Biodiversity Decline - Sweden

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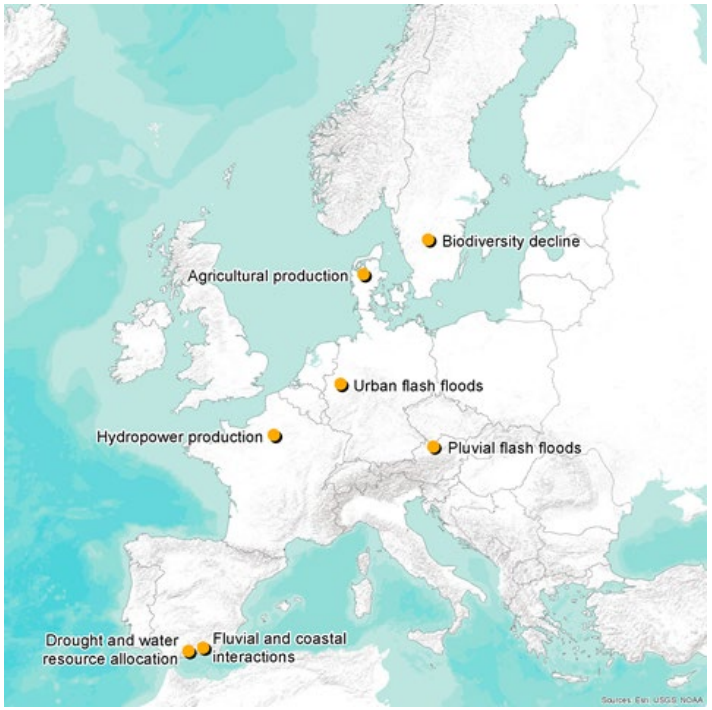
Issue to be addressed

- Jönköping county administration works as a policy maker of environmental protection who has the responsibility to detect changes in ecosystems, and to document them.
- As Jönköping county administration decides and implements environmental regulations in a changing climate, there is a need for information on different climate indicators.



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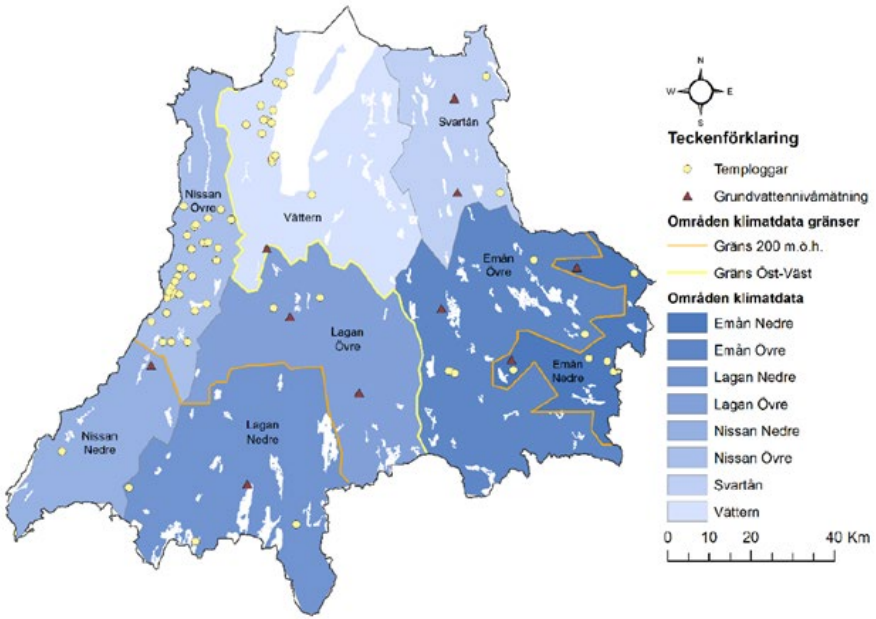
Issue to be addressed

- Biodiversity in an area can be impacted by climate change, leading to changes in species diversity and availability. This can affect ecosystem resilience, which can in turn lead to changes in available resources (e.g. drinking water) and recreational activities.
- Jönköping county has been divided into areas, for which different climate indicators are needed.



Figur 1. Indelning av delområden i Jönköpings med samt punktstationer i länet. Se även tabell 2.

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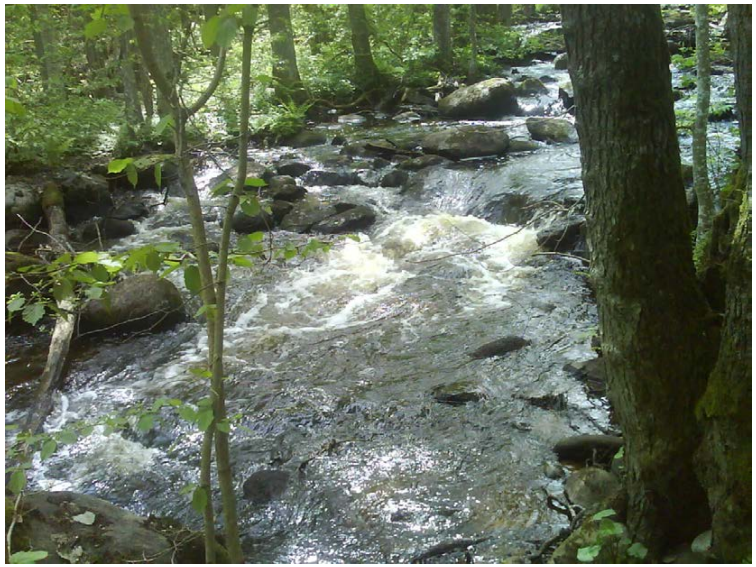
Decision Support to client

- The results will also be used in the environmental monitoring program at the County and is saved in databases together with other local data.
- The environmental monitoring program is shared within municipalities in the County.



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Previous experience with Climate Services

- Jönköping Länsstyrelsen has experience with:
  - Working with knowledge purveyor (SMHI) to use Pan-European climate impact indicators for water temperature. This was used as input to find information on lake stratification.
  - Getting data from national service (SMHI) to use in regional analyses

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Data needed for case study

- Categories of Indicators of interest (32 indicators in total):
  - Air temperature
  - Water temperature
  - Precipitation
  - Water discharge
  - Snow cover
  - Ground water level
  - Growing degree days

- Input data:
  - Euro-CORDEX (from C3S Global Impacts Service)

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Workflow

Step 1: Collect high-resolution Euro-CORDEX data (11km) for early, mid, late century climate projections.

Step 2: Conduct bias adjustment (exact procedure to be decided).

Step 3: Run S-HYPE model using Euro-CORDEX data as input.

Step 4: Post-process results to calculate the desired indicators.

Step 5: Communicate results with client, so changes between historical data and climate projections are understood.

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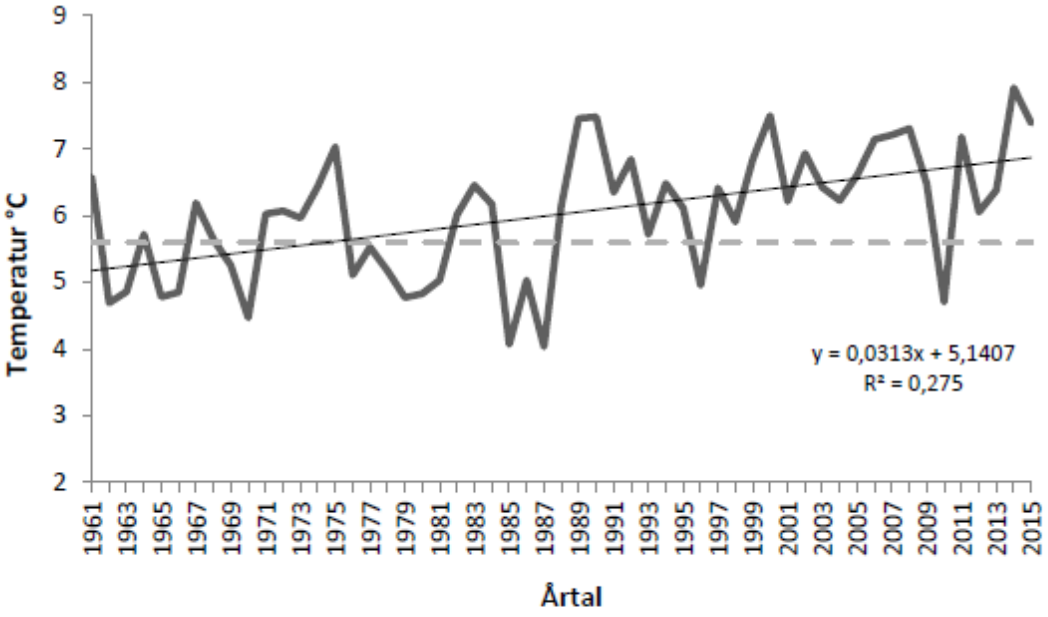
Workflow preliminary results

- Work is to begin in October on running the impact model
- Climate report from 2015, produced by Jönköping Länsstyrelsen shows that changes are occurring historically:
  - Temperature is increasing during 1961 - 2015



Figur 4. Årsmedeltemperaturen i Jönköpings län är ökande. Den streckade linjen visar årsmedelvärdet för hela referensperioden 1961-1990.

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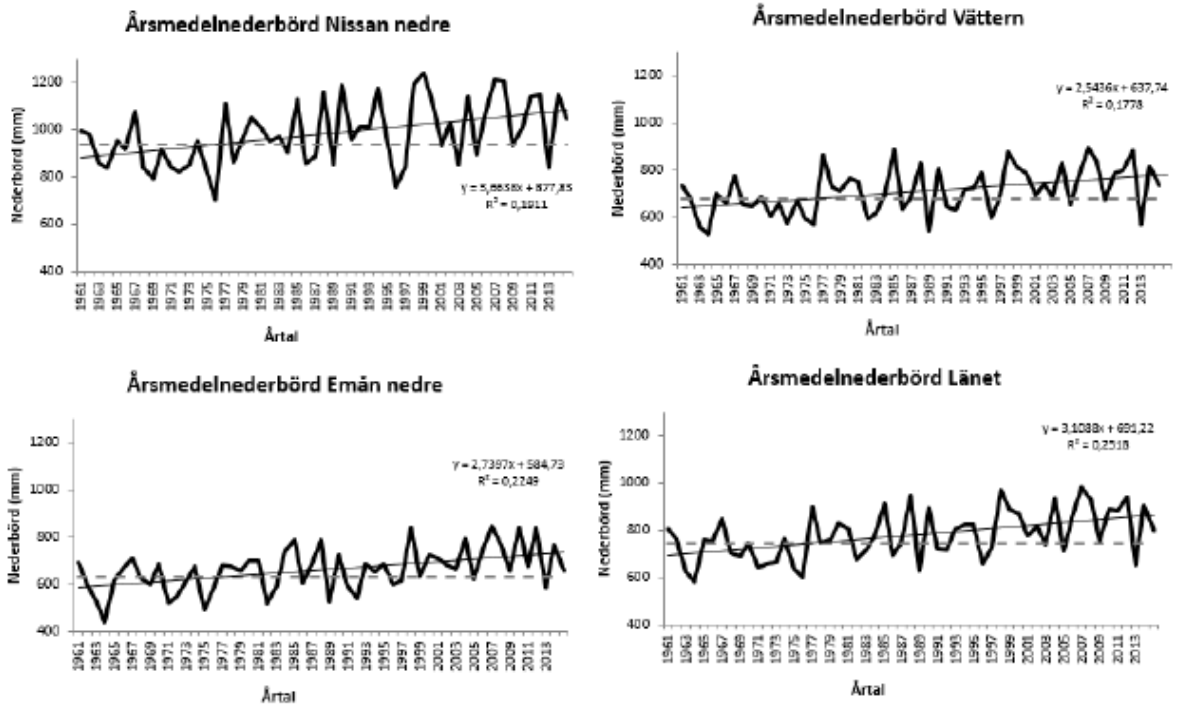
Workflow preliminary results

- Precipitation is increasing in several municipal areas of Jönköping from 1961 - 2015



Figur 15. Årsmedelnederbörden i tre delområden samt länet som helhet under åren 1961-2015. Samtliga delområden visar en trend av ökad nederbörd. De streckade linjerna visar medelvärdet för referensperioden 1961-1990.

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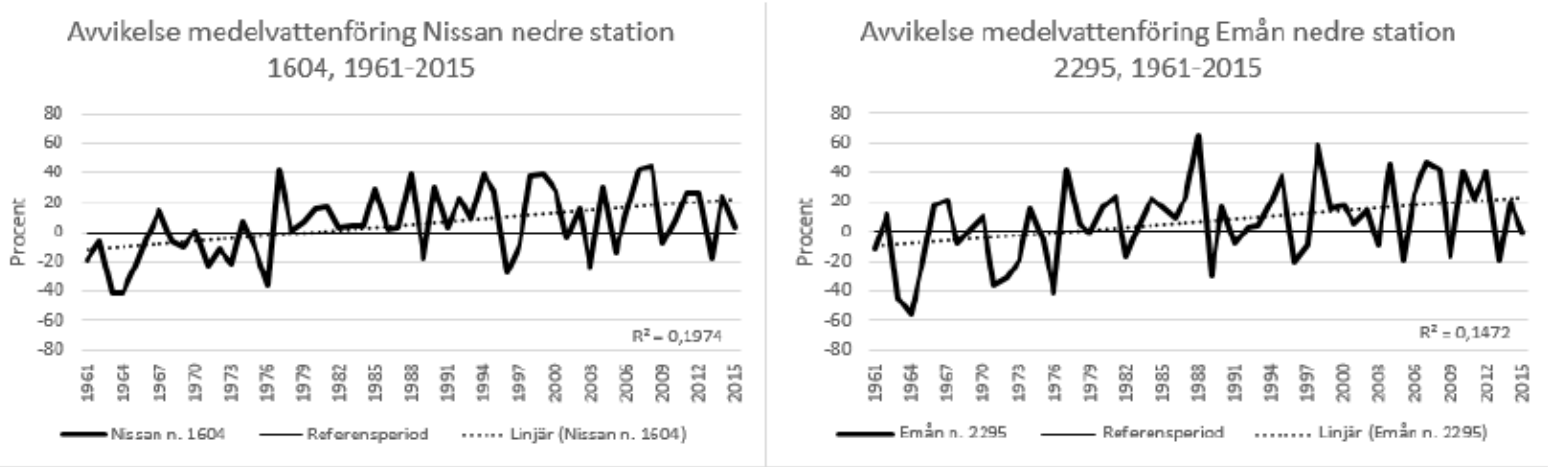
Workflow preliminary results

- Water discharge shows some increases in some parts of the county from 1961 - 2015



Figur 19. Den procentuella avvikelsen vid två modelleringspunkter i västra respektive östra delen av länet. Den streckade linjen visar årsmedelvärdet för hela referensperioden 1961-1990.

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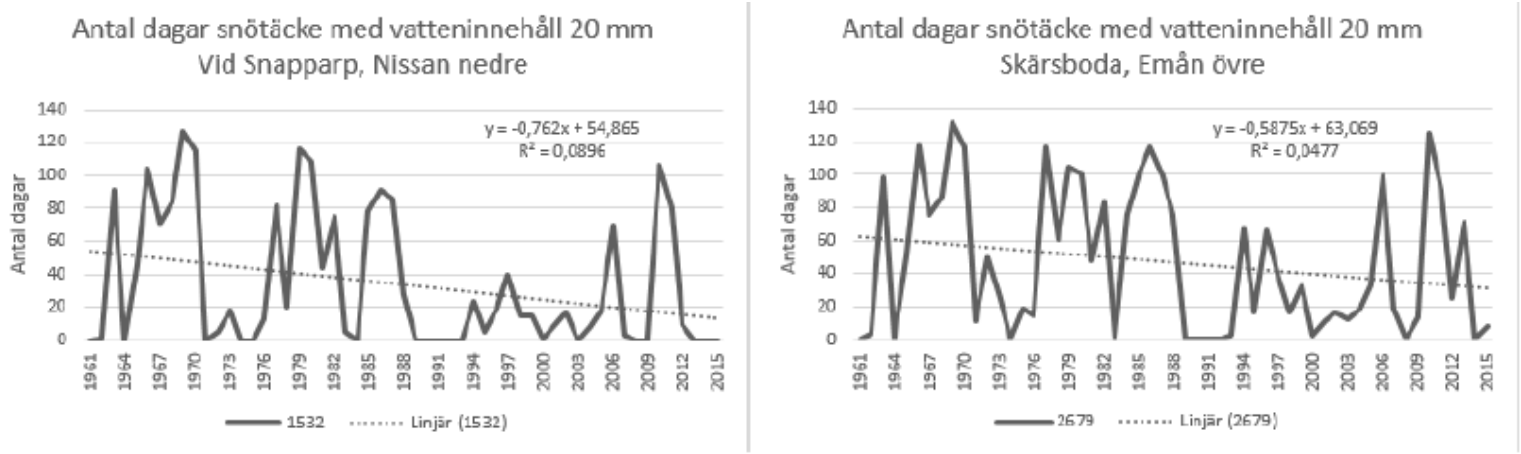
Workflow preliminary results

- Snow cover shows decrease in number of days in some areas from 1961 – 2015



Figur 21. Antalet dagar med snötäcke med vatteninnehåll 20 mm per år vid stationerna Snapparp och Skärsboda 1961-2015.

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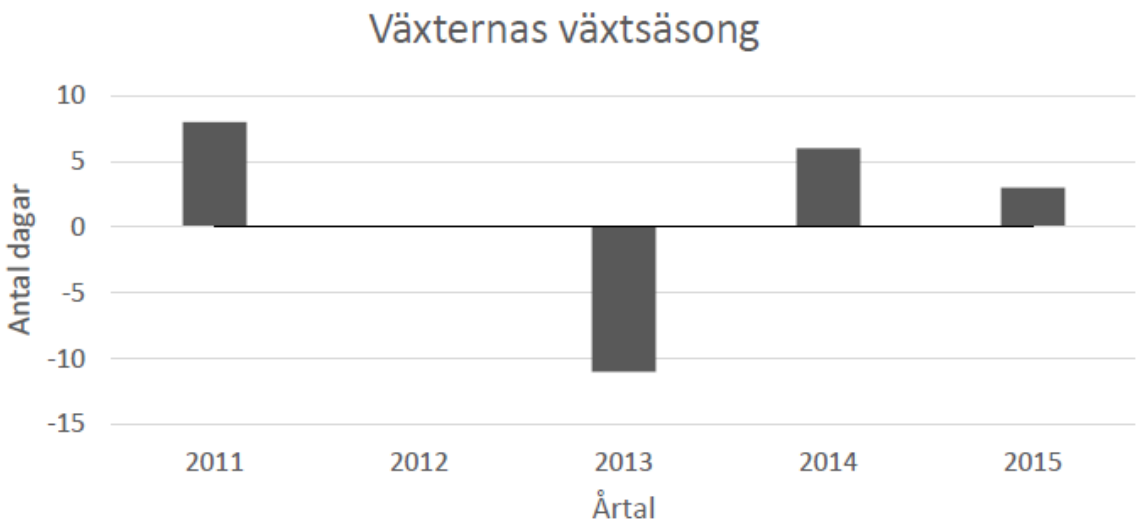
Workflow preliminary results

- Growing degree days show some change when compared to historical data but the direction is not clear



Figur 24. Diagrammet visar den genomsnittliga skillnaden i växtsäsongens längd (antal dagar) jämfört med referensvärdet för perioden 1873-1951. Ett positivt värde anger att växtsäsongen varit längre jämfört med referensperioden.

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What do these preliminary results mean for the clients climate issue?

- The results from historical data give a current state of affairs.

- Important to find out how the patterns change from here!
  - In 20 years
  - In 50 years
  - In 80 years

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What is the importance and relevance of adaptation in this case study?

- Jönköping county have to include climate change in future planning, state supervision, permission and environmental monitoring.

- In this case study focus is on giving Jönköping county more information of the magnitude of impact of different variables in the future. The results will help the client prioritize questions regarding biodiversity and environmental management.

- Adaptation to preserve and conserve biodiversity in different municipal regions is important because it is a pillar of healthy ecosystems which many people rely upon.

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What connections to different policies does this case study have?

- All policy makers at regional level have the responsibility to plan for a sustainable future in a changing climate. The method used in this study can hopefully be used by other counties or surveyors of the environment.

- Since 8th March, 2018, there is a climate change strategy implemented based on the Paris Agreement and Agenda 2030 goals:

    - Nationally – 'Develop a long-term sustainable and robust society that actively meets climate change by reducing vulnerabilities and taking advantage of opportunities.'

    - Regionally – 'A guide for the county's actors to actively respond to climate change and create a long-term, robust society and sustainable development.'

https://www.lansstyrelsen.se/jonkoping/stat-och-kommun/samhallsbyggnad/plan-och-bygg---pbl/klimatanpassning.html

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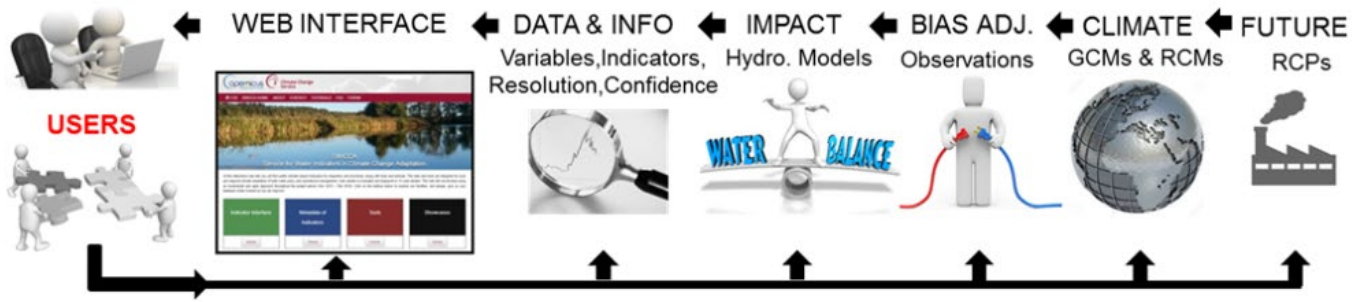
Which aspects for improvement in the climate service can be identified so far?

- More indicators can be added to interface
- Historical data can be added
- Further feedback to come as workflow progresses



Feedback loops in user-driven design, development, production and evaluation of climate services

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What work is remaining?

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What scientific publications are likely?

- Unsure
  - Climate impacts on biodiversity in a swedish county?
  - Contribution to a paper on case studies – How pan-European data was used at local level to support decision making?

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Final Conclusions and Case study status

- In summary:
  - One online meeting held, followed by email correspondence
  - Much work to be done, but it is clearly described and reasonably straight forward.

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