

- Using SWAT+ for CRIDA in the Katari basin, Bolivia

*Jose Pablo Teran Orsini
Afnan Agramont Akiyama
Leonardo Villafuerte
Guadalupe Peres – Cajas
Ann van Griensven*





South
America

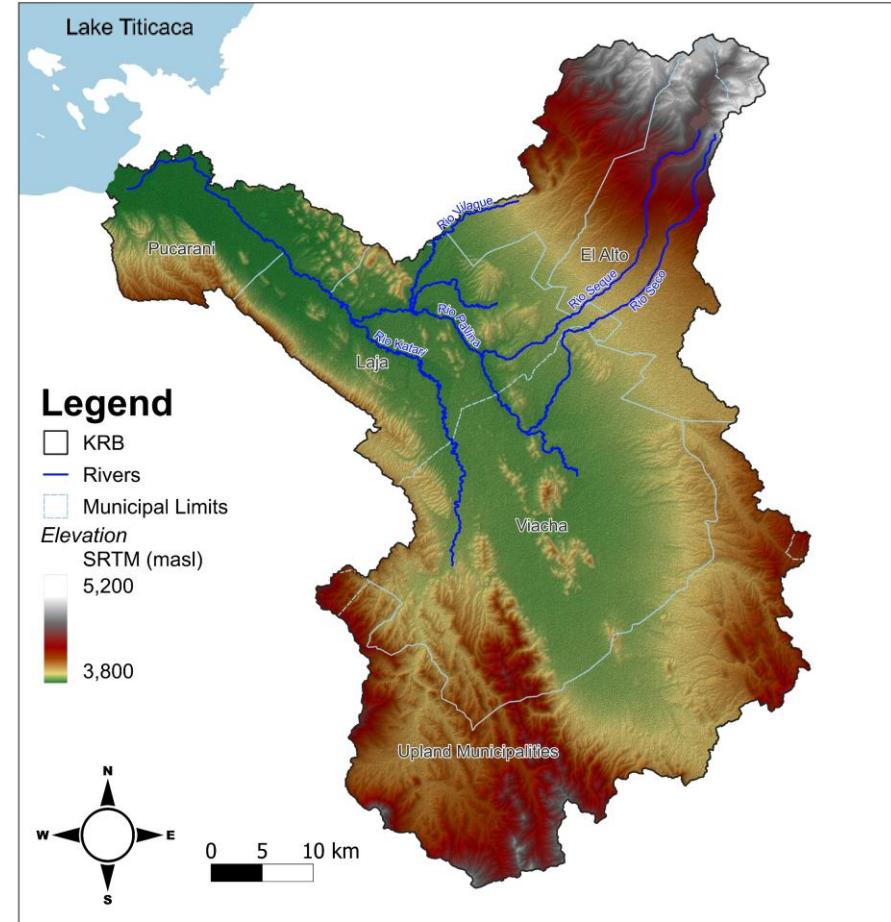
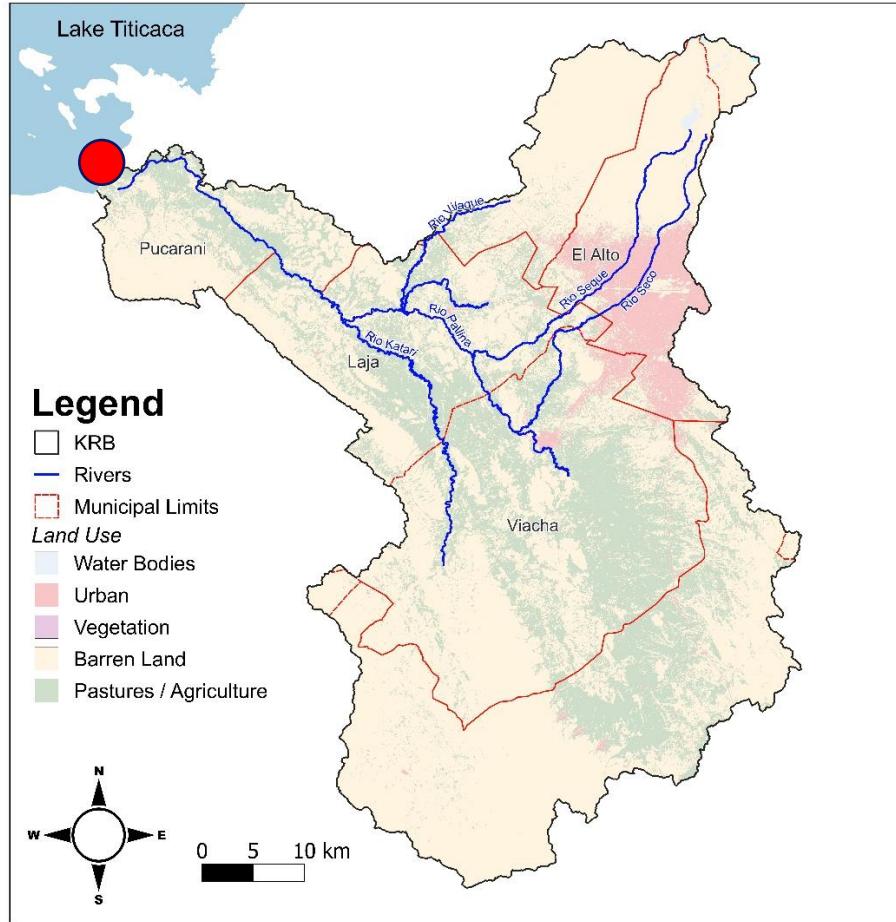


Andes Mountains

Titicaca Lake

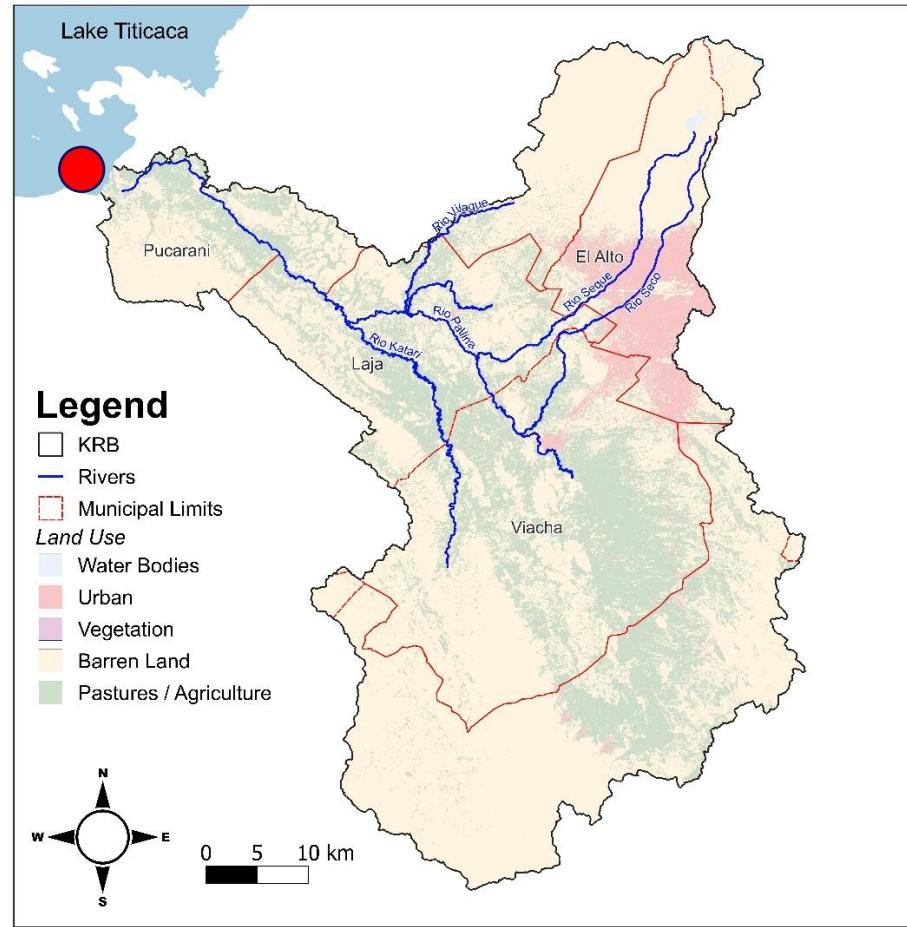
North Altiplano

Katari River Basin (KRB)

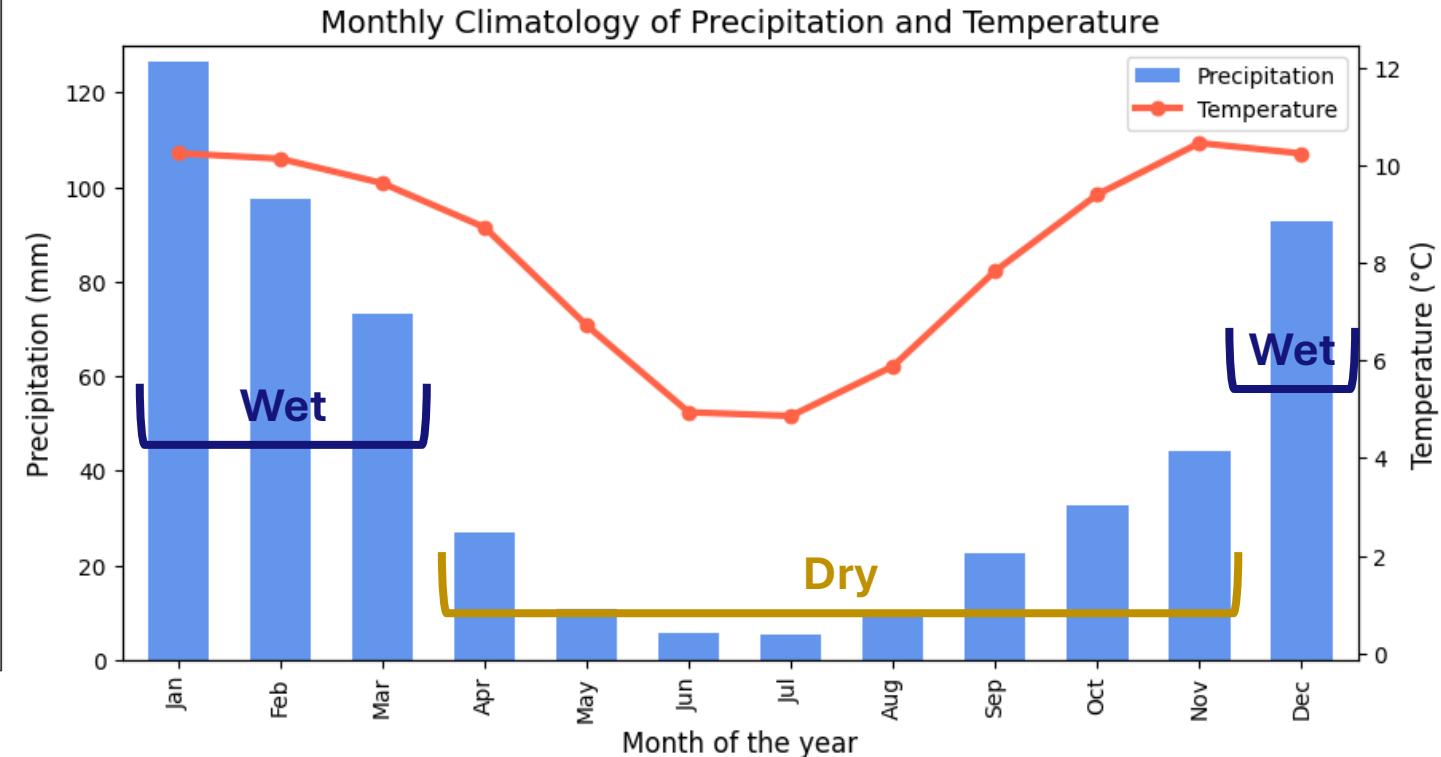


- Part of the Lake Titicaca Basin.
- Located in the Andean Plateau ("Altiplano").

Katari River Basin (KRB)



- Average yearly P \approx 600 mm
- Marked dry and wet periods.





Mount Huayna Potosí



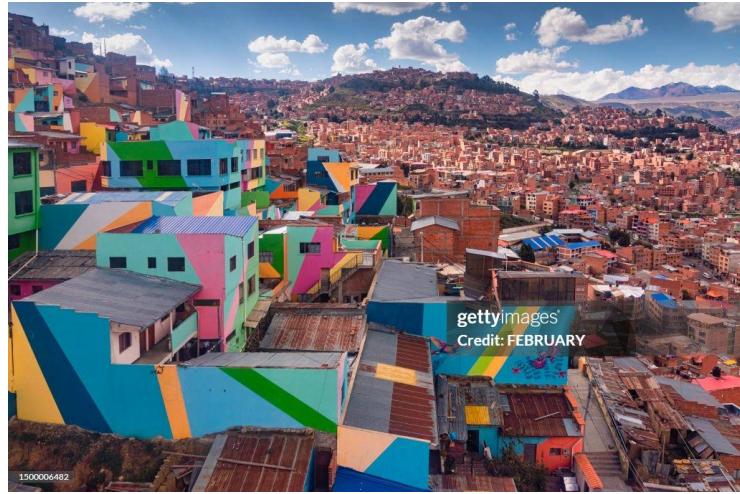
Main Square of Chojasivi





October 2021 – Ministry of Water and Environment cleaning campaign

Katari River Basin (KRB)



Source: Gettyimages



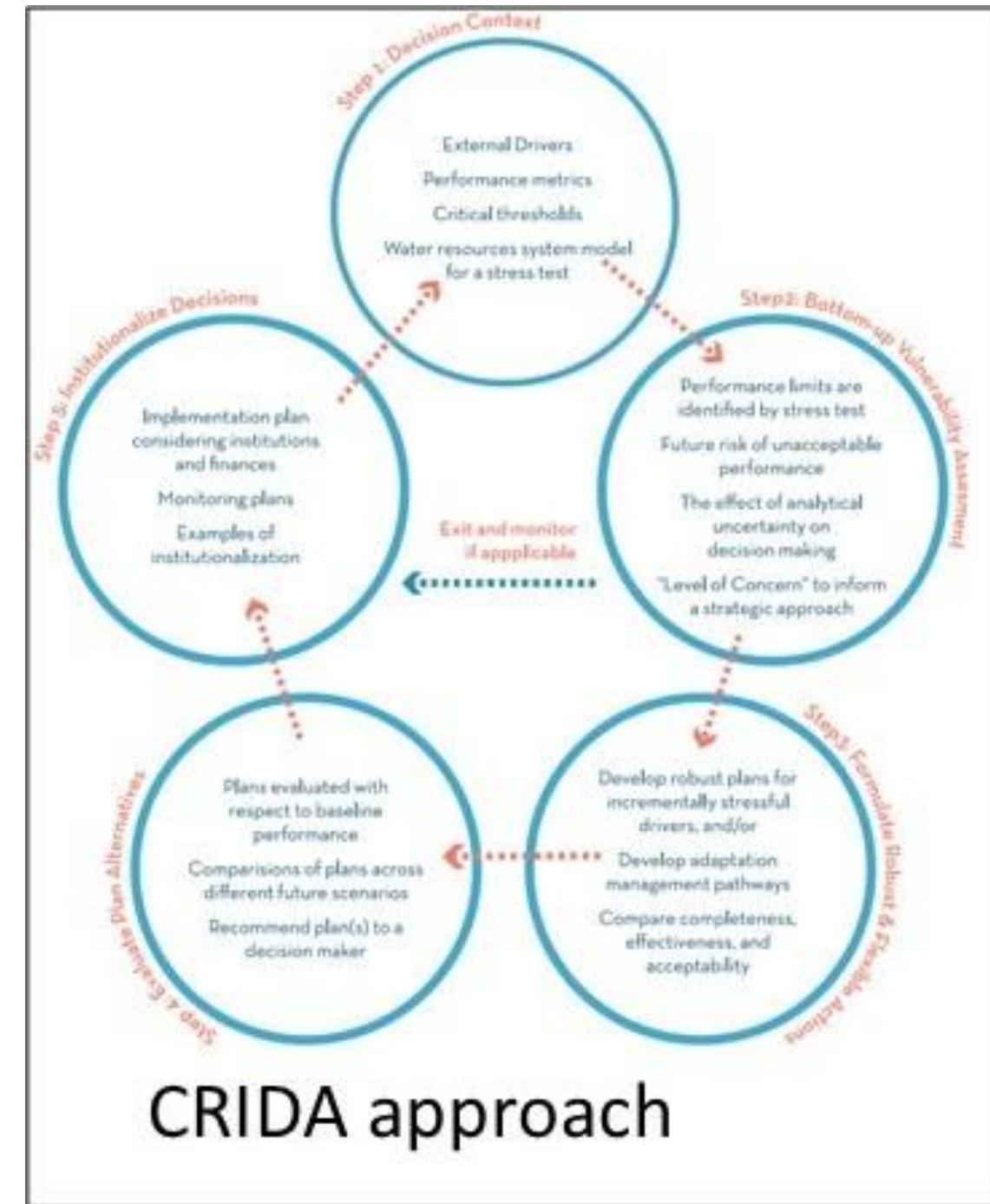
Source: Defensoría de Bolivia



Source: Guardiana Bolivia

**Challenges of
pollution, droughts and
floods**

**Our goal...
Implement UNESCO's
CRIDA framework.**



STEP 0: Community engagement through citizen science

STEP 1: Decision context

STEP 2: Vulnerability assessment

STEP 3 : Formulate robust actions

STEP 4: Evaluate alternatives

STEP 5: Institutionalise decisions

Step 0 Citizen science

- High school Chojasivi
- Water quality monitoring

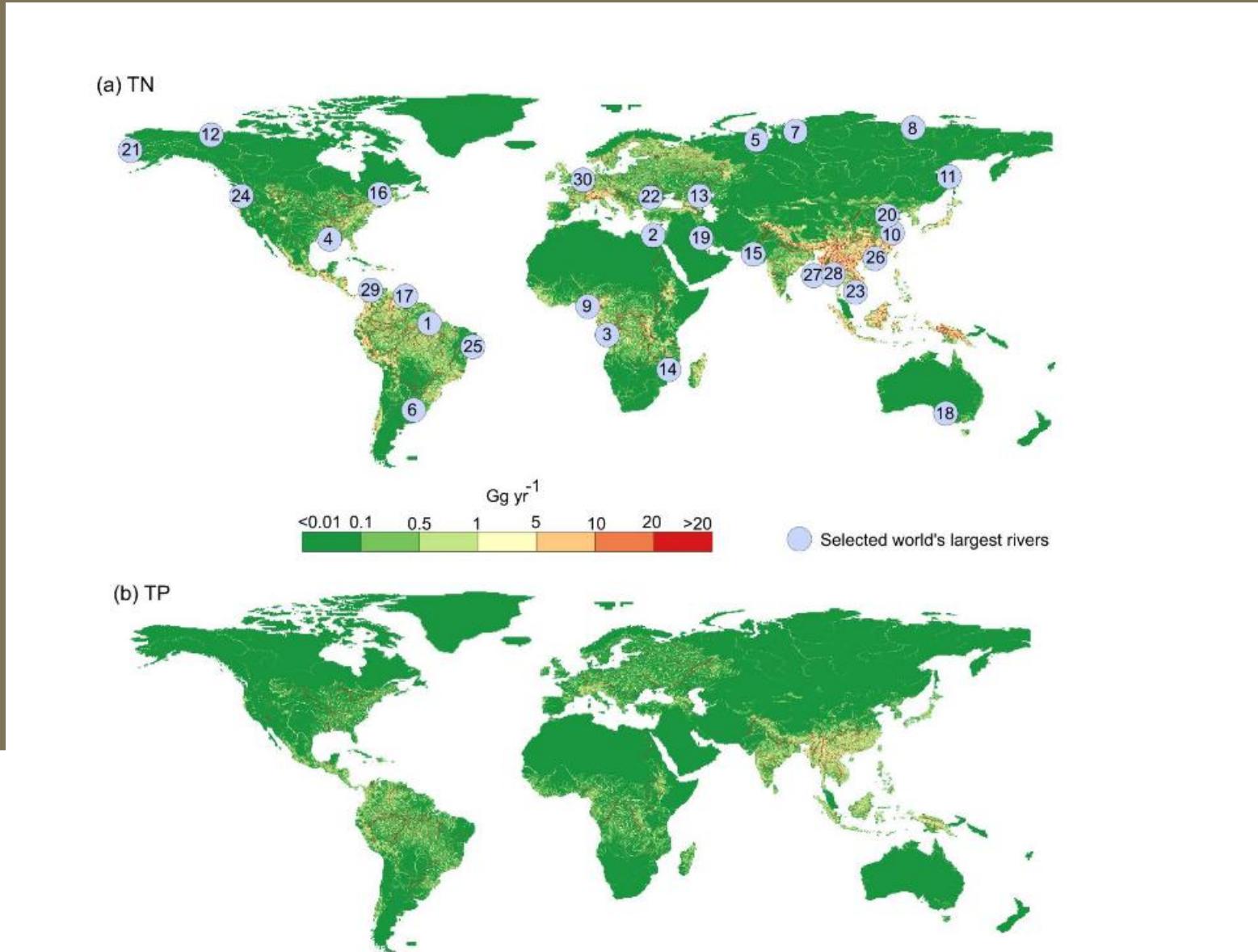


Step 1-2: Identification of current problems

- Collaborative, and participatory workshop

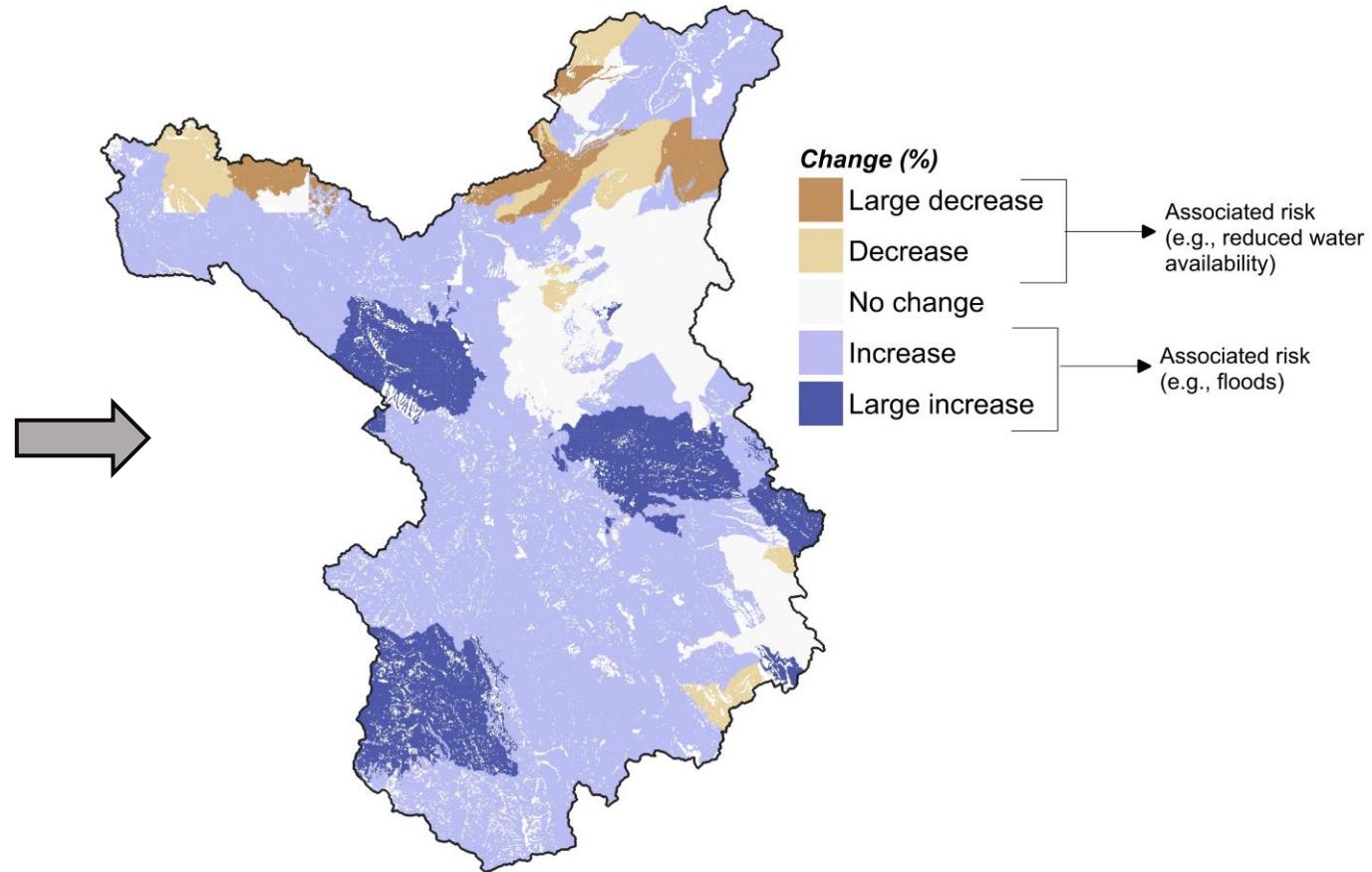
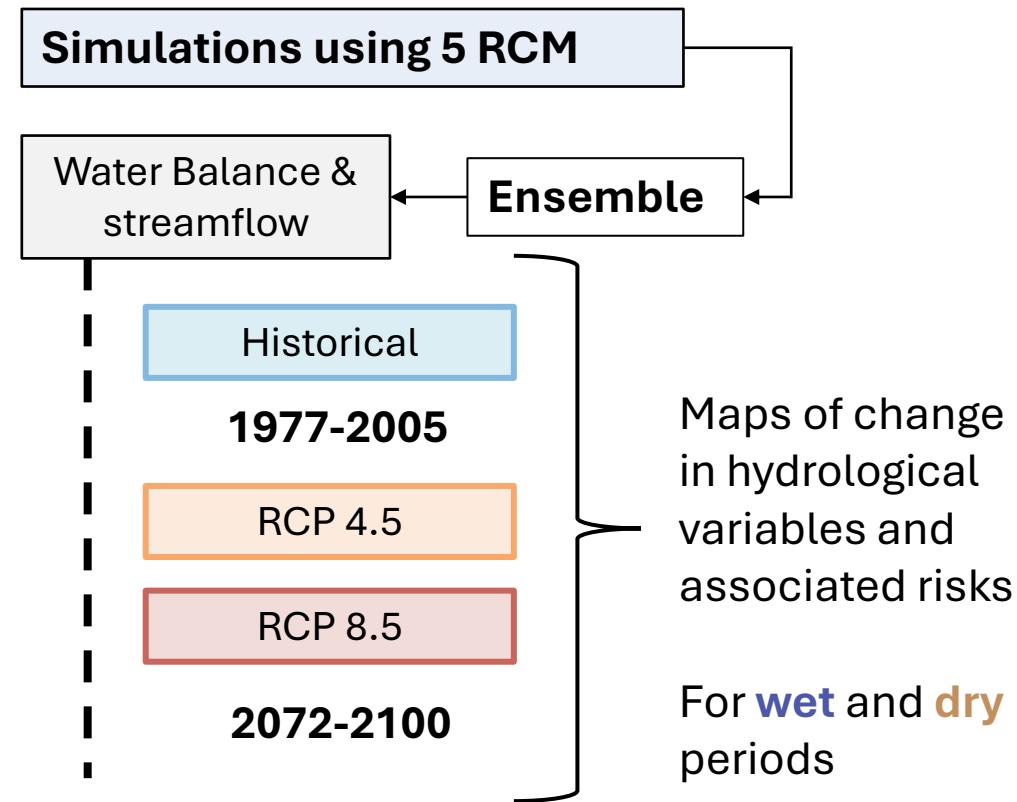


Open Software: CoSWAT-WQ v1.0

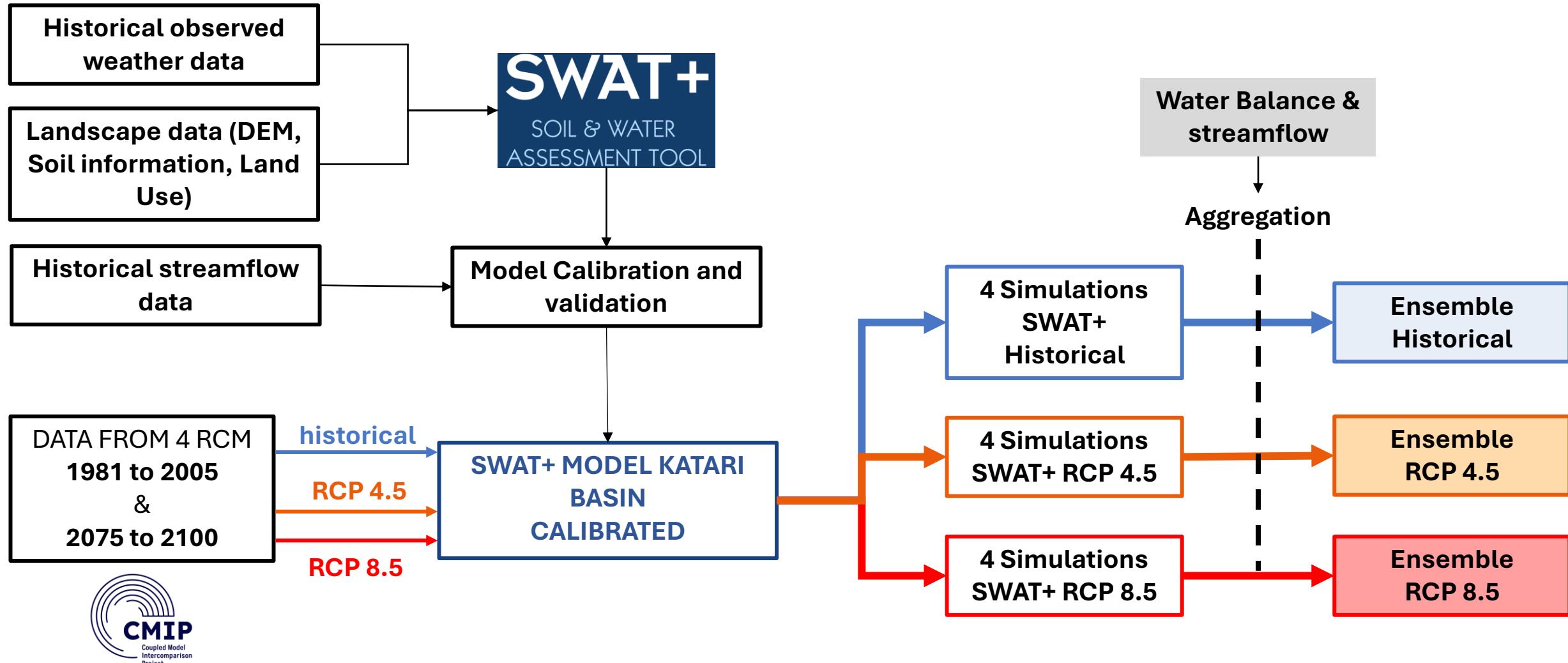


Universiteit Brussel

Workflow: Future scenarios for vulnerability assessment

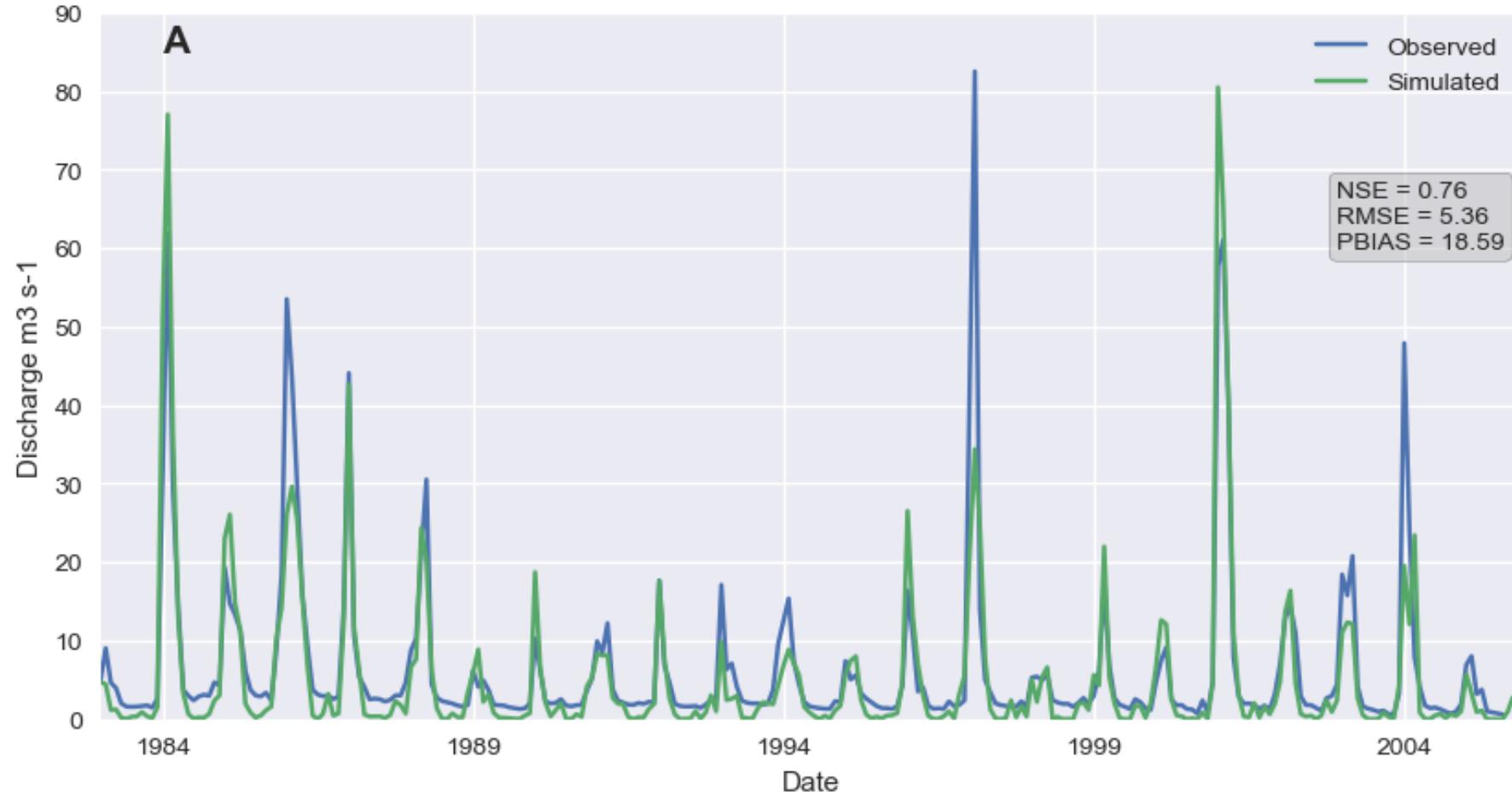


Workflow: Future scenarios for vulnerability assessment



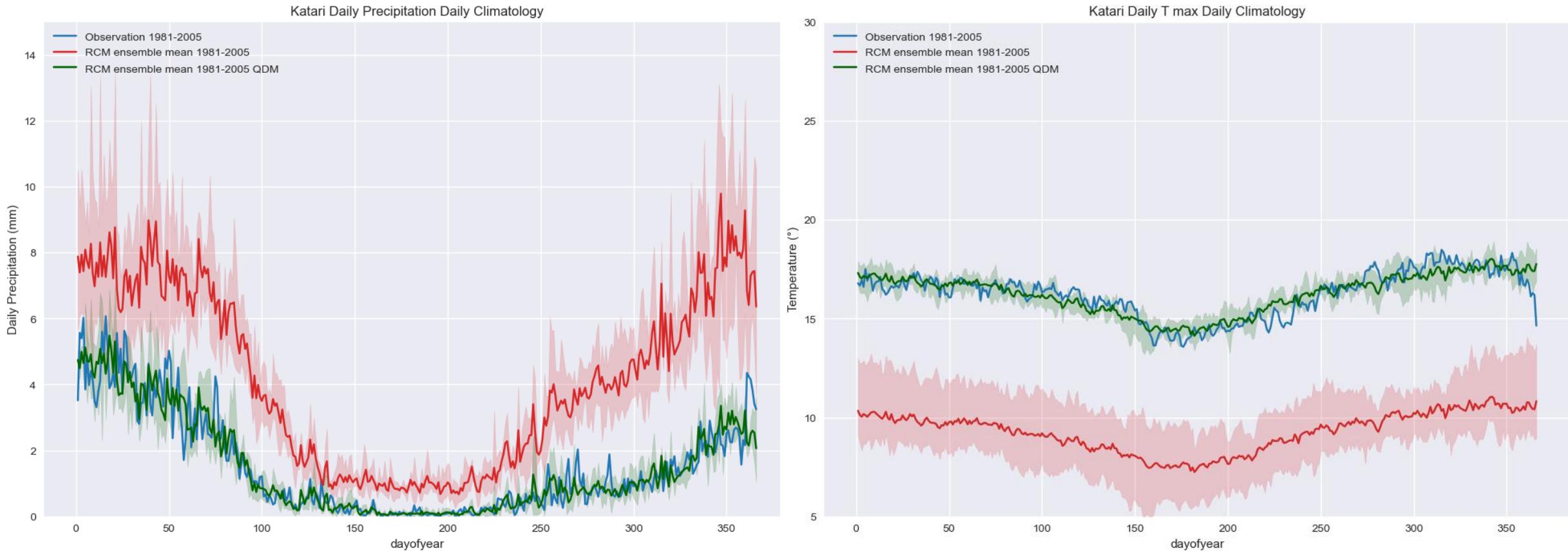
Extra → Model calibration

At Tambillo: Gaging station near outlet



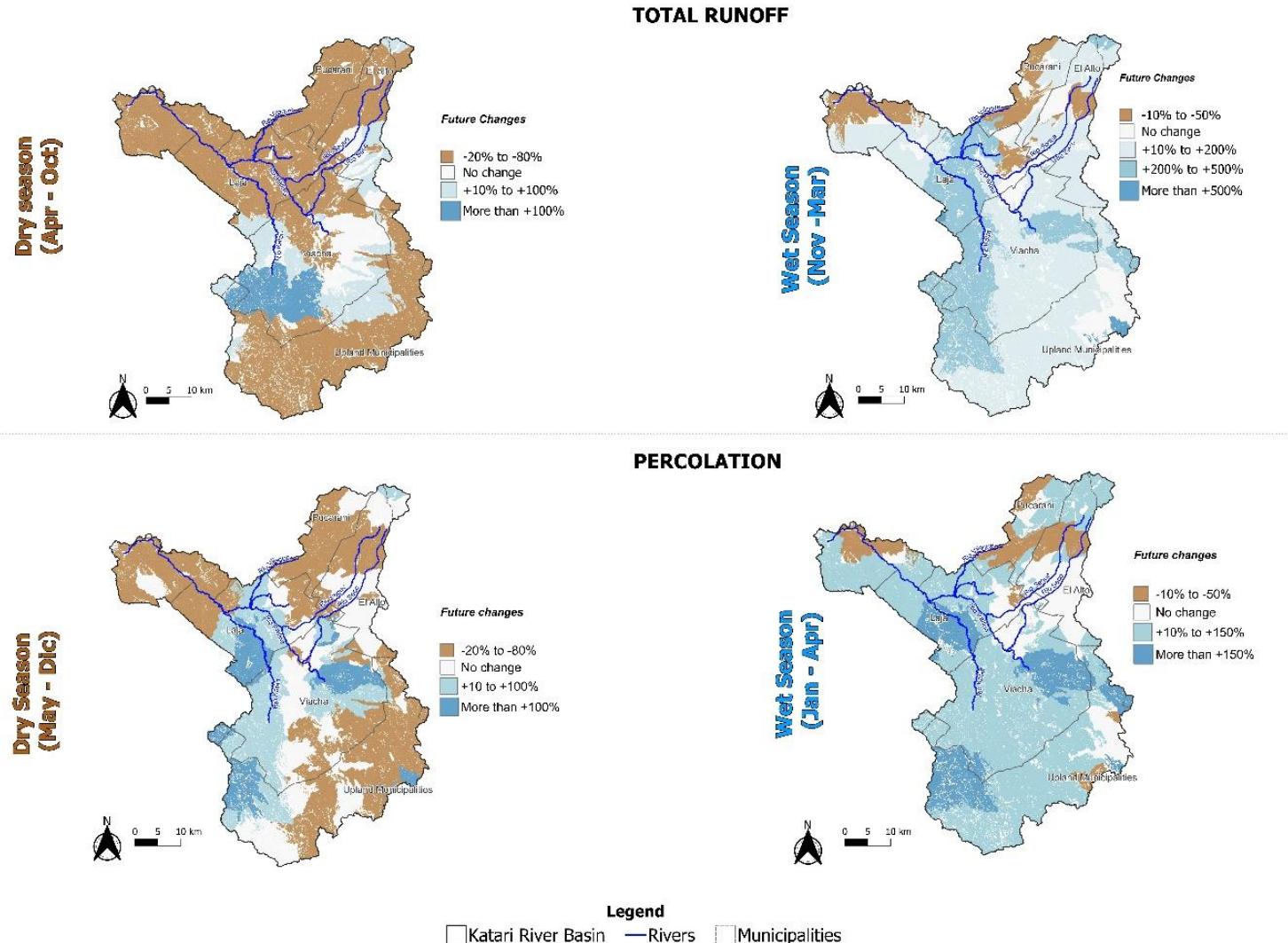
Extra → Bias correction of RCM data

- Bias correction (Quantile Delta Mapping): Using historical precipitation and temperature data.



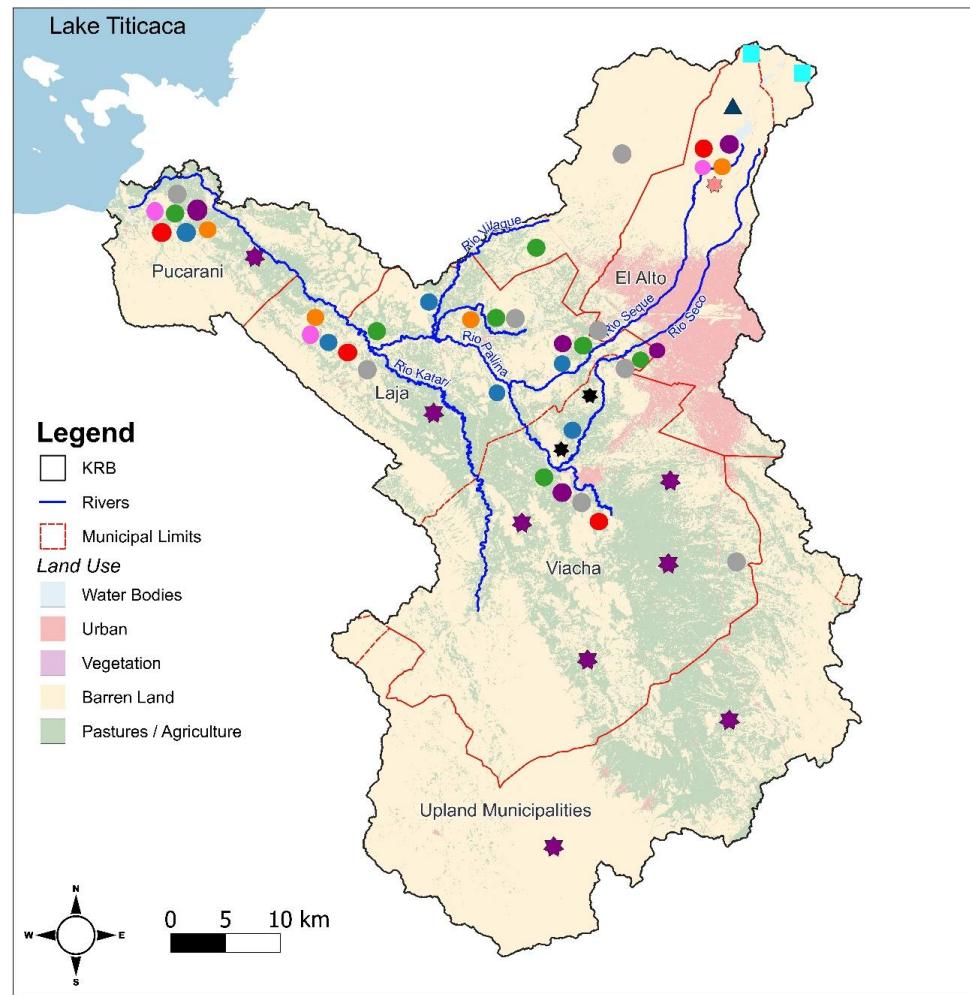
Step 1-2: Climate impact/stress test using CoSWAT-WQ

SPATIAL
DISTRIBUTION OF
MEAN CHANGES
IN DRY AND WET
SEASON FOR RCP
4.5



Step 1-2: Vulnerability assessment

- Collaborative, and participatory works
- Presentation of results about future scenarios



Step 3-4: Co-creation of adaptation pathway

- Infrastructures
- Nature based Solutions



Results: Identification of problems

- Collaborative, and participatory workshop



Spatial identification challenges



Will to collaborate within sectors

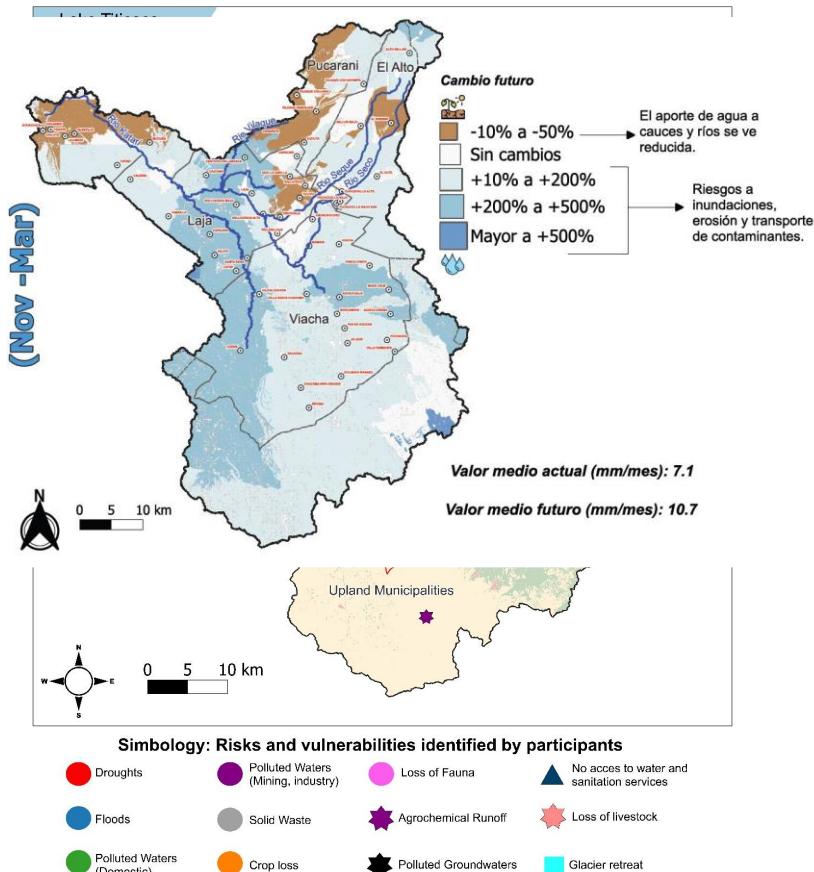


Could not define indicators



Results: Vulnerability assessment

- Presented results on workshop
- Stakeholders defined vulnerabilities by area



Quantified future impacts



Reusable tool throughout CRIDA



Ambiguity on identifying vulnerabilities





Results

- Increased community **interest and awareness**.
- Community engagement.
- Empowered youth engagement.
- Increased contemporary environmental literacy.
- Potential policy implications.
- Co-creation of solutions

Conclusion

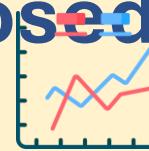
- Scientists, NGO's communities and government need to work together to co-create robust solutions

Future work

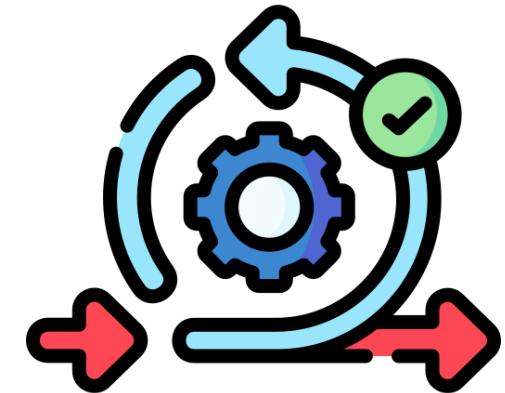
Define adaptation
strategies collaboratively



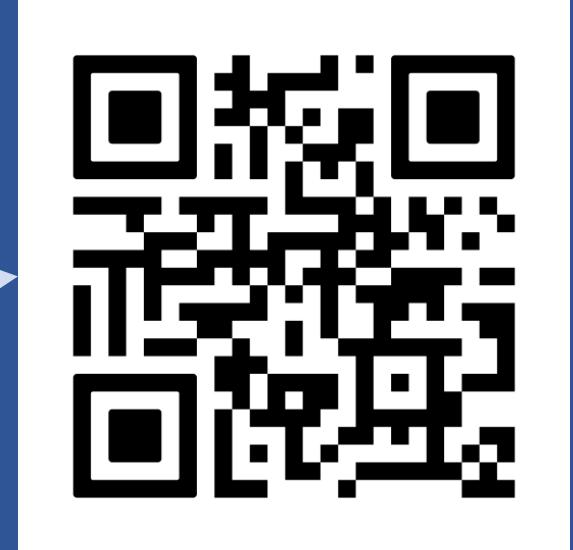
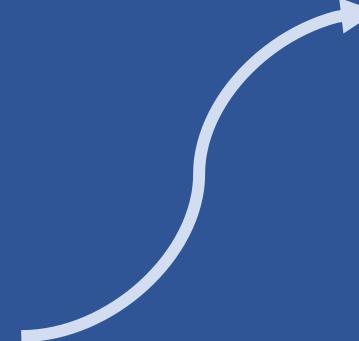
Evaluate uncertainties and proposed
scenarios



Application for Green Climate Fund



Thank you!



Check our video in the supplementary material

Link to GitHub Repository: <https://github.com/jopator/SWATPlusForCRIDA>



WATER AND CLIMATE
DEPARTMENT

Extra → Dealing with uncertainty (CRIDA)

Be explicit about analytic uncertainty in relation to indicators and thresholds.
Compare scenarios:

KNMI Climate Scenarios					
	GL	GH	WL	WH	
Damage Threshold	Mid-term (2050)	X	X	X	X
	Long-Term (2085)	X	X	X	X
Recovery Threshold	Mid-term (2050)	X			X
	Long-Term (2085)		X	X	X

Table 2.1. Climate scenarios in the Waas River Basin. Scenarios that surpass thresholds are denoted by X.

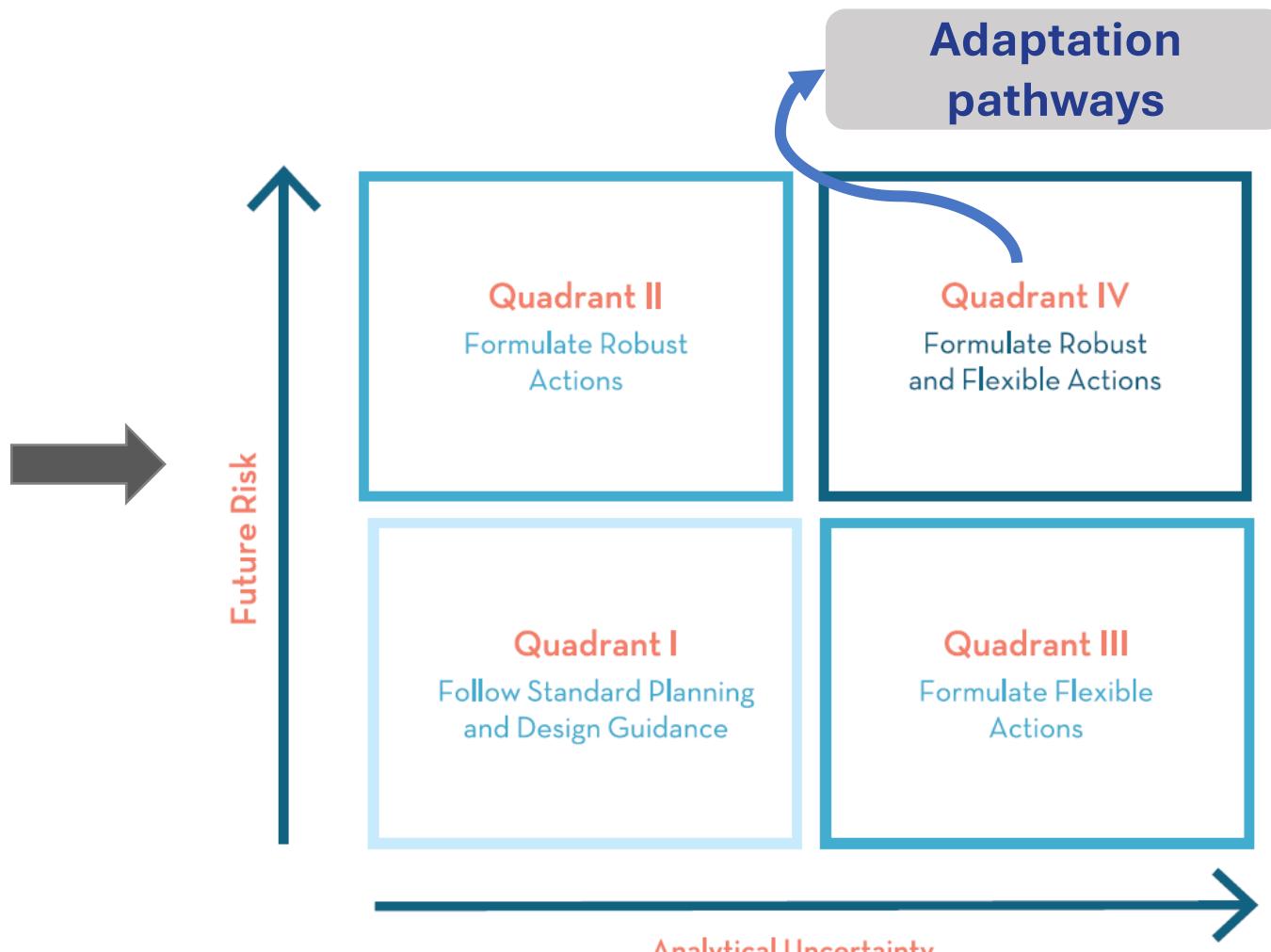
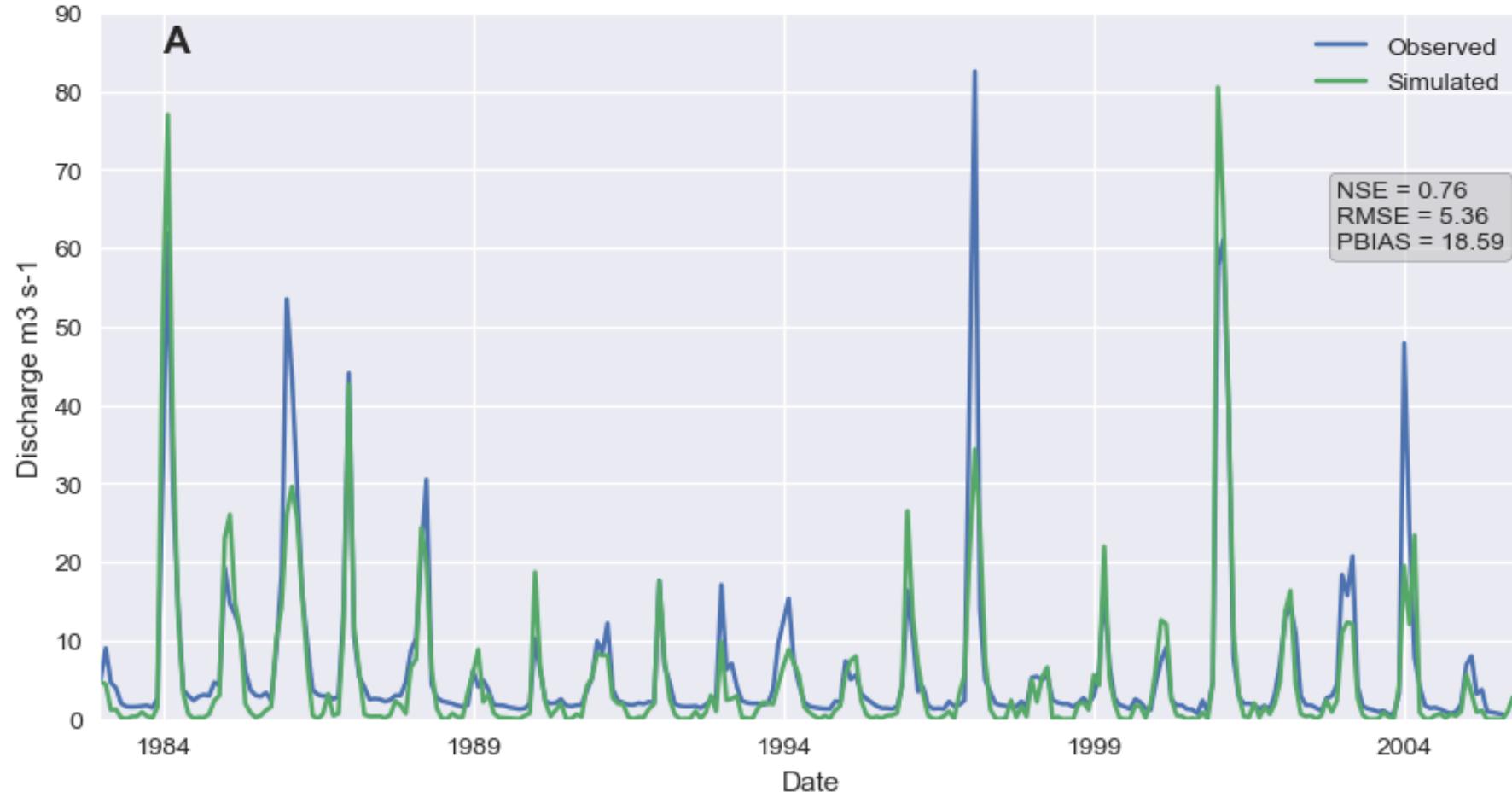


Figure 3.1. The decision matrix distinguishes levels of uncertainty relative to the severity of future risks.

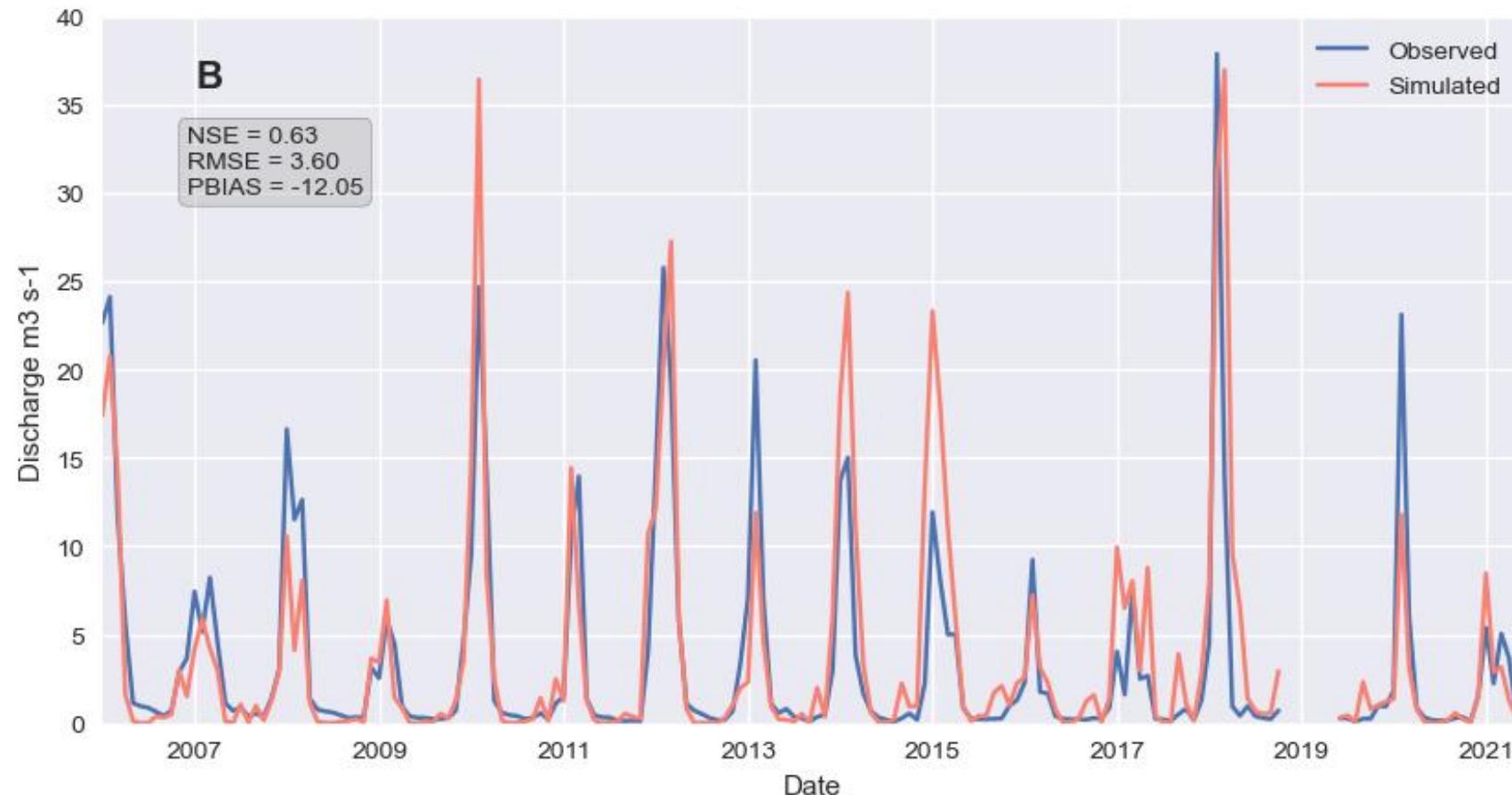
Extra → Model calibration

At Tambillo: Gaging station near outlet



Extra → Model validation

At Tambillo: Gaging station near outlet



Extra → Bias correction of RCM data

- Bias correction (Quantile Delta Mapping): Using historical precipitation and temperature data.

