Climate Risk Screening of Public Investment Projects in CAREC Region: ADB Experience in Uzbekistan on Supporting Adaptation Decision Making for Climate Resilient Investments

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Objective of Climate and Disaster Risk Screening

National Development Strategy 2030

Accelerated transition to a green economy

Development goals consistent with nationally determined contributions

Implications on public finance management and investment planning

Strategic Framework of Transitioning to a Green Economy 2030

Targeted measures with specified action plan

Growing number of public investment projects consistent with the strategic targets

Investment planning warranted climate risk screening of proposed projects

Climate and Disaster Risk Screening

Started with pilot districts/sites

Develop a screening tool while building capacity

Streamlined screening to be owned and used by central and regional governments in investment planning

Preliminary Outcomes

Screening of public investment projects is designed in ADB operations

Government resolution on public investment planning amended

Climate Risks in Fiscal Management Strategy

Climate and Disaster Risk Screening Summary

Second-stage risk screening for Kashkadarya Masterplan

Two-stage approach to risk screening

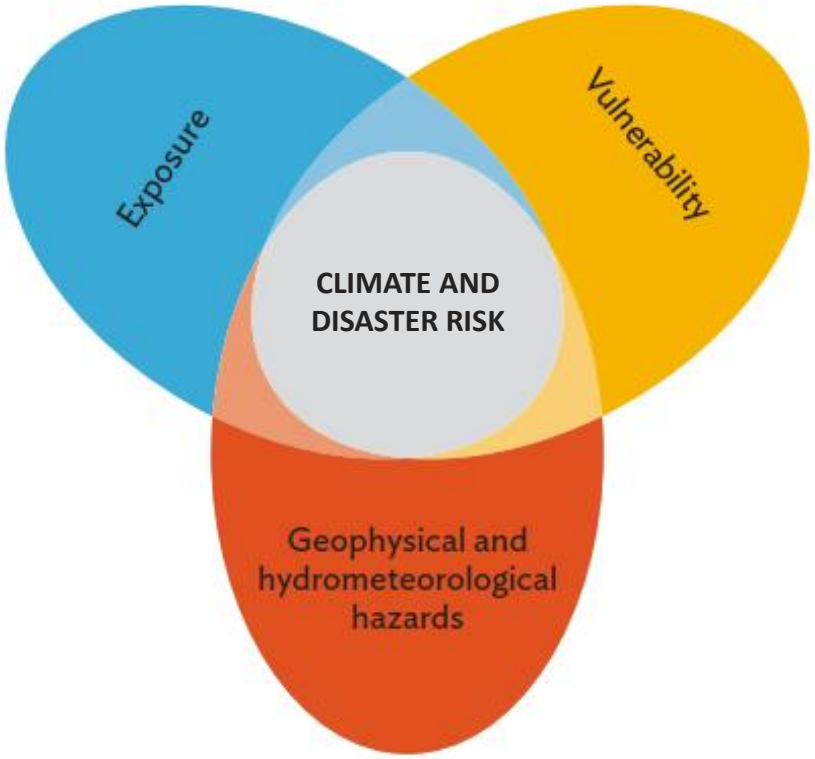
- First-stage: using data from global datasets, as in the risk screening tool being developed by ADB

- **Second-stage**: revised screening report with supplementary local data
  - Data on hazard, vulnerability, recorded disasters and losses, resilience options

- Both stages supported with capacity building

Climate and Disaster Risk Screening Summary

Approach overview / Risk assessment methodology



Risk originating from geophysical and climate hazards is defined as:

$$R = f(H, E, V) \quad \text{or} \quad R = H \times E \times V$$

- **R**isk: potential losses triggered by natural hazards over exposed elements.
- **H**azard: physical phenomena that can cause impact on people and property.
- **E**xposure: location of people, properties, activities in relation to hazards.
- **V**ulnerability: conditions determining the degree of susceptibility to suffer impacts from an hazard.

Project sub-sector	Hazard type H1	Hazard type H2	Hazard type H3
S1	L	H	M
S2	L	M	H
S3	H	M	L

Single Risk score for the whole project reflecting max criteria

Project Risk rating and Next Steps
High risk → Light-touch or detailed CRA/DRA
Moderate risk → Light-touch or detailed CRA/DRA
Low risk → End of screening process OR light-touch CRA/DRA if recommended by expert judgment

NB: In IPCC terminology, *vulnerability* is referred to as *sensitivity*.

Climate and Disaster Risk Screening Summary

Overall project climate and disaster risk rating

Project risk score:

The overall project risk score is based on the highest score associated with any given location, subsector and hazard assessed in this screening. This approach has been taken to ensure that hazards that pose medium or high risk to the project, and hence have the potential to cause adverse consequences and losses, are identified and mitigated.

The risk ratings are defined in Table 1.

Table 1 Risk ratings

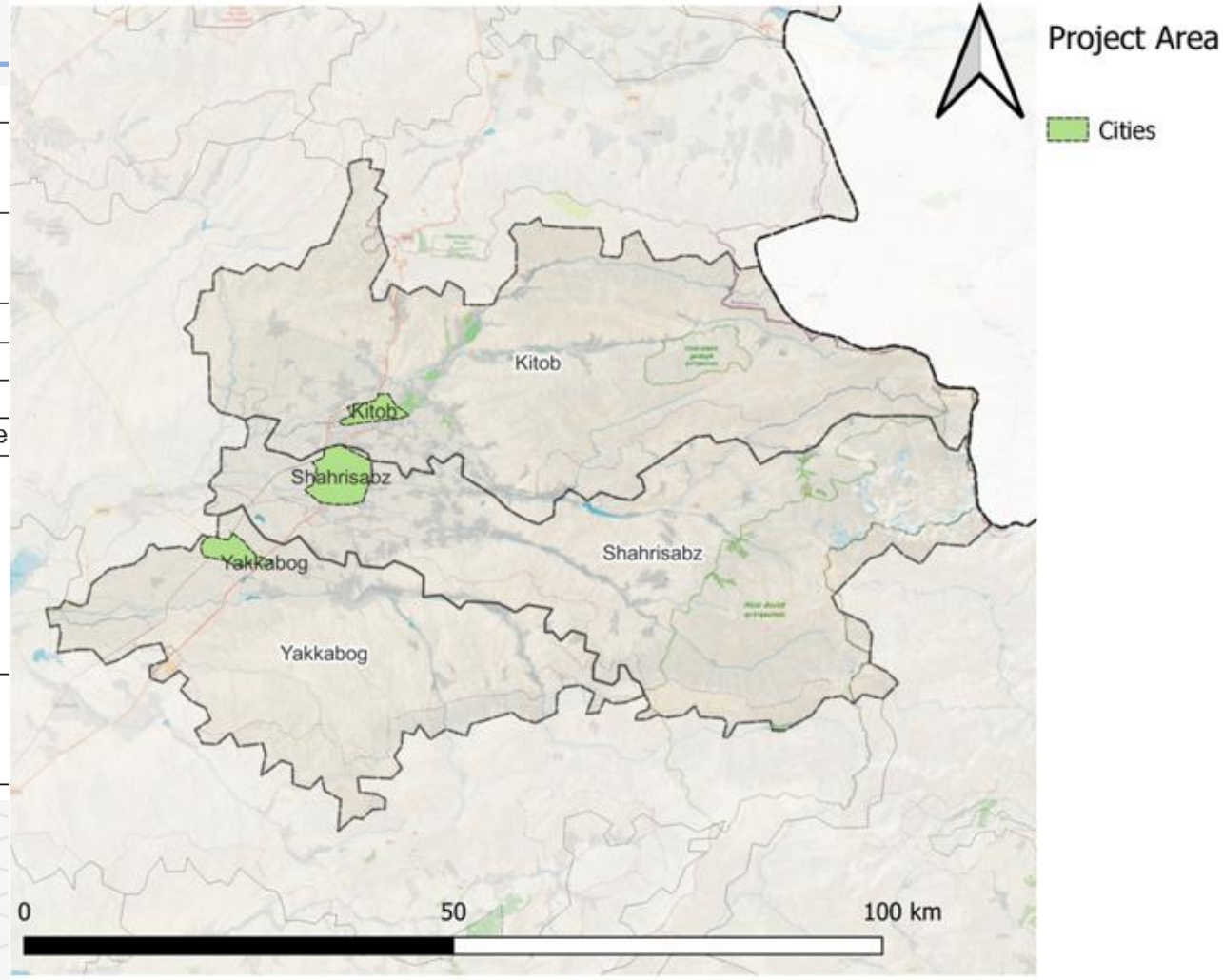
Risk rating	Description
High	A subsector or population is at high risk from a hazard when the subsector or population can experience significant adverse consequences as a result of hazard occurrence
Medium	A subsector or population is at moderate risk from a hazard when the subsector or population can experience moderately adverse consequences as a result of hazard occurrence
Low	A subsector or population is at low risk from a hazard when the subsector or population can experience minor adverse consequences as a result of hazard occurrence

Project information

Table 2 Project information

Project title:	**Kashkadarya Masterplan for the Kitob, Shahrisabz and Yakkabog districts**
Description of project:	The government intends to prepare a masterplan for the area, with a focus on tourism, agricultural production, roads, and the urban environment
Country:	Uzbekistan
Province/district:	Kashkadarya Province / Kitob, Shahrisabz and Yakkabog Districts
Project financing:	*To be confirmed*
Sectors:	Industry and Trade / Transport / Agriculture / Water and urban infrastructure
Subsectors and approximate design life:	Agricultural production: 30 years Trade and services: 30 years Road transport (non-urban): 120 years Urban housing: 60 years Urban sewerage: 60 years Urban water supply 60 years
Locations:	Kitob District Shahrisabz District Yakkabog District

Figure 1 Location overview map



Climate and Disaster Risk Screening Summary

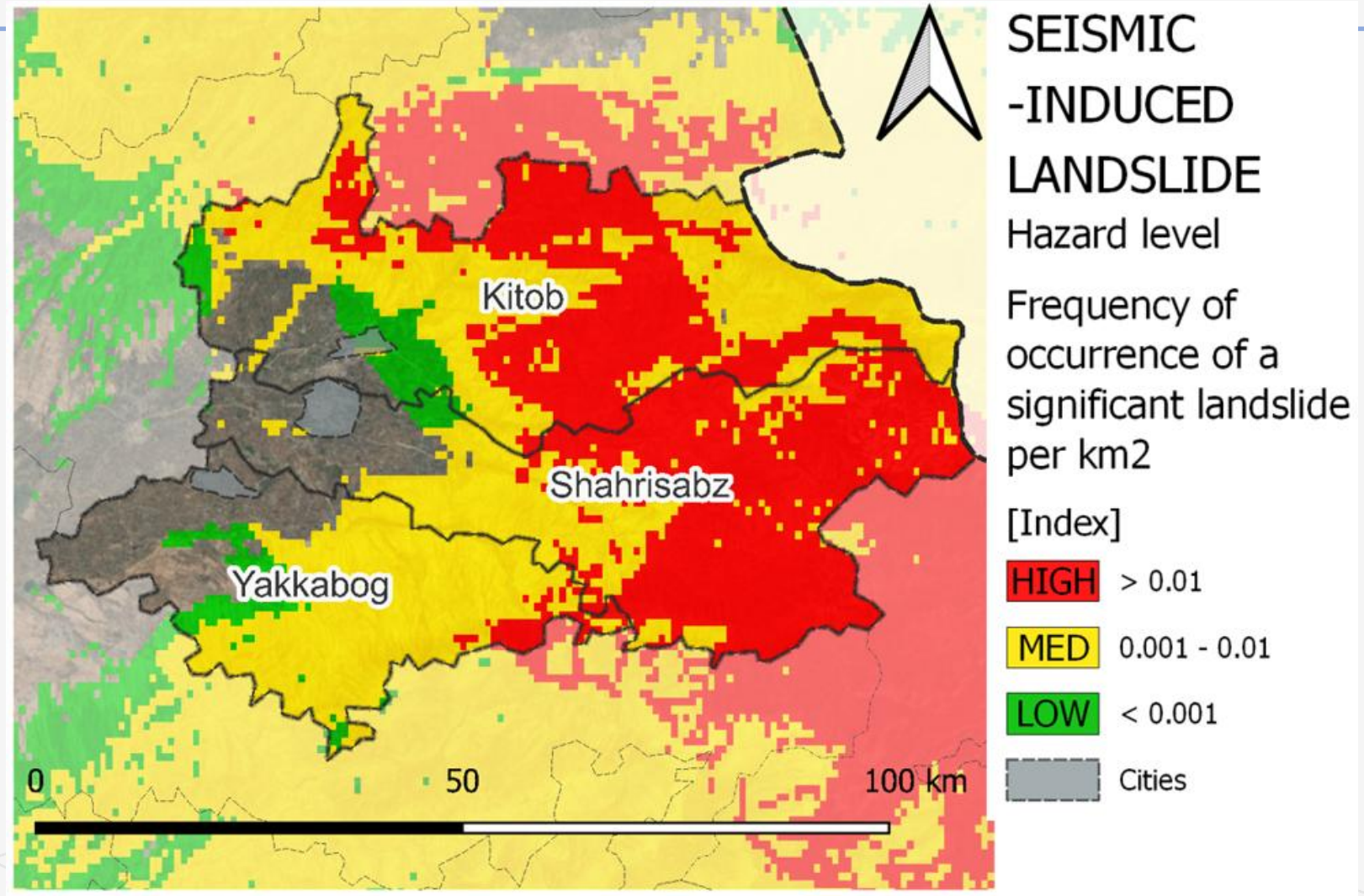
Summary of climate and disaster risk ratings by subsector

The project comprises a number of activities that fall within six subsectors. The hazards that pose high levels of risk to the project subsectors are as follows:

- Activities in the subsector "*Agricultural production*" are at **high** risk from floods, landslides, drought, heat waves, wildfire, increased temperatures and water scarcity
- Activities in the subsector "*Road transport (non-urban)*" are at **high** risk from floods, landslides, heat waves, wildfire, increased temperatures
- Activities in the subsector "*Urban housing*" are at **high** risk from floods, landslides, drought, heat waves, wildfire, increased temperatures and water scarcity
- Activities in the subsector "*Urban sewerage*" are at **high** risk from floods, landslides, wildfire
- Activities in the subsector "*Urban water supply*" are at **high** risk from floods, landslides, drought, heat waves, wildfire, increased temperatures and water scarcity

Detailed hazard information

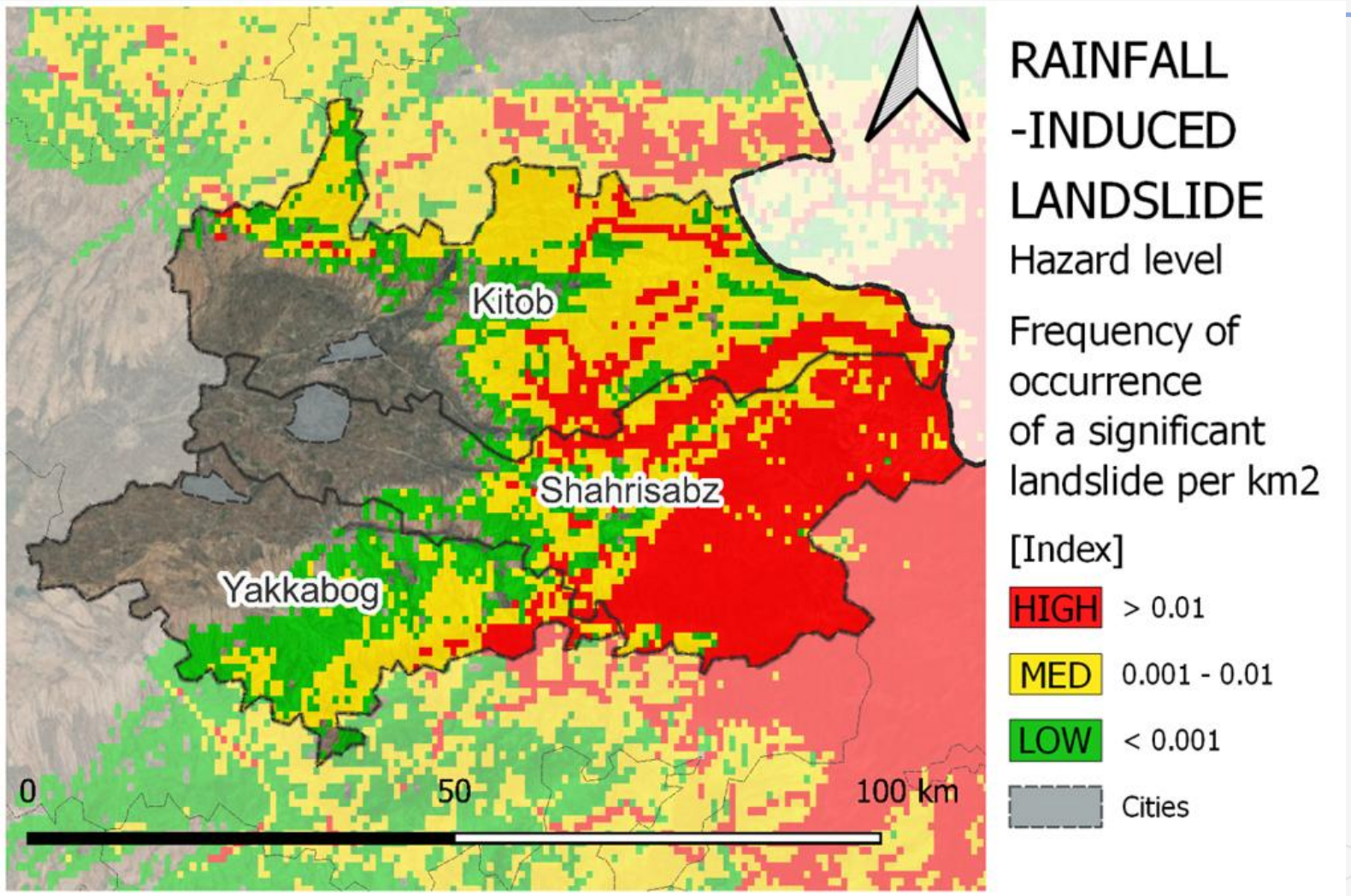
Geophysical hazards – Seismic-induced landslides



Source: ARUP Global Landslide Model, Rainfall trigger.

Detailed hazard information

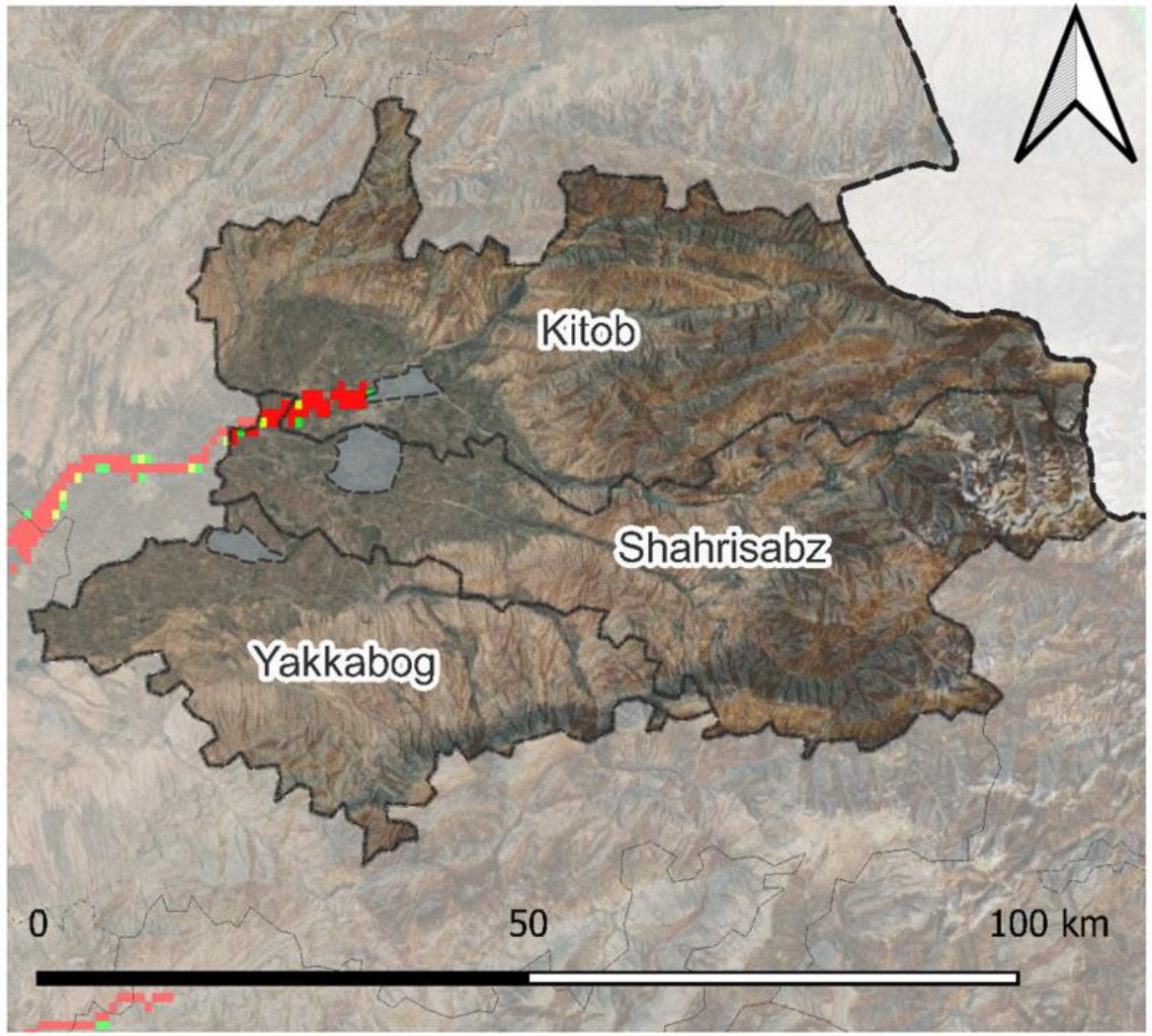
Climate hazards – Rainfall-induced landslides



Source: ARUP Global Landslide Model, Rainfall trigger

Detailed hazard information

Climate hazards – River floods



RIVER FLOOD
Return Period
100 years

Hazard level

Water depth

[m]

HIGH > 1.0

MED 0.50 - 1.0

LOW 0.0 - 0.50

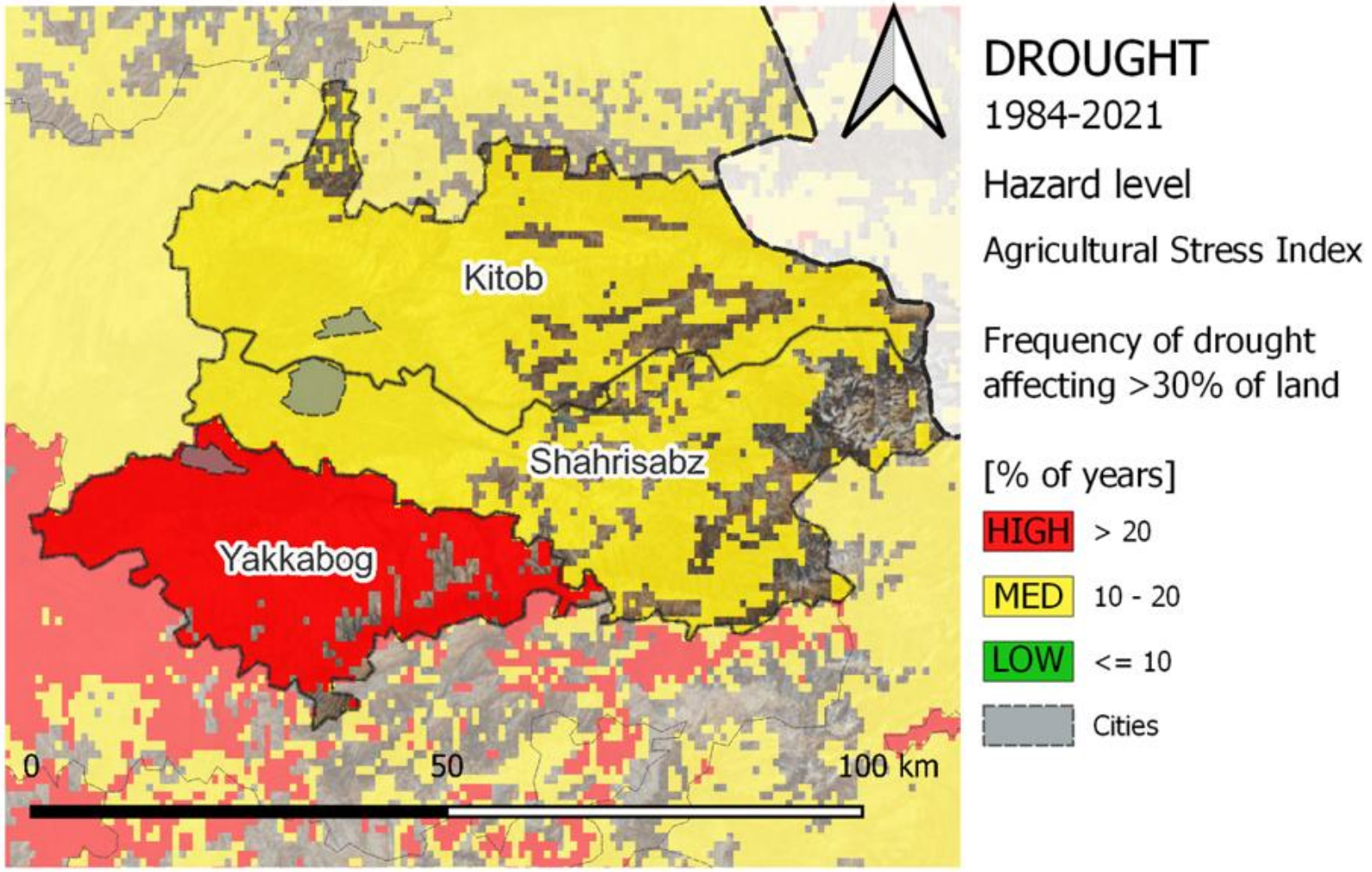
Cities

Source: WRI-Aqueduct Global Flood Model, RP 100 years, water extent and depth.

Detailed hazard information

Climate hazards – Agricultural drought

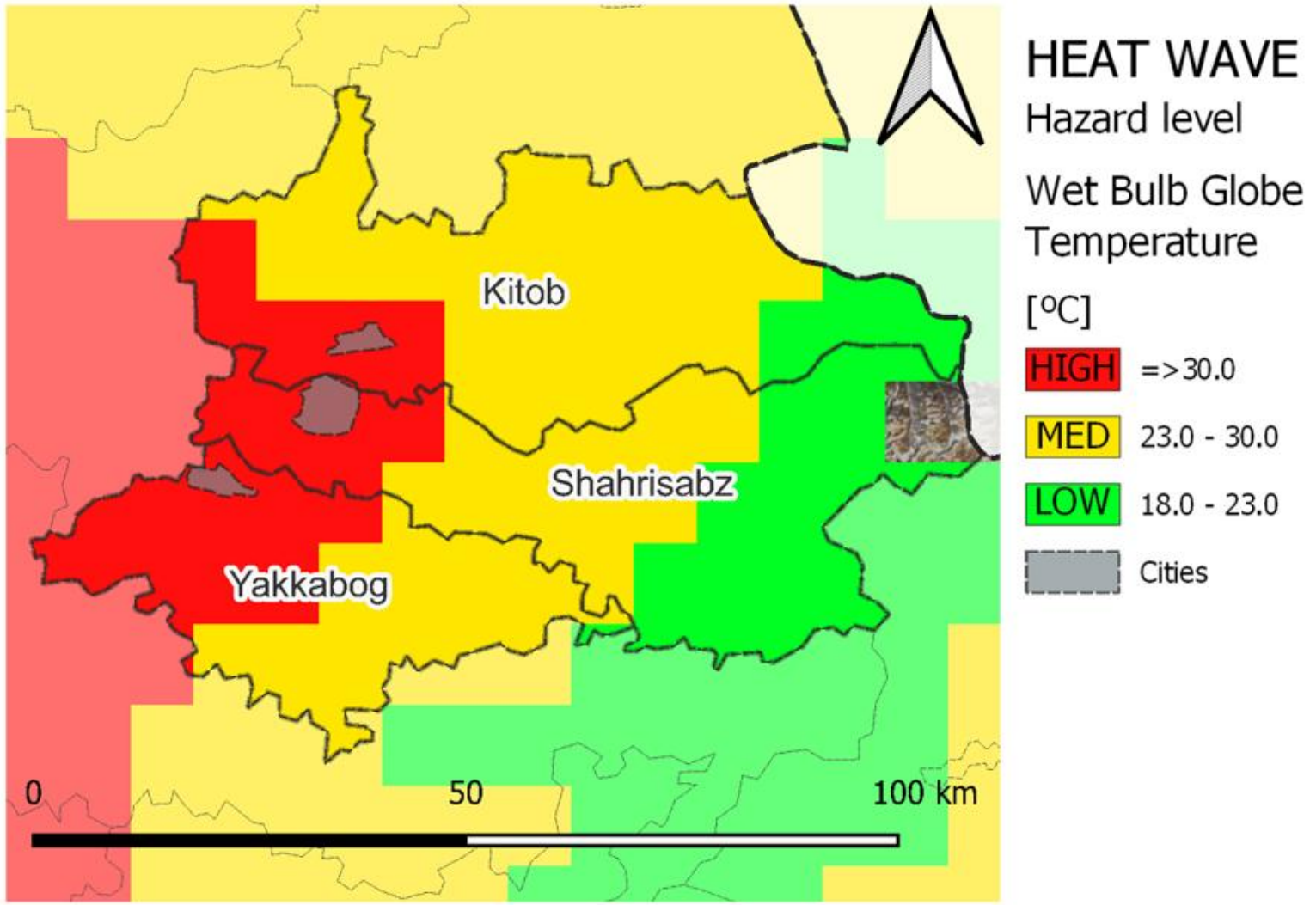
Figure 9 Agricultural drought hazard map (Season 1 – main crop season)



Source: FAO Agricultural Stress Index, 1984-2022

Detailed hazard information

Climate hazards – Heat wave

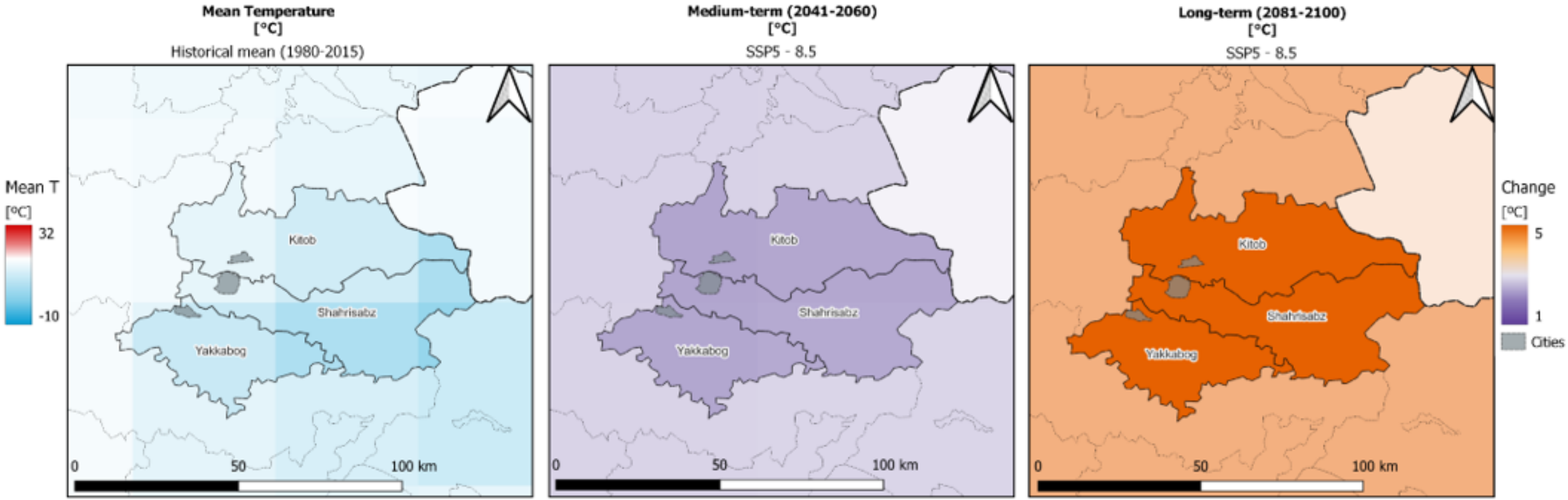


Source: VITO Global Heat Stress model, RP 20 years

Detailed hazard information

Long-term climate change – Mean surface temperature

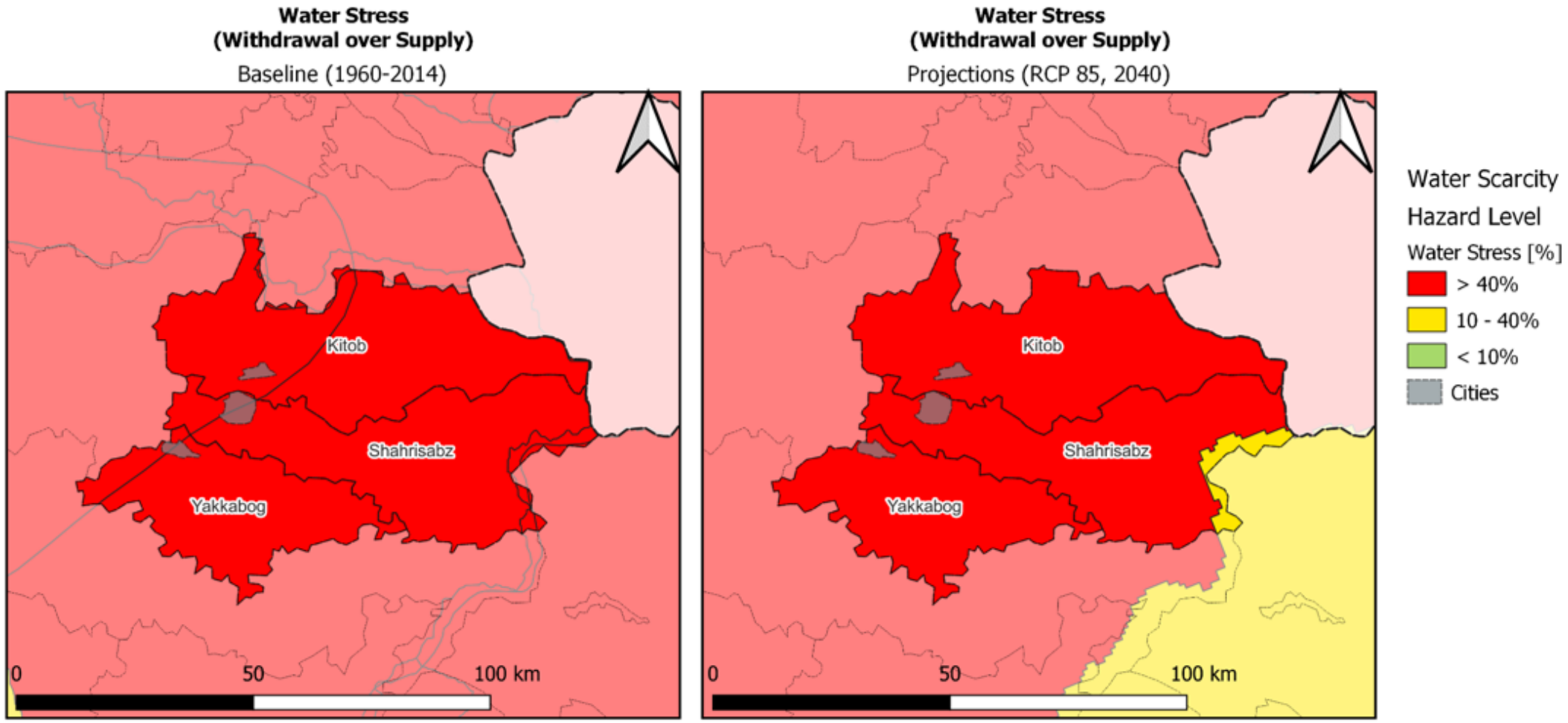
Figure 10 Mean annual temperature anomaly for the design life of the project, compared to historical period 1981-2010



Detailed hazard information

Long-term climate change – Water scarcity

Figure 12 Baseline and future water scarcity in the project region



Source: WRI-Aqueduct Global Water Scarcity Model, Baseline Water Stress categories

Resilience options

Agricultural production

Resilience option	Related hazard	Resilience category
Change in woodland management (e.g., promoting afforestation and avoiding deforestation)	Landslide (impact on agricultural resources, removal of topsoil, blocking of rivers)	Institutions and governance - Policy
Insure against impact of landslides to agricultural production and profitability, to avoid farmland abandonment	Landslide (direct impacts, (e.g., loss of farmland) and indirect impacts (damage to rural transport network and business interruption)	Financing
Capacity building workshops with farmers, Develop/promote networks of farmers and farmers' organizations at regional level for exchange of information and experiences	Climate hazards (multiple) Impact: affecting soil and water productivity, and thus yield, income and livelihoods of farmers	Farmer capacity building on climate smart agriculture
Demonstrations farms, Farmer field schools/farmer discussion groups		Farmer capacity building on climate smart agriculture
Use of multi-media to disseminate information		Farmer capacity building on climate smart agriculture
Diverse system including crops (annual and perennial), livestock, forestry, and fish (aquaculture), providing production and income diversity		Integrated systems
Integration of soil and water management practices (including water harvesting and storage)		
Management of waste streams		
Sustainable household fuel supplies for cooking and heating		
Processing and marketing to ensure food security		

Resilience options

Road transport (non-urban)

Resilience option	Related hazard	Resilience category
Structural measures such as strengthening embankments; reducing the gradient of cut slopes and hill slopes; constructing retaining walls	Landslide (scouring of soils around road infrastructure is compounded by increased debris slides, debris flows and rock falls from landslides)	Infrastructure – Grey infrastructure
Protect against collapse of bridges, culverts, and embankments through structural measures (e.g., anchored abutments to piled foundations, strengthening foundations with concrete; reinforced earth embankment)	Landslide (increase of loads on road components through increased debris, potentially causing their collapse)	
Incorporating climate change considerations (data, projections, uncertainty) into transport systems' planning, design, management, operations and maintenance practices	Landslide (debris leading to road closures, risk to road users and pedestrians, business interruption)	Institutions and governance – Management and planning
Structural and geotechnical design of road components (e.g., bridges, tunnels, culverts, embankments and cuttings) to best-practice, seismic-resilient engineering standards; require higher design standards for key components (e.g., major river crossings)	Earthquakes (seismic shaking)	Institutions and governance – Policy
Initiate studies to evaluate the costs and benefits of modifying existing road components (bridges, embankments) to be more resilient; Develop insurance scheme; Contingency funds for addressing post-disaster needs		Financing
Plan for emergency response in case earthquakes (e.g. alternative or evacuation routes, early warning systems, emergency services, responsive capacities)		Institutions and governance – Management and planning
Reinforce at-risk bridge structures (e.g. piers, abutments, columns, foundations) to protect against scouring (e.g. rip-rap); Elevate bridge structure (deck level, piles)	Flood (flooding can accelerate scouring of road and bridge support structures (e.g. foundations, piers), negatively impacting their structural integrity)	Infrastructure – Grey infrastructure
Protect against collapse (e.g. anchored abutments to piled foundations, strengthening foundations with concrete); Strengthen granular bases and subgrade soils (using artificial or natural cements); Strengthening embankments (e.g., with geogrids)	Flooding (saturation of pavements, subgrade materials, and embankments, which can cause road embankment instability, and can negatively affect the structural integrity of roads, bridges and tunnels)	

Resilience options

Urban housing

Resilience option	Related hazard	Resilience category
Structural measures to decrease the incidence of landslides, including surface and sub-surface drainage, soil nailing of slopes, reducing the gradient of cut slopes and hill slopes, constructing retaining walls	Landslide (debris from rotational slides, rockfalls and debris flows impacting urban housing)	Infrastructure – Grey infrastructure
Plant climate-resilient (heat or moisture resistant) vegetation on slopes; Change management activities of vegetation adjacent to housing (e.g. avoiding monoculture vegetation that may not survive high temperatures or droughts)		Infrastructure – Green infrastructure
Protect against collapse of road components such as bridges, culverts, and embankments through structural measures (e.g., anchored abutments to piled foundations, strengthening foundations with concrete; reinforced earth embankment)		Infrastructure – Grey infrastructure
Relocate urban housing to less exposed areas (e.g., away from rock faces, deeply weathered soil slopes, gullies)		Practice and behaviour Management and planning
Structural and geotechnical design of urban housing to best-practice, seismic-resilient engineering standards; require higher design standards for critical buildings (e.g., schools, hospitals)	Earthquakes (seismic shaking)	Institutions and governance – Policy
Initiate studies to evaluate the costs and benefits of retrofitting / strengthening existing urban housing stock		Financing
Plan for emergency response in case of disasters and other extreme events (e.g. evacuation routes, early warning systems, emergency services, responsive capacities)		Institutions and governance – Management and planning

Resilience options

Urban sewerage / Urban water supply

Resilience option	Related hazard	Resilience category
Structural measures to decrease the incidence of landslides, including soil nailing of slopes, reducing the gradient of cut slopes and hill slopes, constructing retaining walls	Landslide (landslide debris impacting sewerage and water supply infrastructure such as pumping stations, water treatment systems, sewage treatment plants, and pipelines)	Infrastructure – Grey infrastructure
Replace or retrofit segmental concrete pipes with ductile PVC pipes; use sliding sleeve connections or gasketed joints in system to account for ground deformations imposed on the water pipeline or sewer pipe	Landslide (ground deformations can cause failure of pipes and result in direct damage losses, loss of service, and flooding of the surrounding area)	Technology
Protect against collapse of road components such as bridges, culverts, and embankments through structural measures (e.g., anchored abutments to piled foundations, strengthening foundations with concrete; reinforced earth embankment)	Landslide (debris from rotational slides, rockfalls and debris flows impacting urban housing)	Infrastructure – Grey infrastructure
Relocate water supply and sewerage infrastructure to less exposed areas (e.g., away from weathered soil slopes, gullies, historical landslide deposits)	Landslide (debris from rotational slides, rockfalls and debris flows impacting water supply and sewerage infrastructure)	Practice and behaviour Management and planning
Structural and geotechnical design of water supply and sewerage infrastructure (pumping stations, water treatment systems, sewage treatment plants) to best-practice, seismic-resilient engineering standards (e.g., Eurocode 8)	Earthquakes (seismic shaking)	Institutions and governance – Policy
Initiate studies to evaluate the costs and benefits of strengthening existing pumping stations, water treatment systems and sewage treatment plants		Financing
Plan for emergency response in case of disasters interrupting water supply (e.g. provision of water by other means such as bowsers)		Institutions and governance – Management and planning
Relocate water supply and sewerage infrastructure (pumping stations, water treatment systems, sewage treatment plants) to less exposed areas (e.g., away from mapped active tectonic faults)	Earthquake (seismic shaking and fault rupture)	Practice and behaviour Management and planning

Takeaways

1. Be ready for limited data—local stakeholder consultations solution
2. Risk screening of investment projects must be consistent with government investment planning cycle
3. Private investors should not be left out of the screening
4. Risk screening with stakeholders as capacity building from start
5. Introduce policy framework for ownership

Thank you for your attention!