Regional Workshop on Climate and Disaster Risk-Informed Investments

Session 1.4:

Case study of Upstream Climate Assessment in the Amu Darya Basin
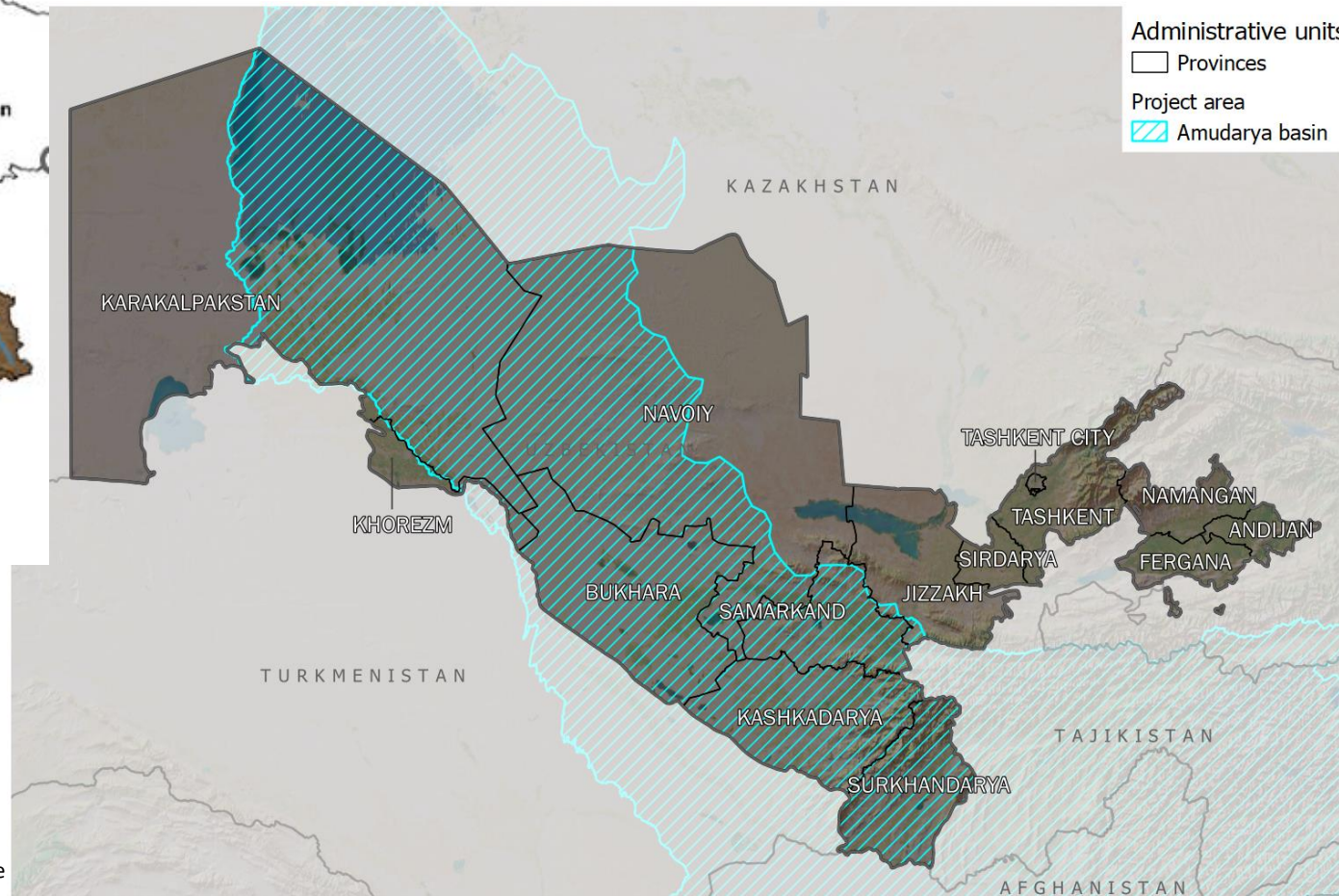
Malte Maass, Climate Change Specialist

Content
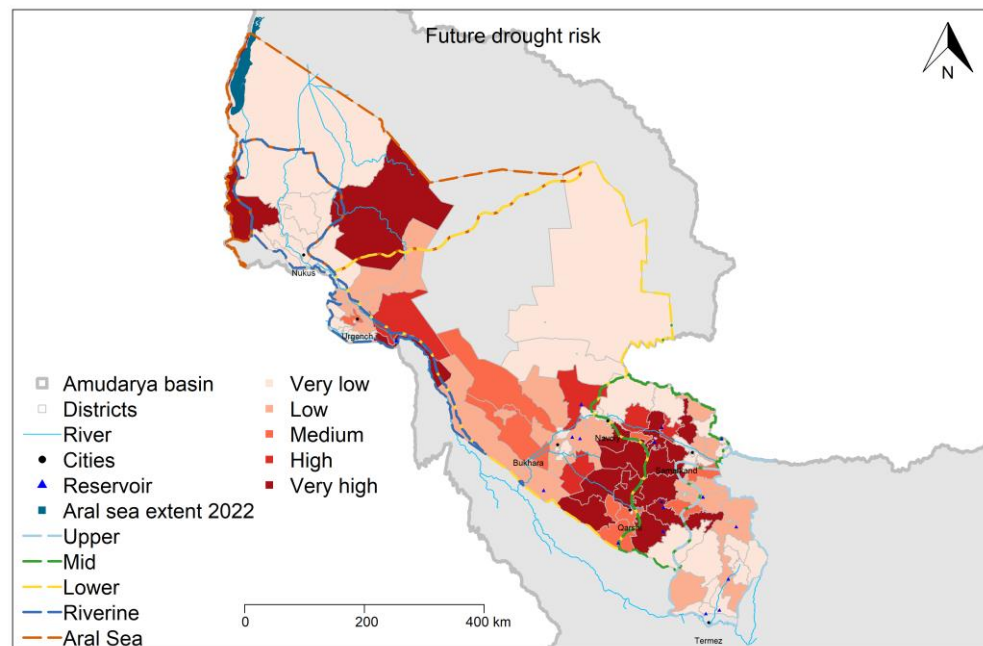
- Background

- Assessment Approach

- Data Types

- Investment Planning

- Conclusion

Background

Assessment Approach

Future drought risk

Legend:
- Amudarya basin
- Districts
- River
- Cities
- Reservoir
- Aral sea extent 2022
- Upper
- Mid
- Lower
- Riverine
- Aral Sea
- Very low
- Low
- Medium
- High
- Very high

0   200   400 km

Task 1
- Draft climate risk mapping
- Socio-economic survey
- Vulnerability of rural livelihoods
  - Final climate-risk mapping
  - Institutional mechanisms for CC
  - Barriers in scaling up
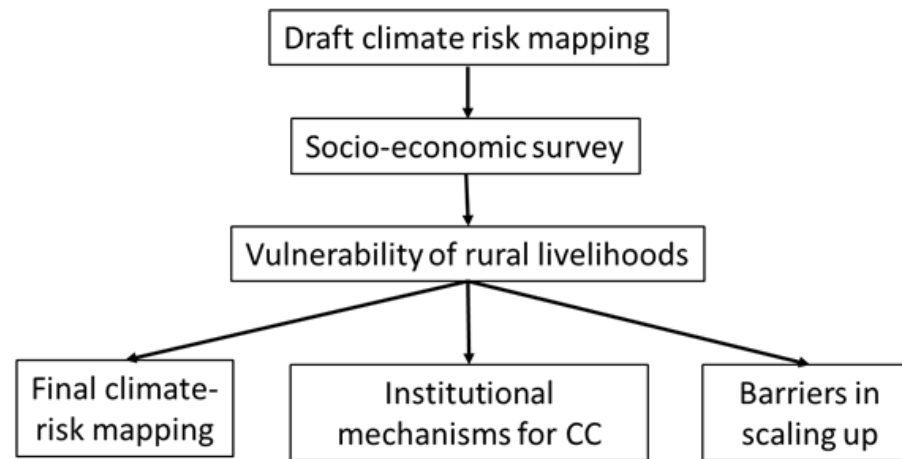
Climate-risk maps → Type 2 options for investment

Task 2
- Stakeholders consultations
- Prioritisation of measures
- Adaptation pathways
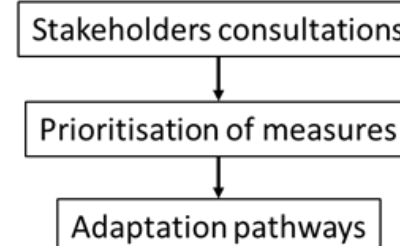
Portfolio of prioritised Type 2 adaptation measures

Task 3
- Alignment
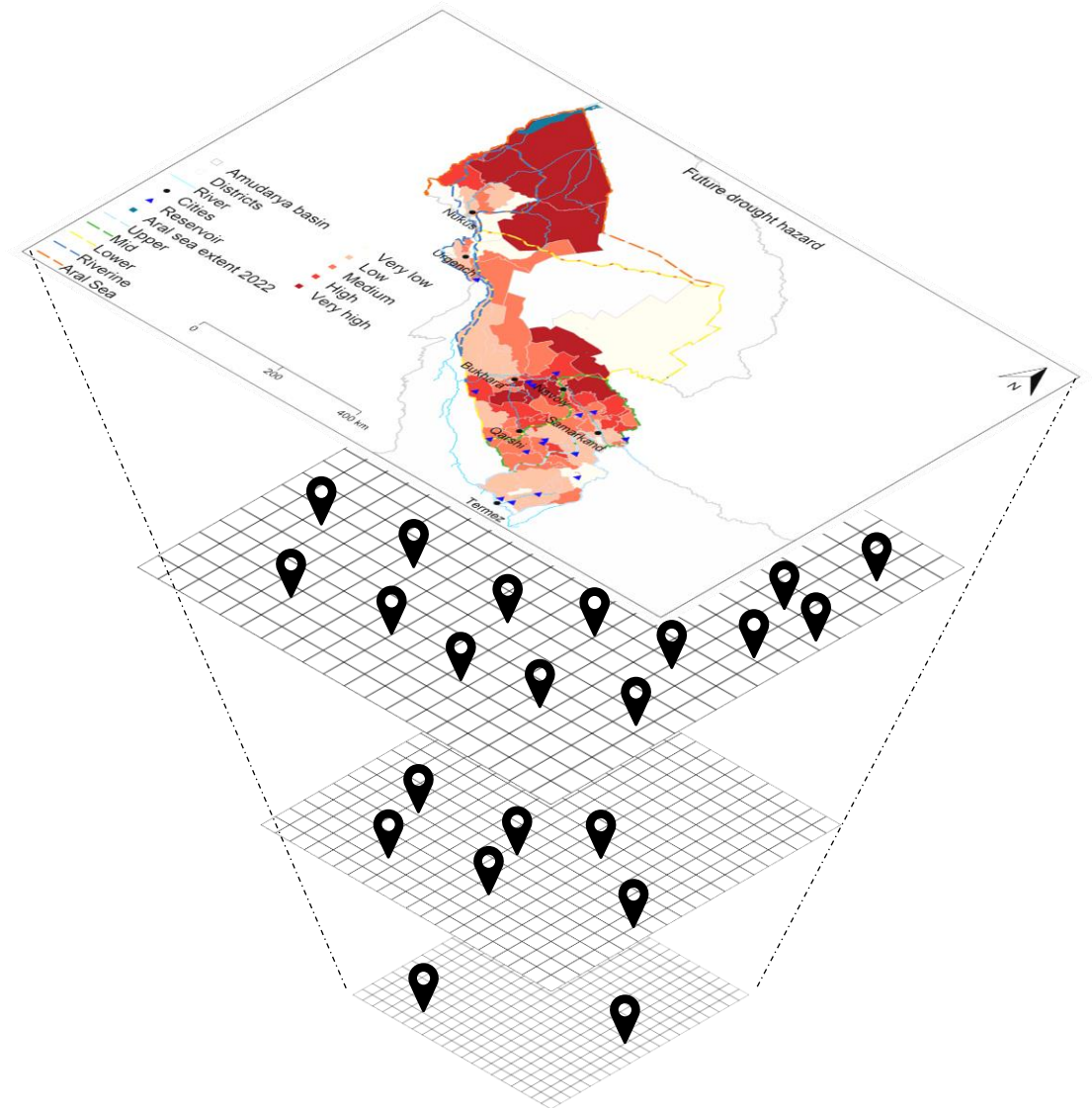- Pre-concept notes
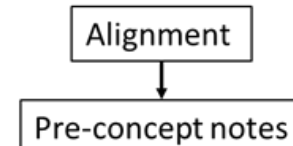
Assessment Concept – Risk Mapping
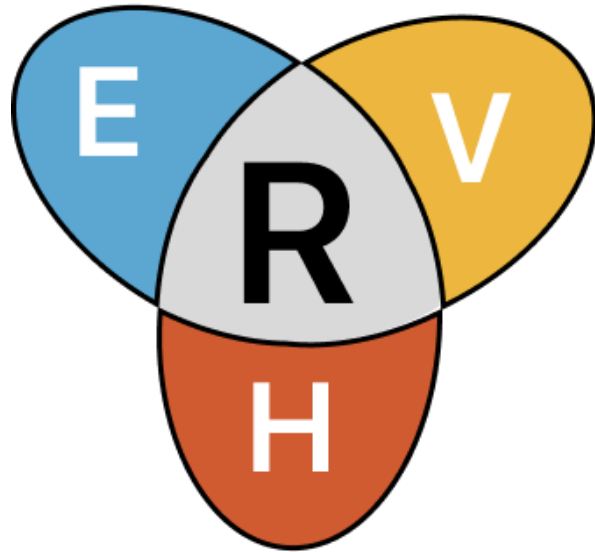
Risk is based on *Hazard*, *Exposure* and *Vulnerability*

Data Types - Hazard

Hazard	Baseline dataset	Baseline metric	Associated Climate Index
Drought	FAO Agricultural Stress Index	Frequency of drought affecting >30% land	Standardized Precipitation Evapotranspiration Index (SPEI)
Rainfall-induced landslides	WB Global Landslide	Average annual frequency of significant rainfall-triggered landslides per sq. km for 1980-2018	Annual maximum 5-day consecutive precipitation (Rx5day)
Rainfall-induced erosion	GloREDa Rainfall erosivity factor	Rainfall erosivity above a certain threshold	Annual maximum 1-day precipitation (Rx1day)
Heat waves	VITO Global Heat Model	20-years mean return value of temperature above a certain threshold	Warm spell duration (WSDI)
River floods	WRI Global Flood Model	Water depth return period 100 year	not applicable
Glacial Lake Outburst Floods	Remote sensing-based dataset	Proximity indicator	Annual maximum 5-day consecutive precipitation (Rx5day)
Dust storms and wind erosion	Wind erosion risk potential	Severity indicator	CMIP6 Wind speed projections
Wildfire	Fire Weather Index	30-year return period intensity value	Warm spell duration (WSDI)

Data Types - Vulnerability and Exposure

Hazard	Vulnerability dataset	Metric
Drought, Dust storms and wind erosion	WRI Aqueduct Water Risk	Water Demand, measured as water withdrawals. Projected change in water withdrawals is equal to the summarized withdrawals for the target year, divided by the baseline year, 2010.
Rainfall-induced landslides	WUEMoCA dataset	Inverse of Water Productivity ($1/\$ \ m^{-3}$) for cotton, rice, wheat
Rainfall-induced erosion	WUEMoCA dataset	Inverse of Water Productivity ($1/\$ \ m^{-3}$) for cotton, rice, wheat
Heat waves, Wildfire	WRI Aqueduct Water Risk	Water Stress, measured as the ratio of demand for water by human society divided by available water.
River floods, Glacial Lake Outburst Floods	WUEMoCA dataset	Net Irrigated Area (in ha)

Hazard	Exposure dataset	Metric
Drought, Dust and windstorms, Rainfall-induced landslides, Rainfall-induced erosion, Heat waves, Wildfire, River floods, Glacial Lake Outburst Floods	– WUEMoCA dataset – Gridded Population of World Version 4	– Net Irrigated Area (in ha) – Nr. inhabitants per km^2

Data Types – Risk Maps

Future Hazard — Landslide

Exposure — Irrigated Area

Vulnerability — Vulnerability Cotton

Legend:
- River
- Cities
- Reservoir
- Aral sea extent 2020
- Upper
- Mid
- Lower
- Riverine
- Aral Sea
- Very low
- Low
- Medium
- High
- Very high

Cities shown: Nukus, Urgench, Bukhara, Navoiy, Samarkand, Qarshi, Termez
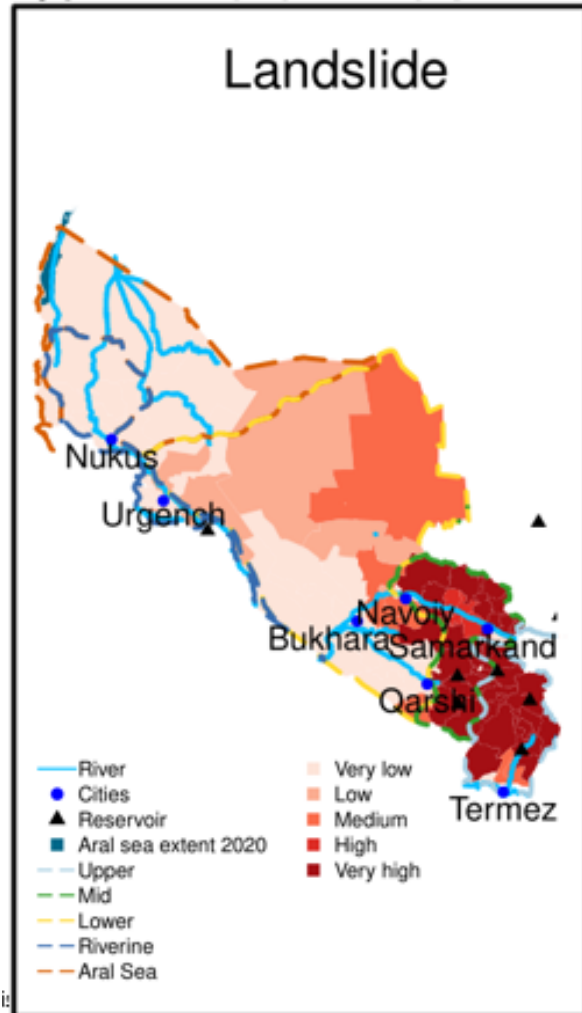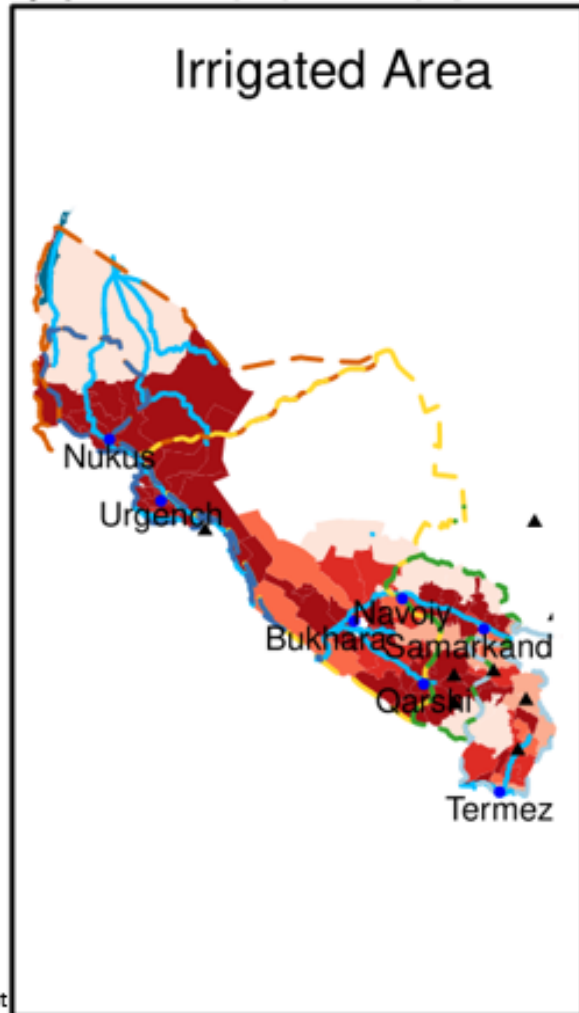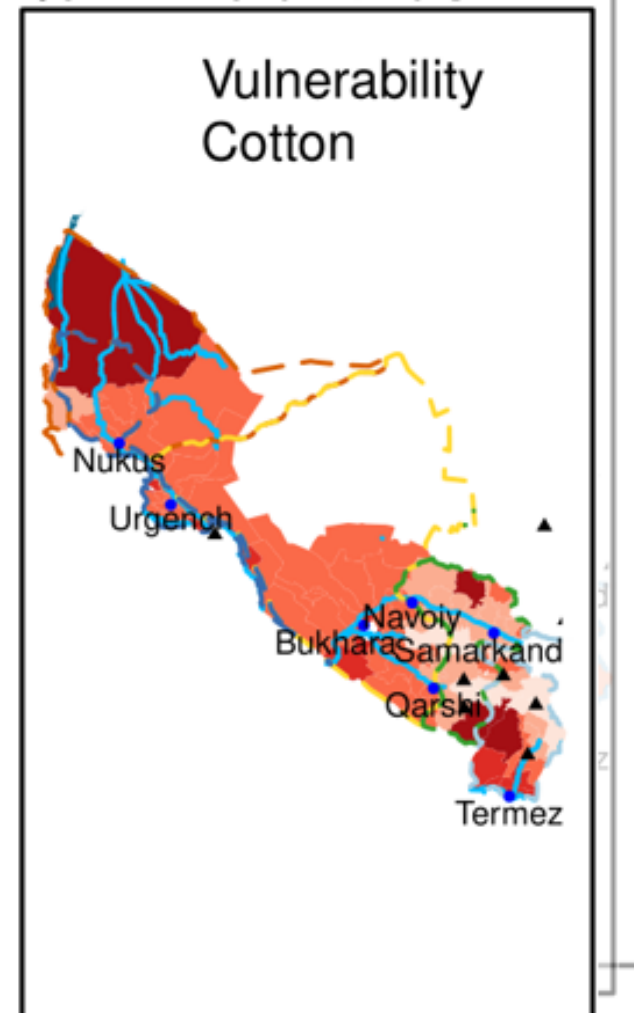
Climate change adaptation technologies integrated into agriculture (hectares)

Legend:
- Drip irrigation systems
- Greenhouses
- Agronomic practices (zero tillage (no plowing), crop rotation, secondary crops, etc.)
- Drought- and salt-tolerant crops
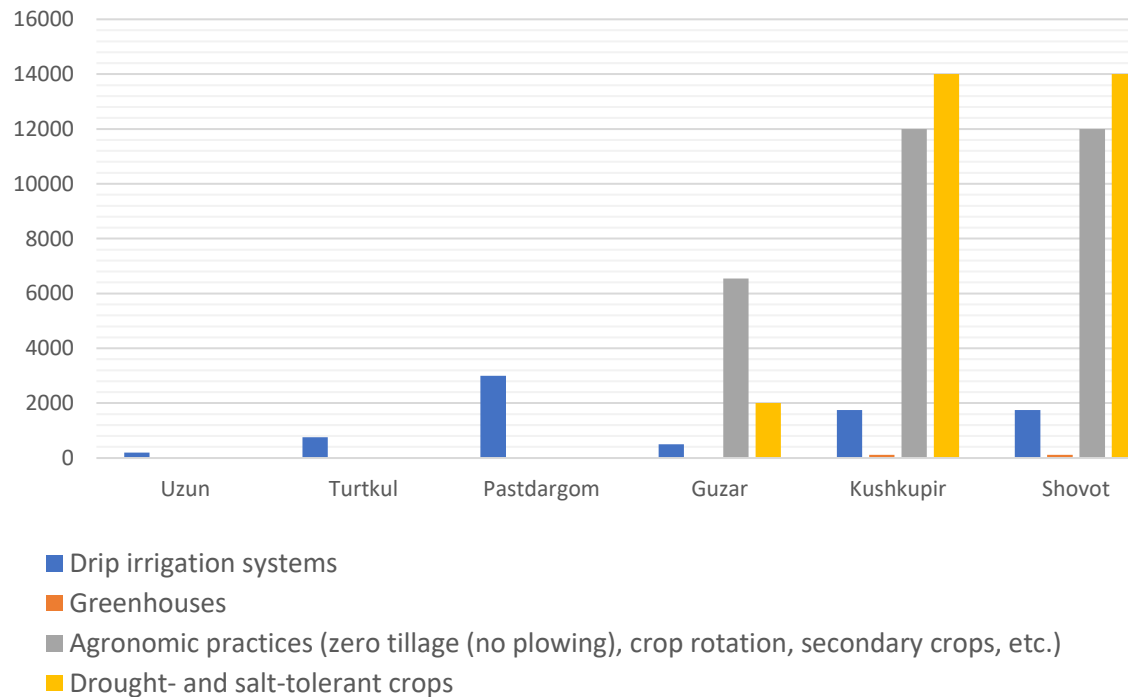
Selected districts for ground survey and stakeholder engagement workshops

Legend:
- Selected_districts
- **Ecozones**
- **Zones**
  - Aral Sea
  - Lower
  - Mid
  - Riverine
  - Upper
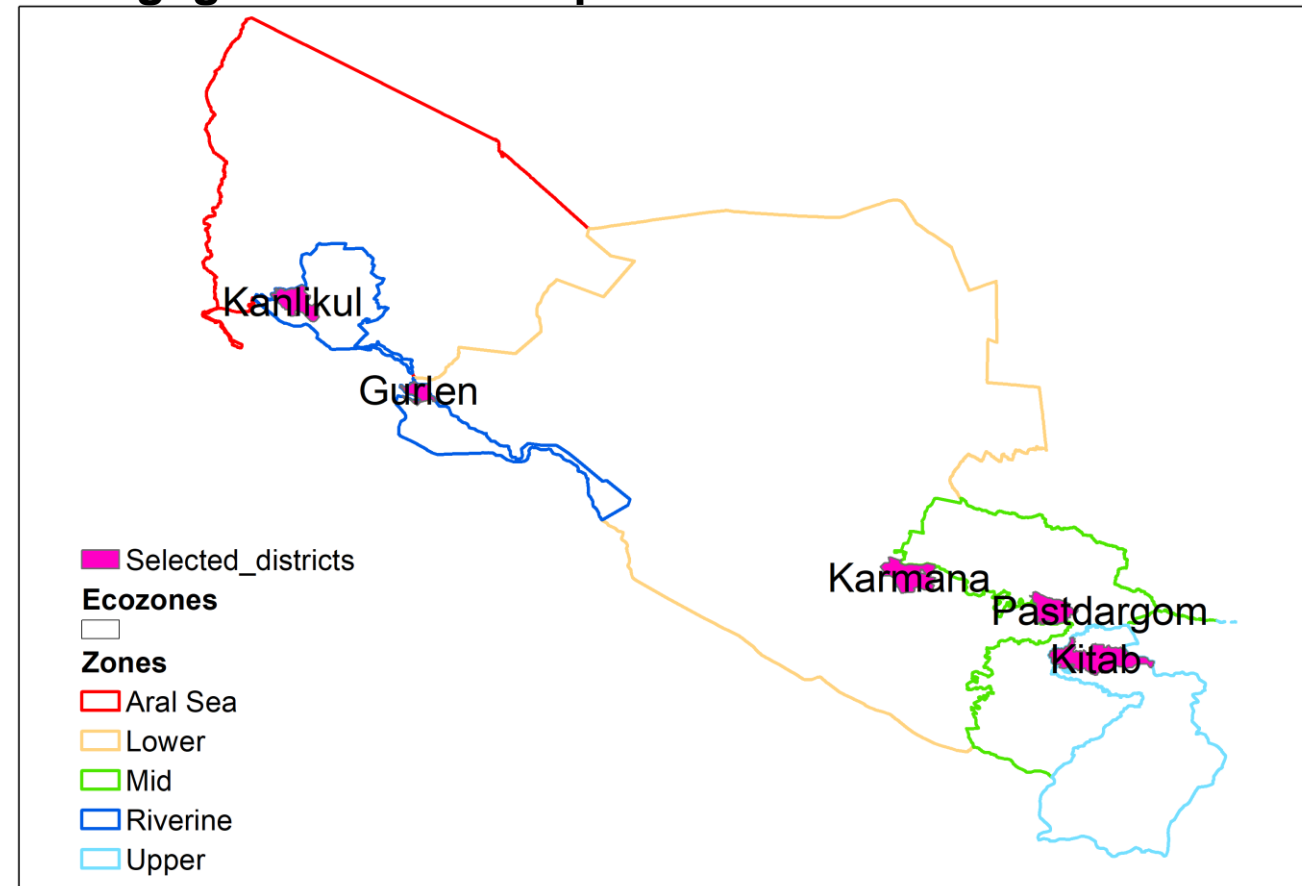
Investment Planning

Multi-Criteria Decision Analysis

No.	Criterion	Weights
1.	Investment costs	0.153
2.	Operation and maintenance (O&M) costs	0.094
3.	Poverty reduction / alleviation	0.107
4.	Revenue generation potential	0.080
5.	Climate resilience	0.085
6.	Biodiversity & ecosystems	0.082
7.	Technical feasibility	0.072
8.	Impact on women and children	0.112
9.	Water and food production & security	0.119
10.	Eco-tourism	0.097
	Total of weights	**1.000**

Adaptation Pathways
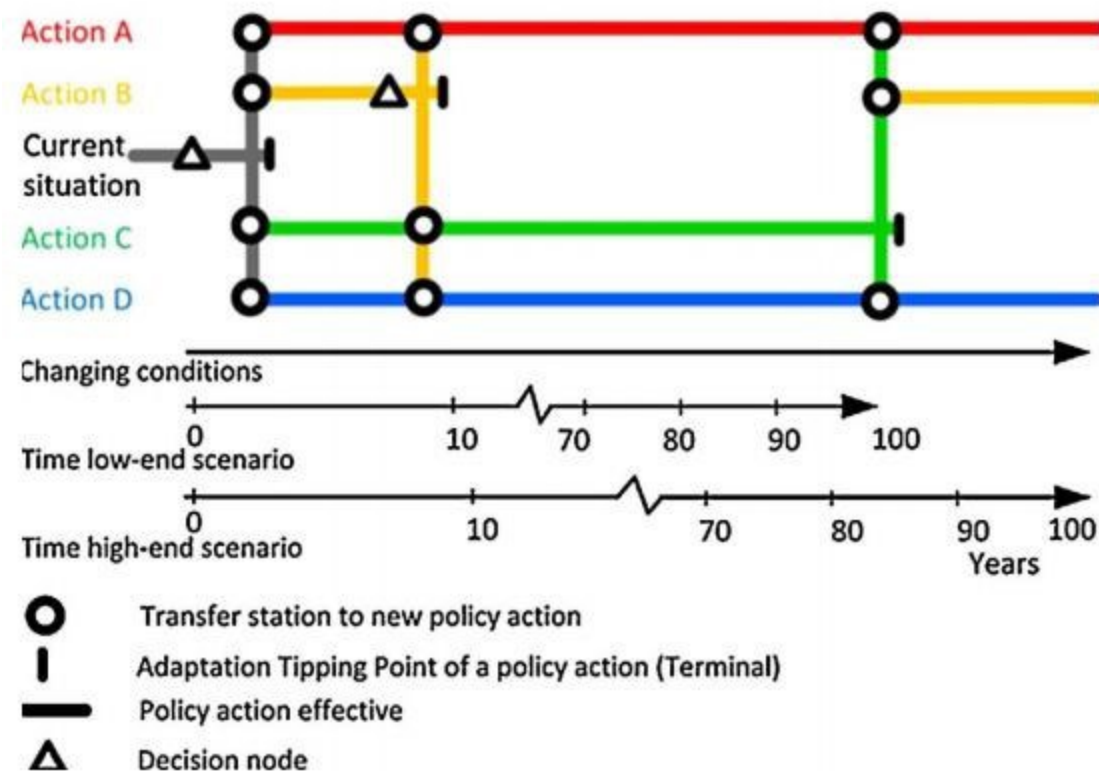
Conclusion

Key Question:

- What data is needed?

- How is the data used?

- Who is involved?

- How to integrate in decision-making processes?

Thank You