HYDROLOGICAL ECOSYSTEM SERVICES FROM CONSTRUCTED AGRICULTURAL WETLANDS – NOW AND IN THE FUTURE

Land Use and Water Quality: Agriculture and the Environment 2025
Aarhus, June 3rd of 2025

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"[…] current knowledge of the interseasonal and interannual variability of the land surface water storage cycle at the regional to global scales is still rather incomplete […]"

(Frappert et al., 2008)

RESEARCH AIM

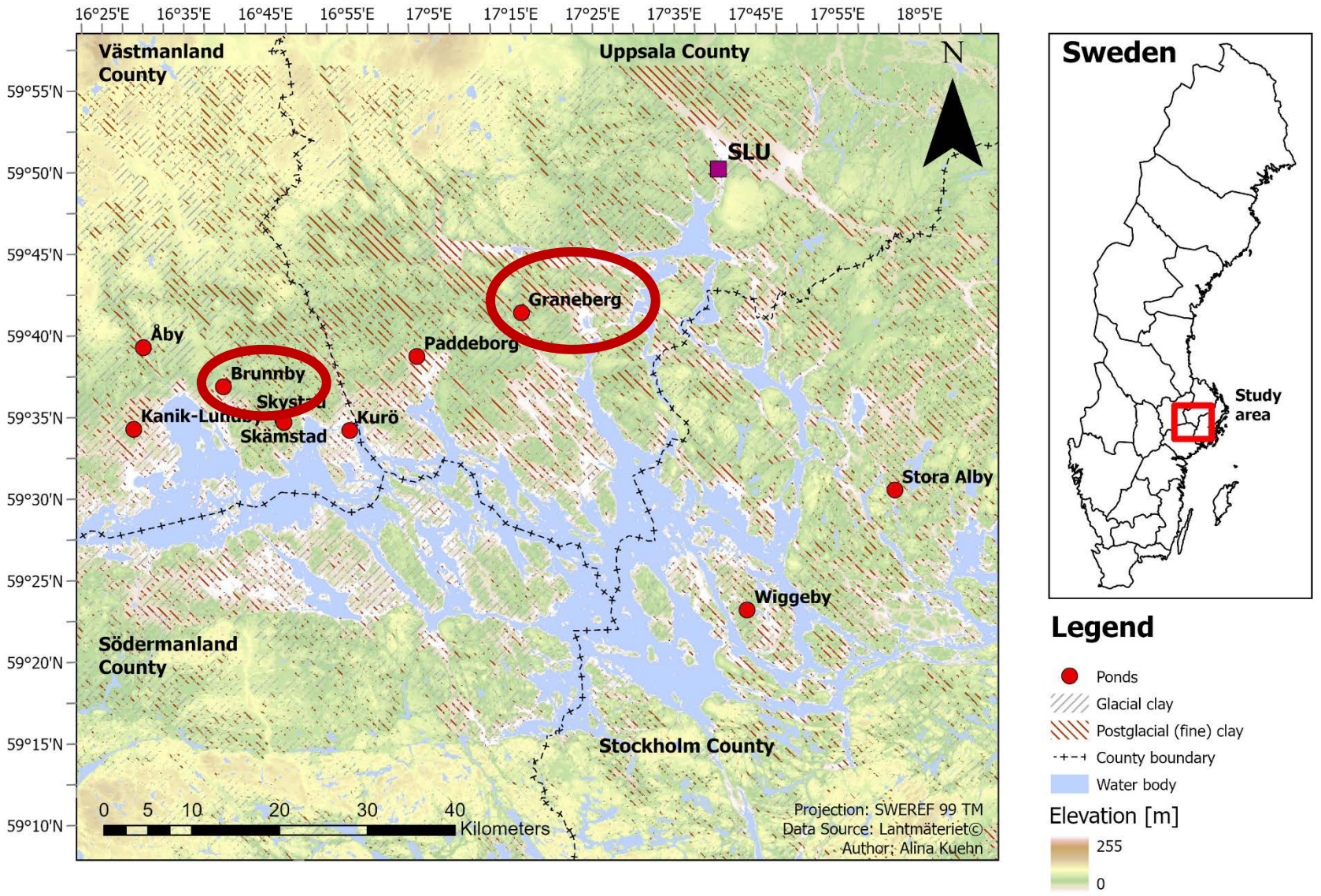
Use **water level** as **proxy** for water storage capacity and assess if constructed wetlands can simultaneously contribute to **multiple hydrological ecosystem services** now and in a changed climate.

RESEARCH OBJECTIVES

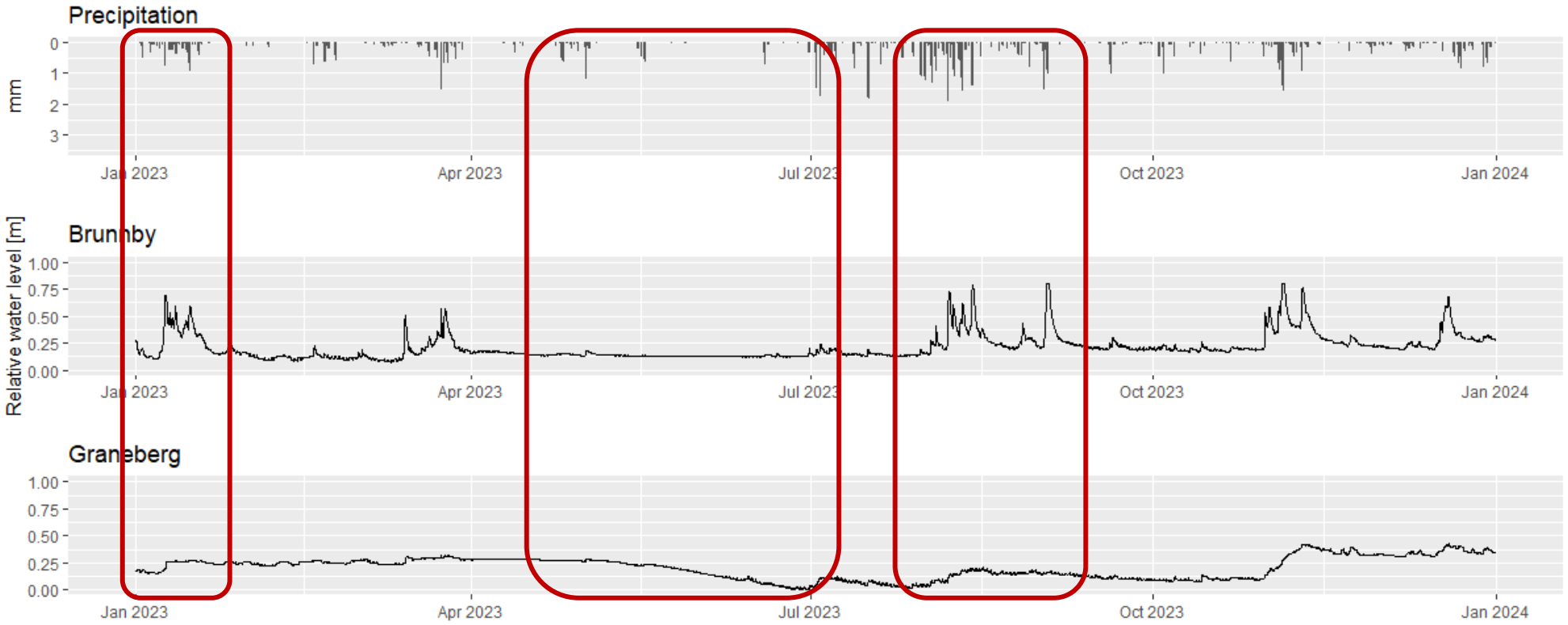
Developing an **innovative and simple approach** to model possible **climate scenarios** in the future.

Assessment of constructed wetland's **response to precipitation** under different potential future scenarios.

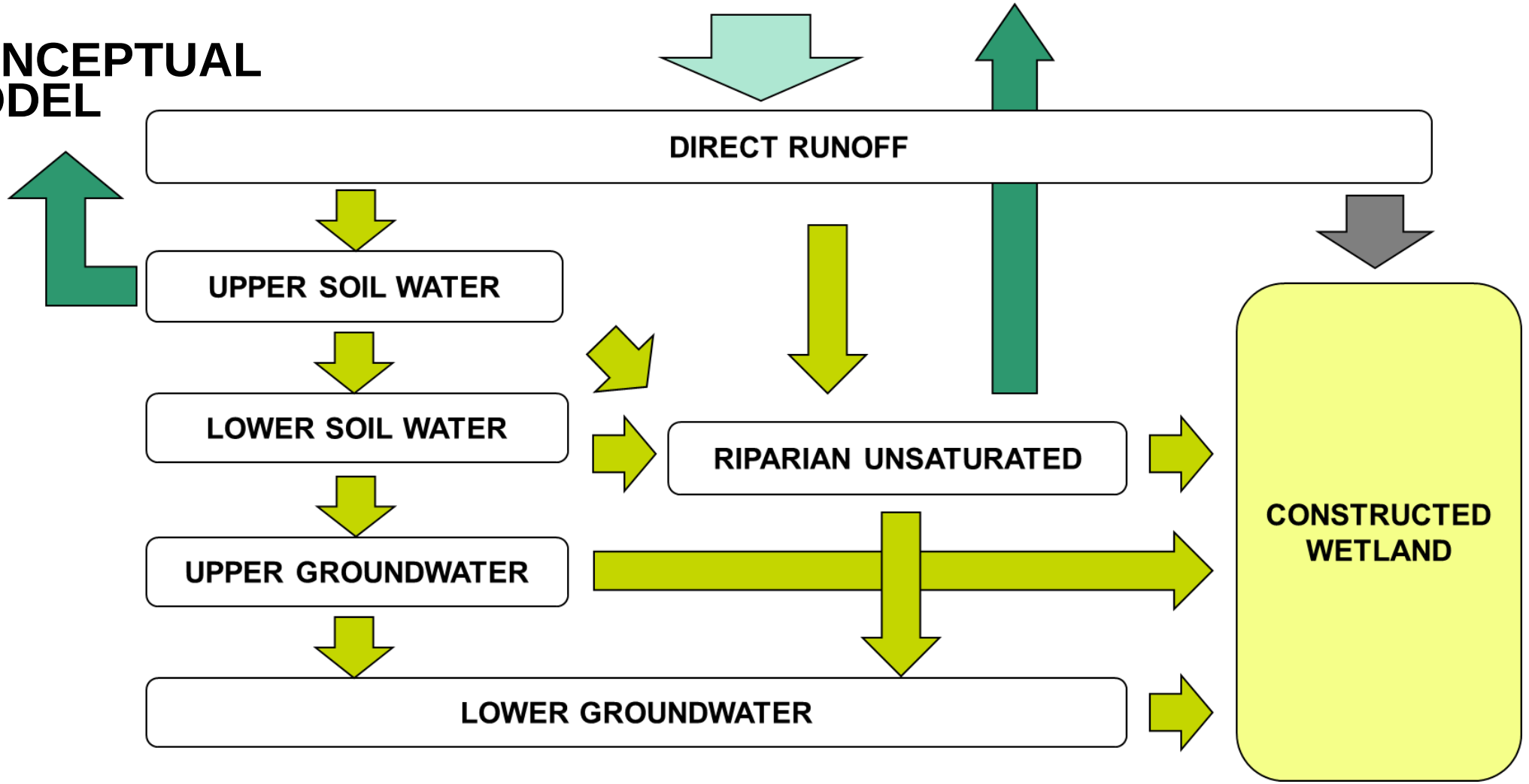
STUDY SITE


16°25'E
16°35'E
16°45'E
16°55'E
17°5'E
17°15'E
17°25'E
17°35'E
17°45'E
17°55'E
18°5'E
59°55'N
59°50'N
59°45'N
59°40'N
59°35'N
59°30'N
59°25'N
59°20'N
59°15'N
59°10'N
Västmanland County
Uppsala County
Södermanland County
Stockholm County
N
SLU
Graneberg
Åby
Paddeborg
Brunnby
Skyst
Kanik-Lund
Skämstad
Kurö
Stora Alby
Wiggeby
0 5 10 20 30 40
Kilometers
Projection: SWEREF 99 TM
Data Source: Lantmäteriet©
Author: Alina Kuehn
Sweden
Study area
Legend
Ponds
Glacial clay
Postglacial (fine) clay
County boundary
Water body
Elevation [m]
255
0

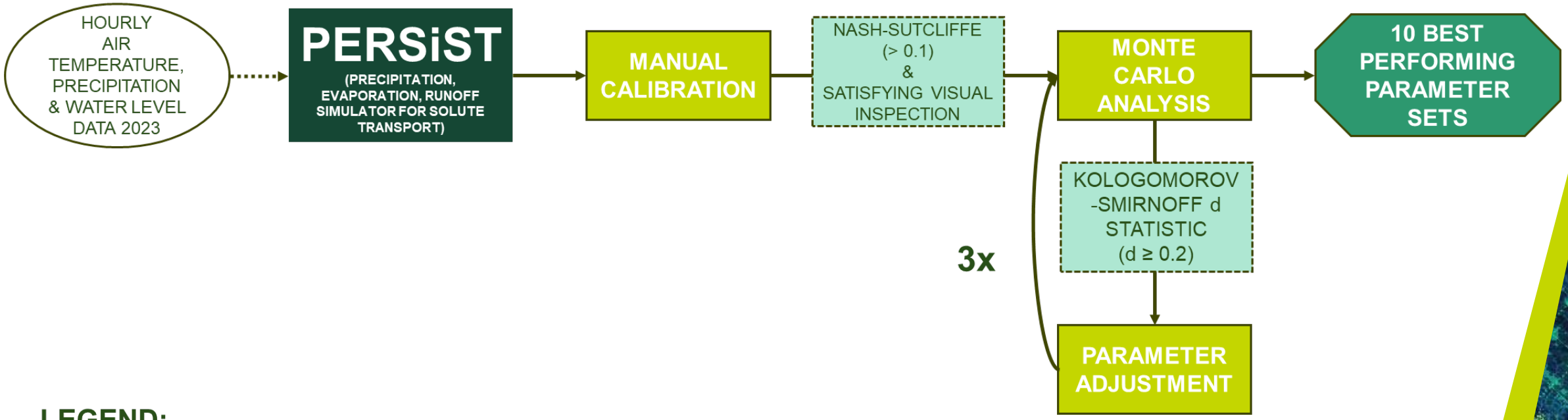
WATER LEVEL MEASUREMENTS



CONCEPTUAL MODEL

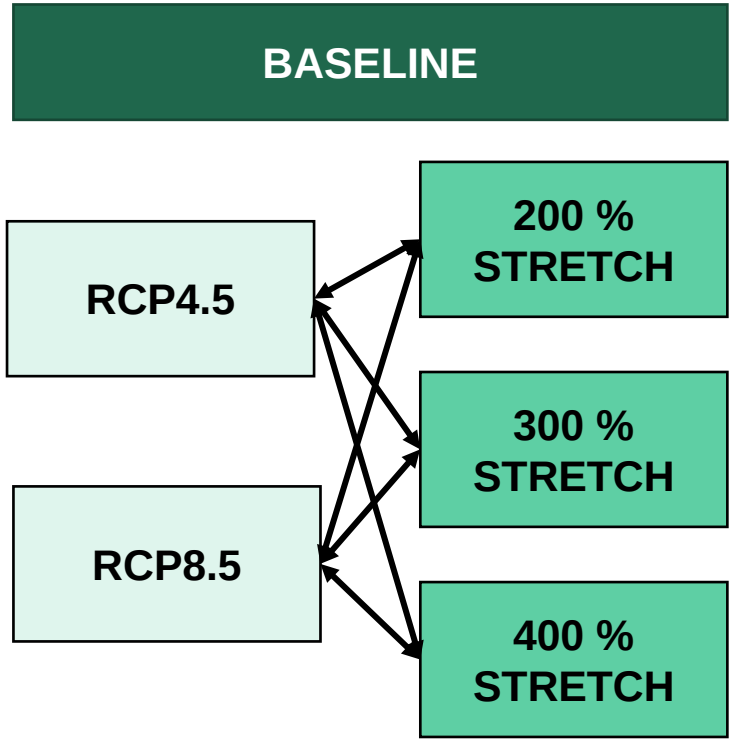


MODEL WORKFLOW

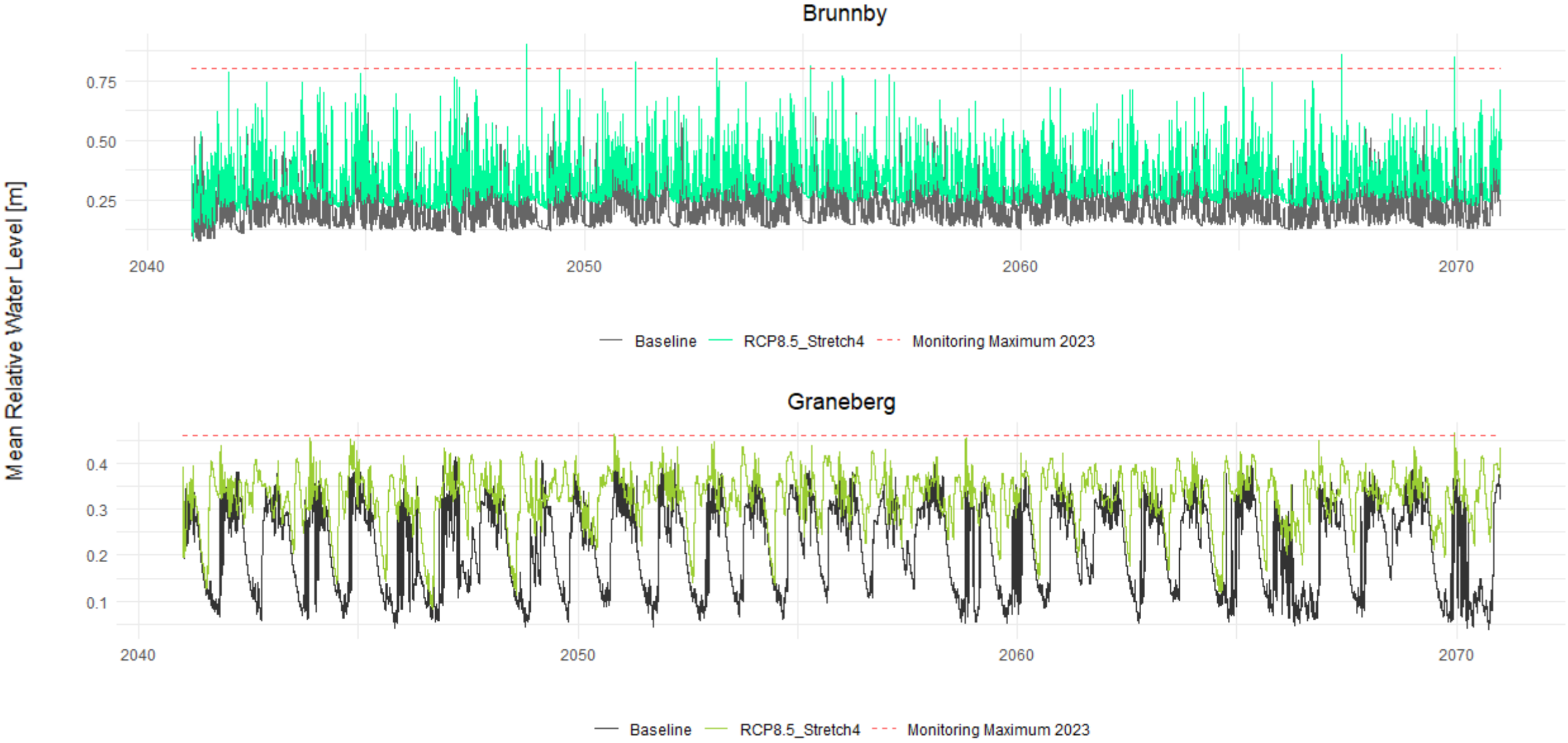


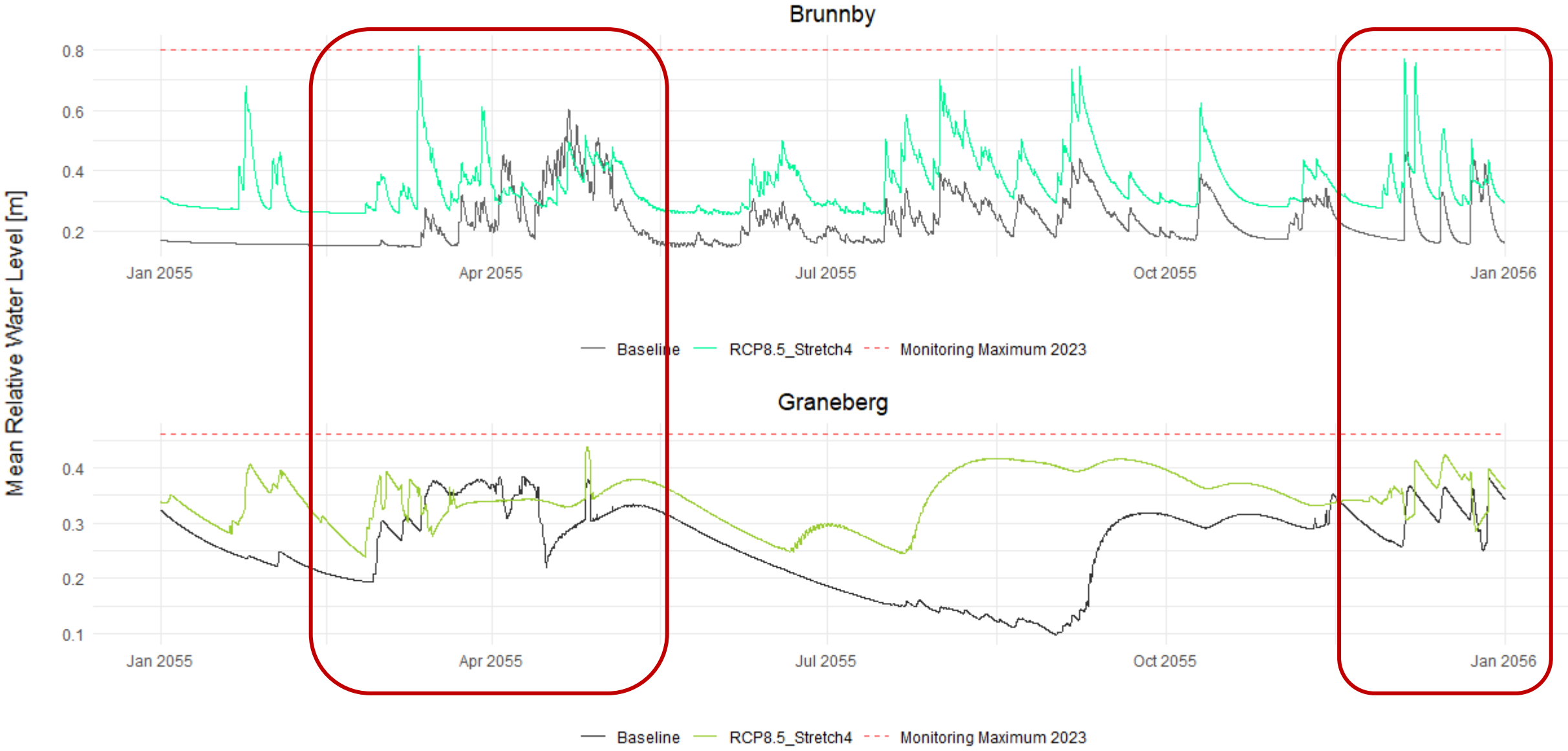
CLIMATE SCENARIOS

- Baseline scenario
  - ERA5-Land data for **1971-2000**
- RCP4.5 & RCP8.5
  - **Delta shift**
- Precipitation stretches
  - Simulation of **more extreme** precipitation events



∑ 12 SCENARIOS


Brunnby
Mean Relative Water Level [m]
0.75
0.50
0.25
2040
2050
2060
2070
Baseline
RCP8.5_Stretch4
Monitoring Maximum 2023
Graneberg
0.4
0.3
0.2
0.1
2040
2050
2060
2070
Baseline
RCP8.5_Stretch4
Monitoring Maximum 2023


Brunnby
Mean Relative Water Level [m]
0.8
0.6
0.4
0.2
Jan 2055
Apr 2055
Jul 2055
Oct 2055
Jan 2056
Baseline
RCP8.5_Stretch4
Monitoring Maximum 2023
Graneberg
0.4
0.3
0.2
0.1
Jan 2055
Apr 2055
Jul 2055
Oct 2055
Jan 2056
Baseline
RCP8.5_Stretch4
Monitoring Maximum 2023

ASSESSMENT OF RESPONSE TO PRECIPITATION

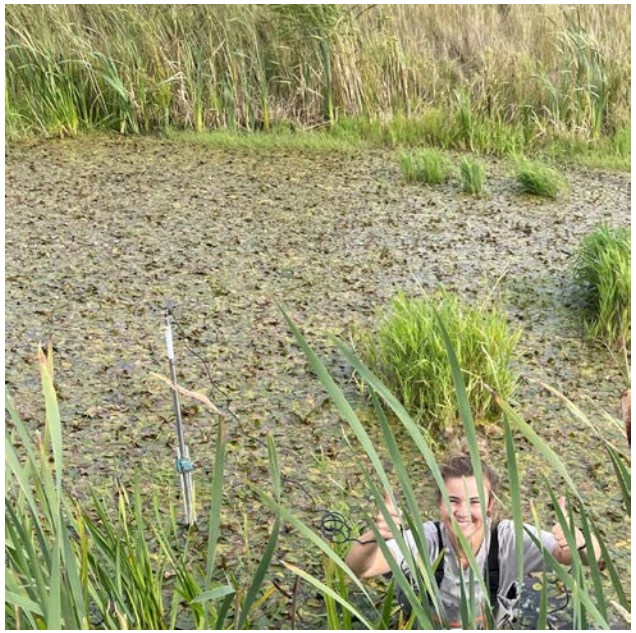
- Response to precipitation events
  - **Location** in landscape
  - Pond **design** & **relative area** of CW
  - **Interactions** with other **(sub)surface water bodies**

CONCLUSION

- Results indicate **resilience** to climate change
  - Potential to buffer **extreme events** & maintain **biodiversity**

(Åhlén et al., 2022, Thorslund et al., 2017)

NEXT STEPS



- Improve **model output**
- Create simple approach to **simulate droughts**

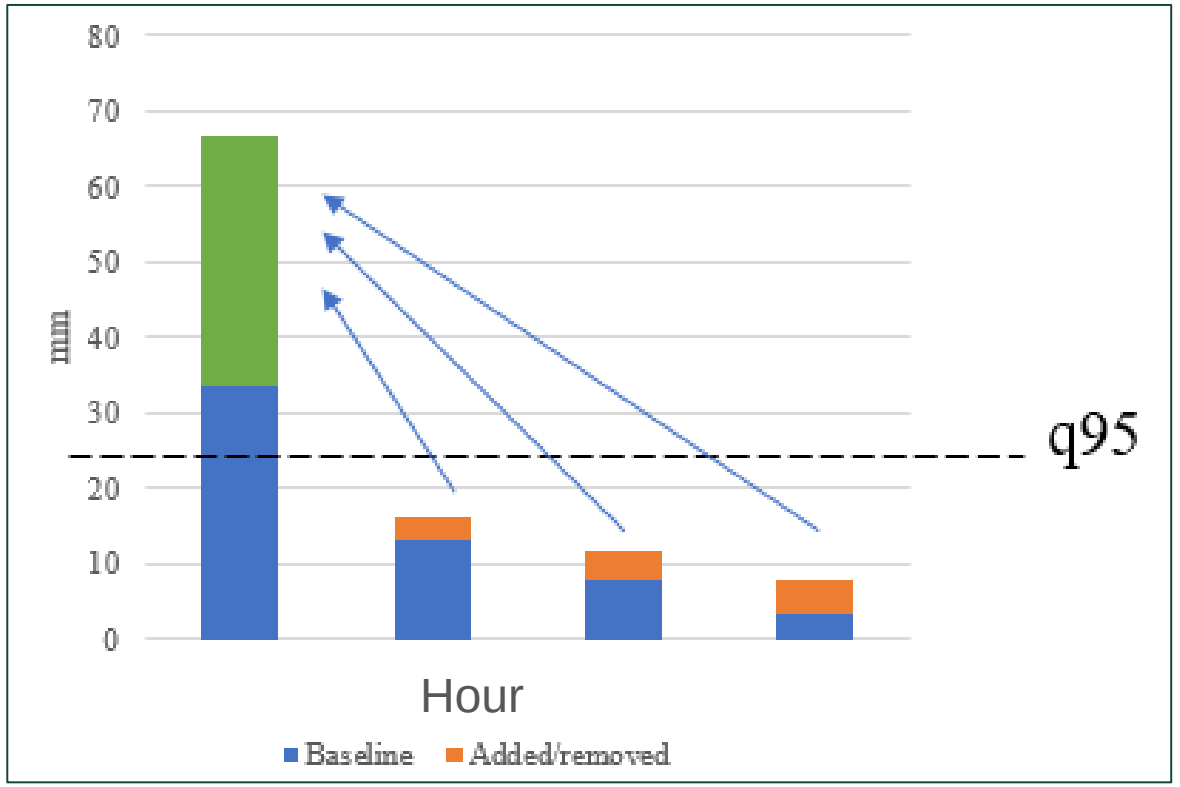
THANKS FOR YOUR ATTENTION

In case you want to reach out:

alina.kuehn@slu.se or **LinkedIn**

PRECIPITATION STRETCHES

- Adaptation of precipitation amount of **extreme precipitation hours (= precipitation > 95th percentile)** & non-extreme precipitation hours
  - Increase by constant percentage & decrease by substracting
  - Stretches can be chosen arbitrary & according to user‘s interest



Conceptual figure of redistribution of precipitation adapted from Laguna Marín, Futter & Lannergård (n.p.)

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