seedlings) and health (dust, trauma) due to strong wind.



Impact Chain for risks related to mudflows with relevant hazard, vulnerability and exposure factors. A strong focus have been set on ecosystem related factors

The most important factors aggravating these climate risks in the region are not primarily the changing climate but an increase in vulnerability due to socio-economic developments. The most important processes and factors contributing to the high and increasing vulnerability are:

- Land degradation and degraded Ecosystem Services (ESS) because of overgrazing and deforestation
- Limited water availability combined with an increase in water demand for irrigation
- Population growth and a related increase in agricultural area
- Poverty, missing job opportunities, dependency on remittances.

Furthermore, missing capacities as well as missing trans-border cooperation with Kyrgyzstan are contributing to the high vulnerability

Climate change will exacerbate existing problems. Data models show an increase in temperature, which will lead to more intense meteorological droughts leading to agricultural droughts. In combination with other climate impacts (e.g. less melt water from snow) water availability in summer will most likely decrease, while it might increase in winter and early spring. The potential increase of heavy rain events has to be considered but cannot be verified by observation data or climate scenarios since neither station data nor climate models are able to capture extreme precipitation events in this remote mountain region sufficiently.
The assessment revealed that often vulnerability factors are as important as climate change itself for understanding climate risks and for planning appropriate adaptation measures.