

Seminarium om kulturgrödor, SLU, Ultuna, måndagen den 20 maj 2019

Ett förändrat klimat och hållbar spannmålsproduktion, vad bör vi tänka på?

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**Sommaren 2018: inte bara extrem utan
exceptionell...**



**Anpassning till ett förändrat klimat *och*
kraftfullt minskade växthusgasutsläpp...**

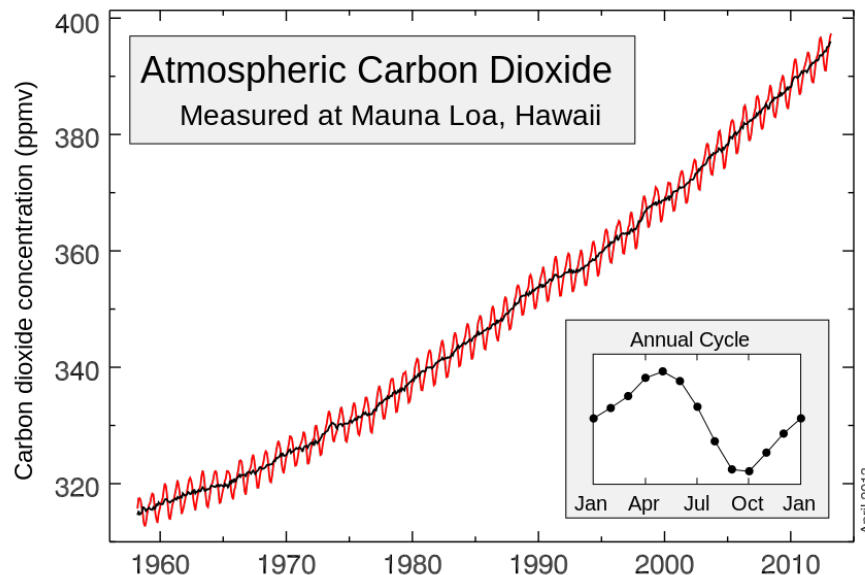


”Limiting global warming to 1.5 °C would require rapid, far-reaching and unprecedented changes in all aspects of society.” (IPCC, 2018)

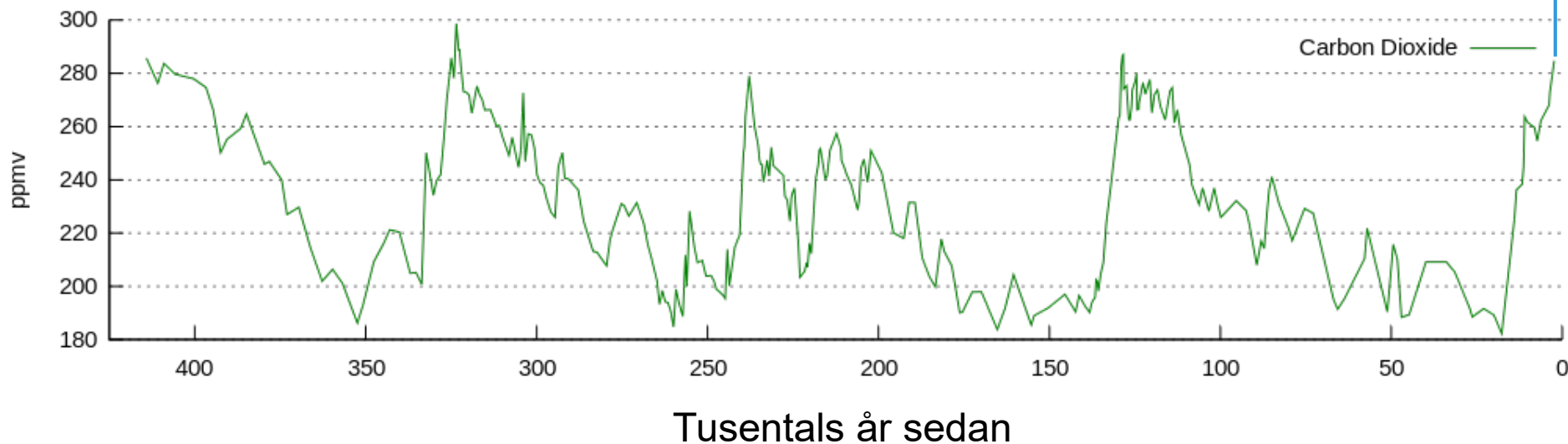
Även inom jordbruket och spannmålsproduktionen...



Koldioxidhalt i atmosfären

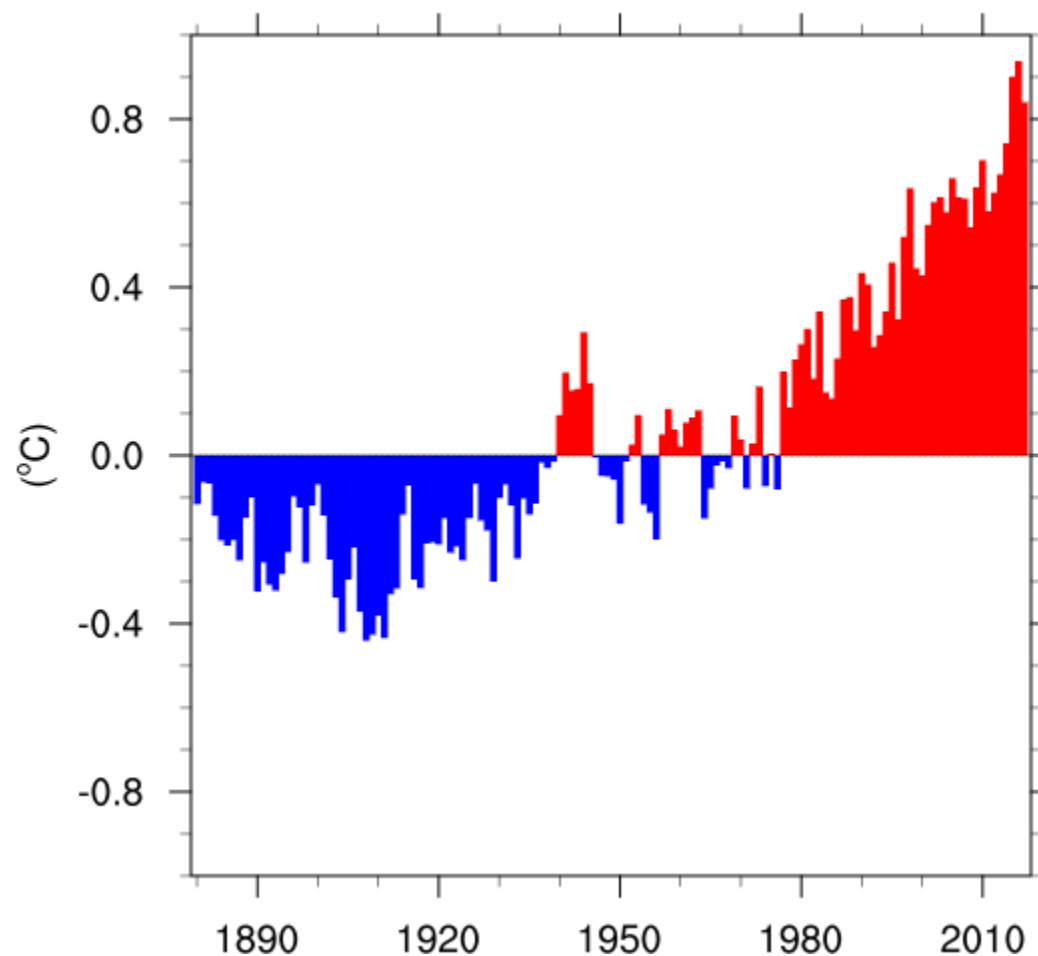


Idag runt
415 ppm
(högst på
3 milj. år)



Global uppvärmning fram till idag

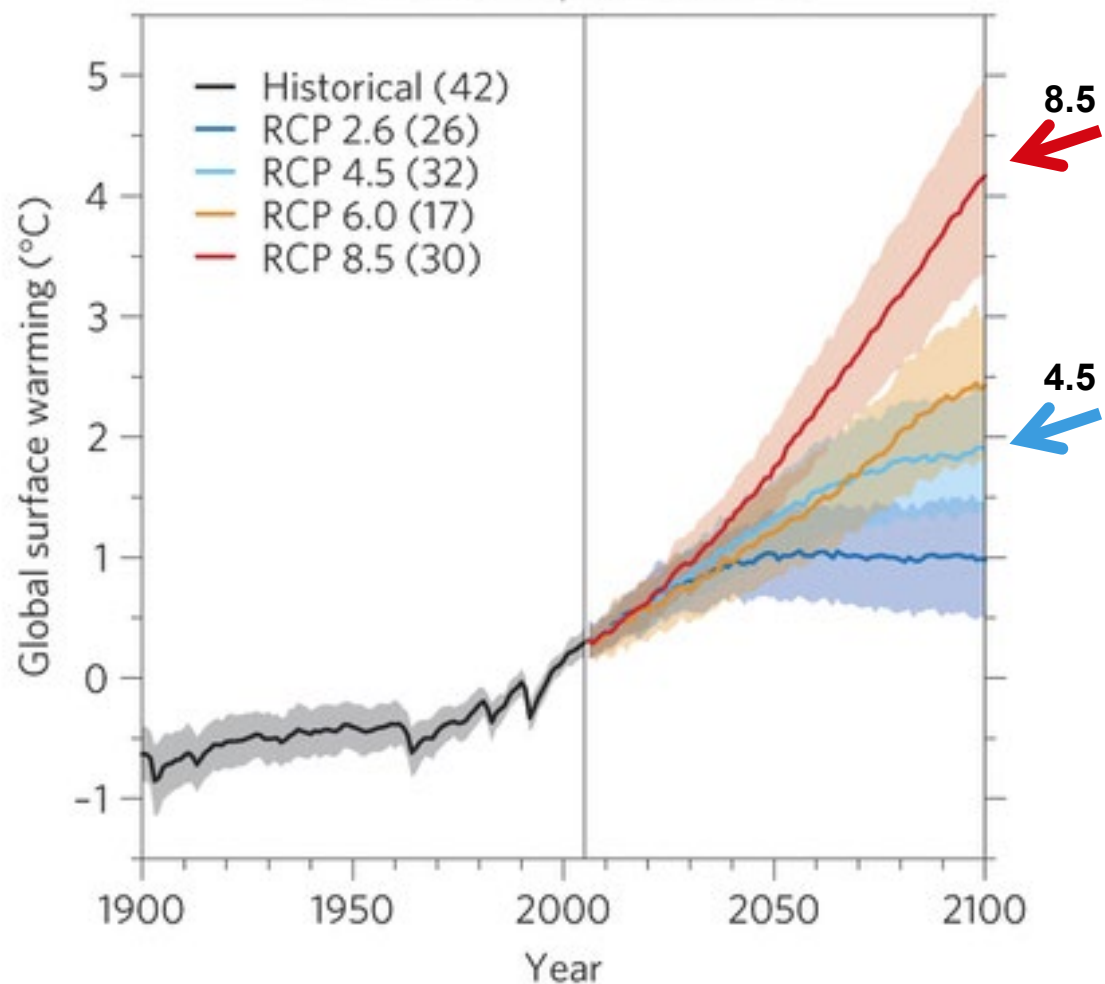
Global temperaturavvikelse jämfört med 1900-1999



Global årsmedeltemperatur (°C) jämfört med medelvärdet för 1900-1999 (Data från NOAA).

Framtiden?

CMIP5 models, RCP scenarios



RCP8.5: Utsläppen fortsätter att accelerera.

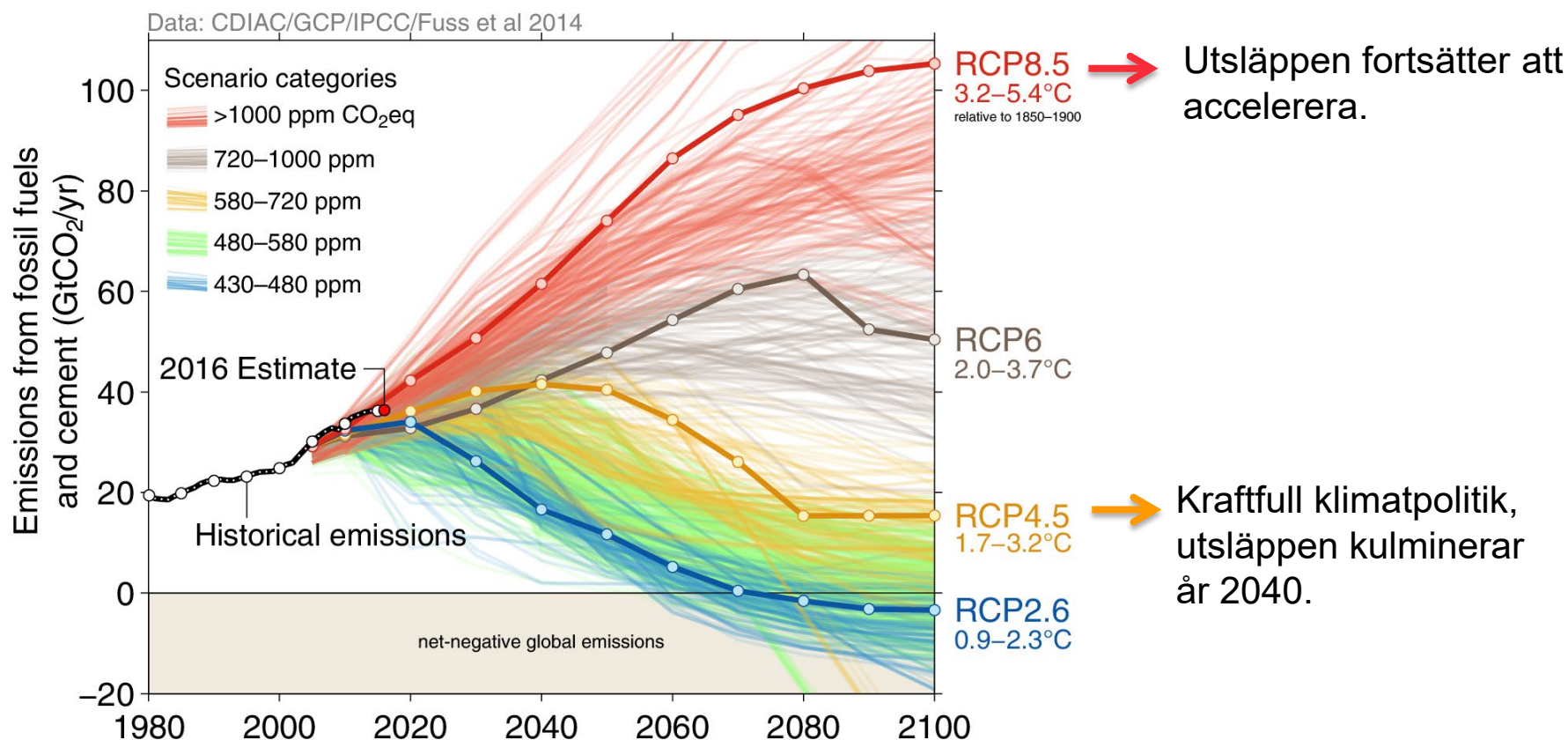
RCP4.5: Kraftfull klimatpolitik, utsläppen kulminerar år 2040.

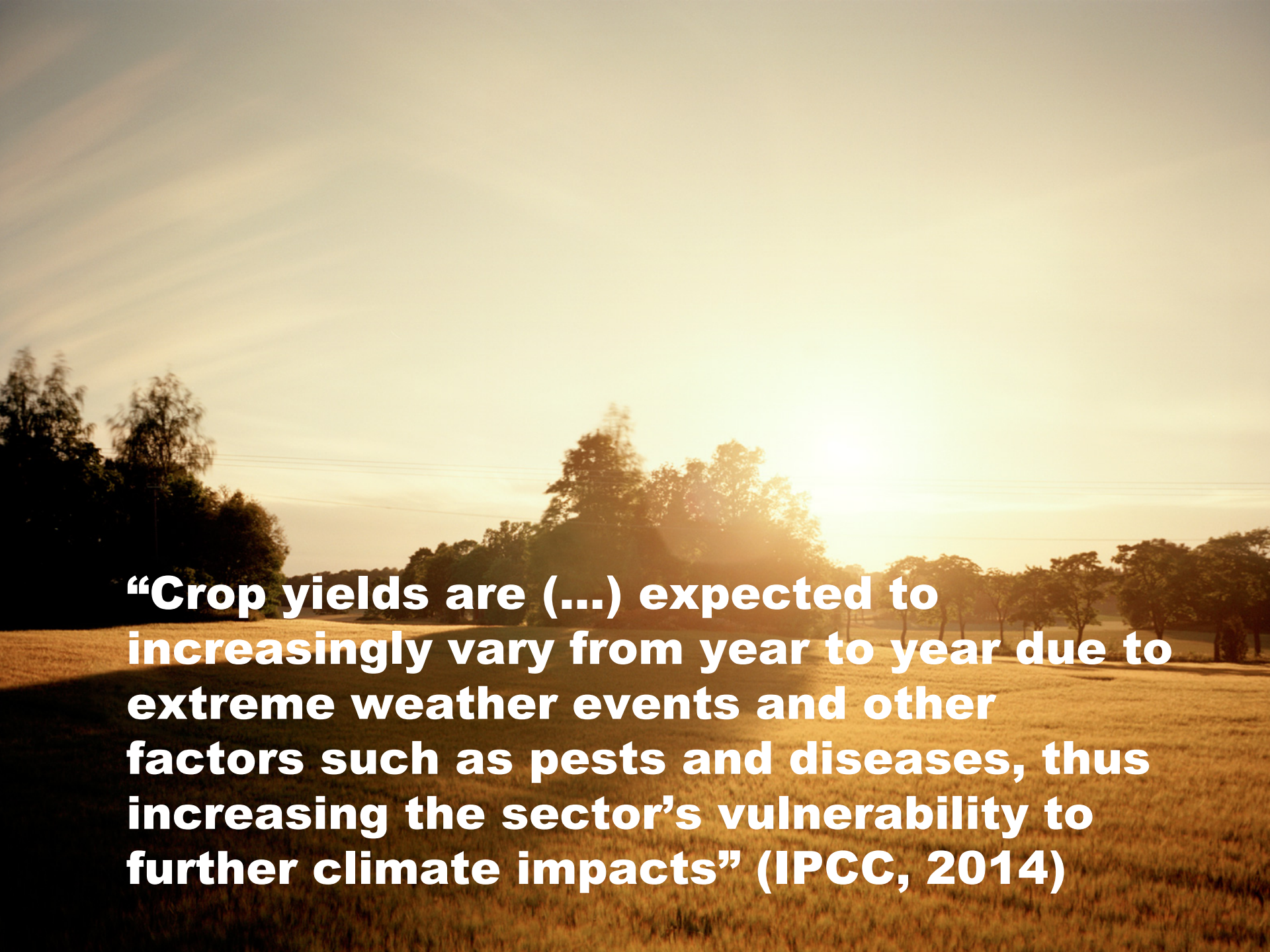
Enhet: W/m^2

Inget scenario är mer sannolikt än något annat.

Vart är vi på väg?

Observerade globala **utsläpp** och global **temperaturutveckling** utifrån scenarier för framtida utsläpp.





“Crop yields are (...) expected to increasingly vary from year to year due to extreme weather events and other factors such as pests and diseases, thus increasing the sector’s vulnerability to further climate impacts” (IPCC, 2014)

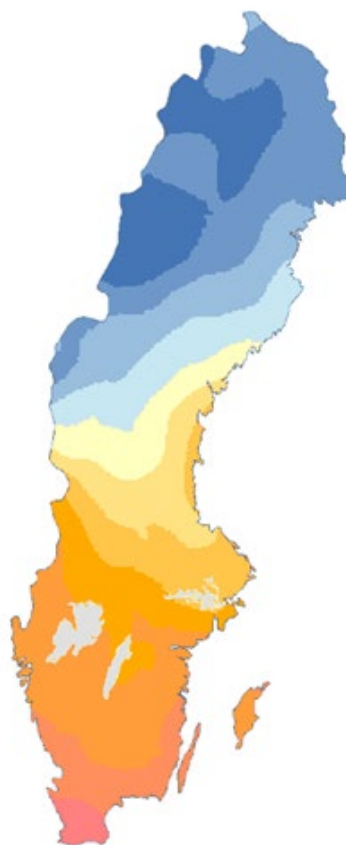
Månadsvis temperaturavvikelse 2018

Jämfört med 1961–1990

maj



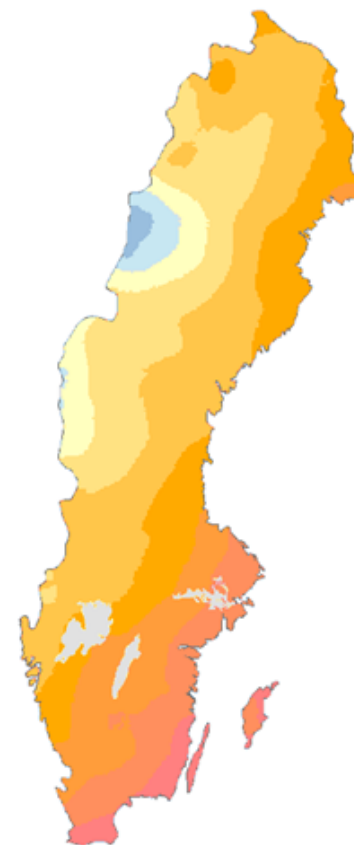
juni



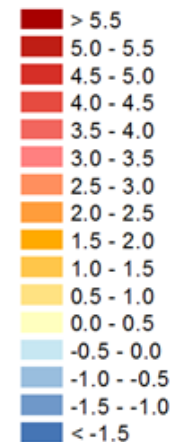
juli



augusti



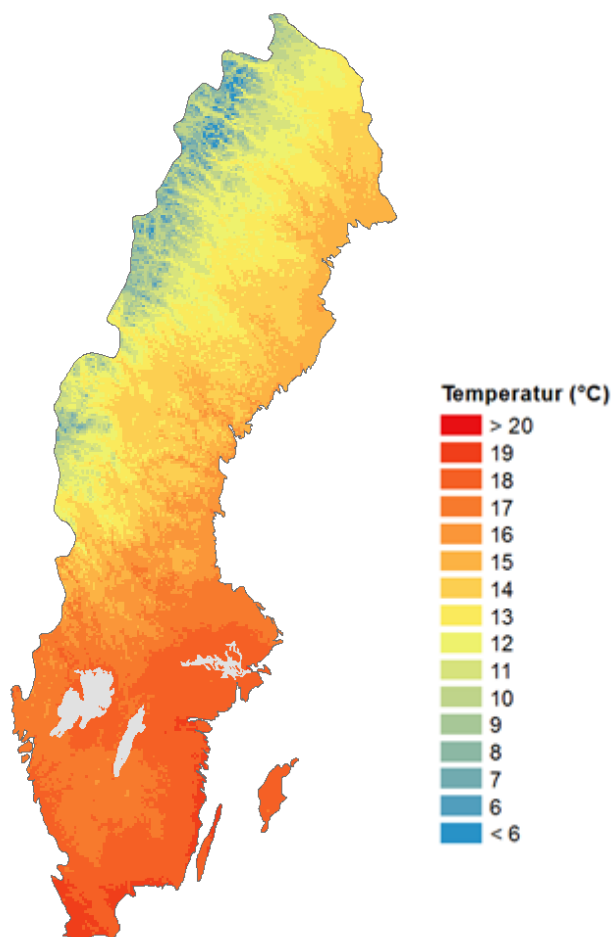
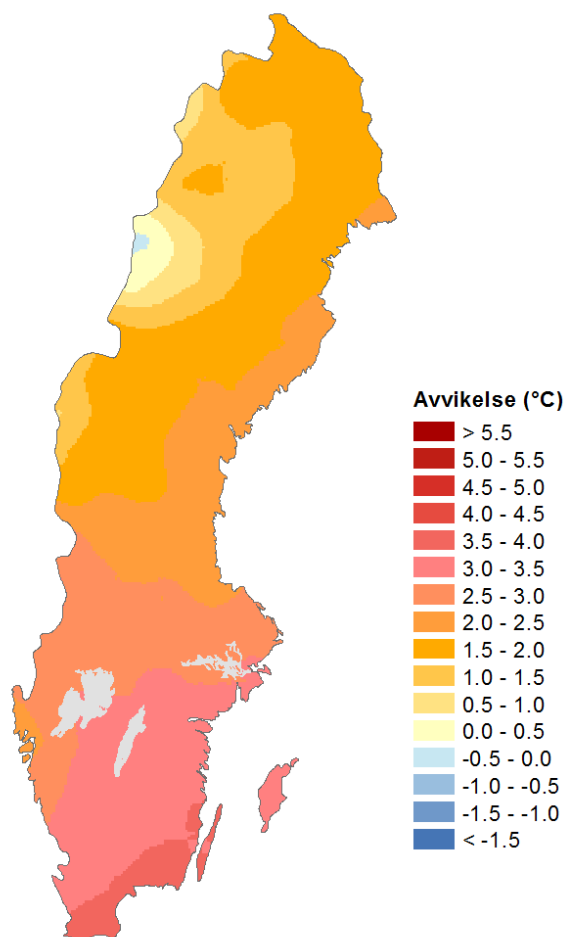
Avvikelse (°C)



Medeltemperatur sommarmånaderna (jja)

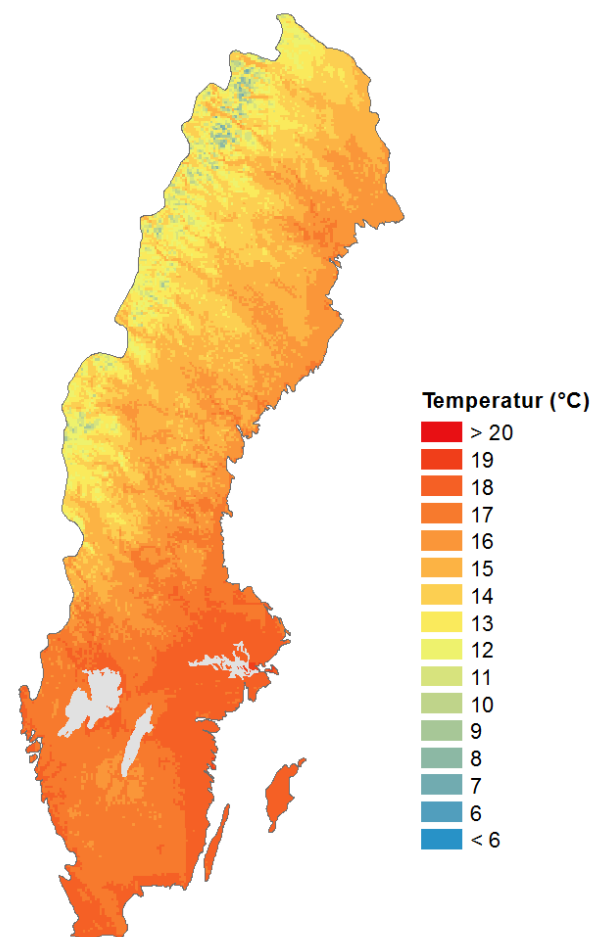
2018 vs 1961–1990

2018



Medeltemperatur sommarmånaderna (jja)

RCP4,5 2069–2098



Antal varma dagar

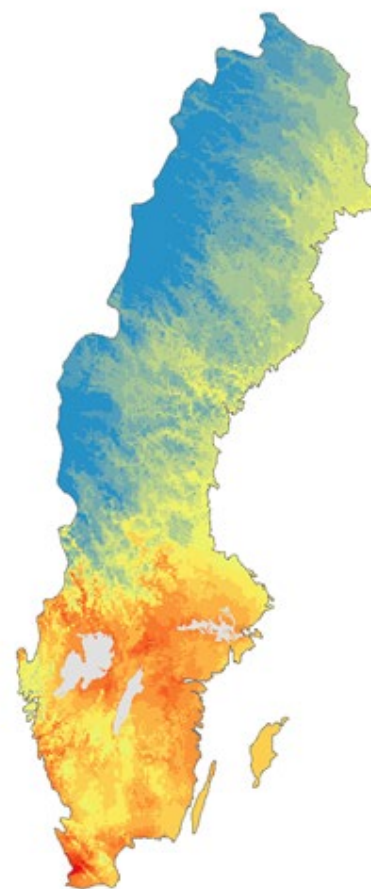
1961-1990



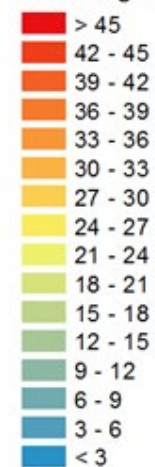
1991-2013



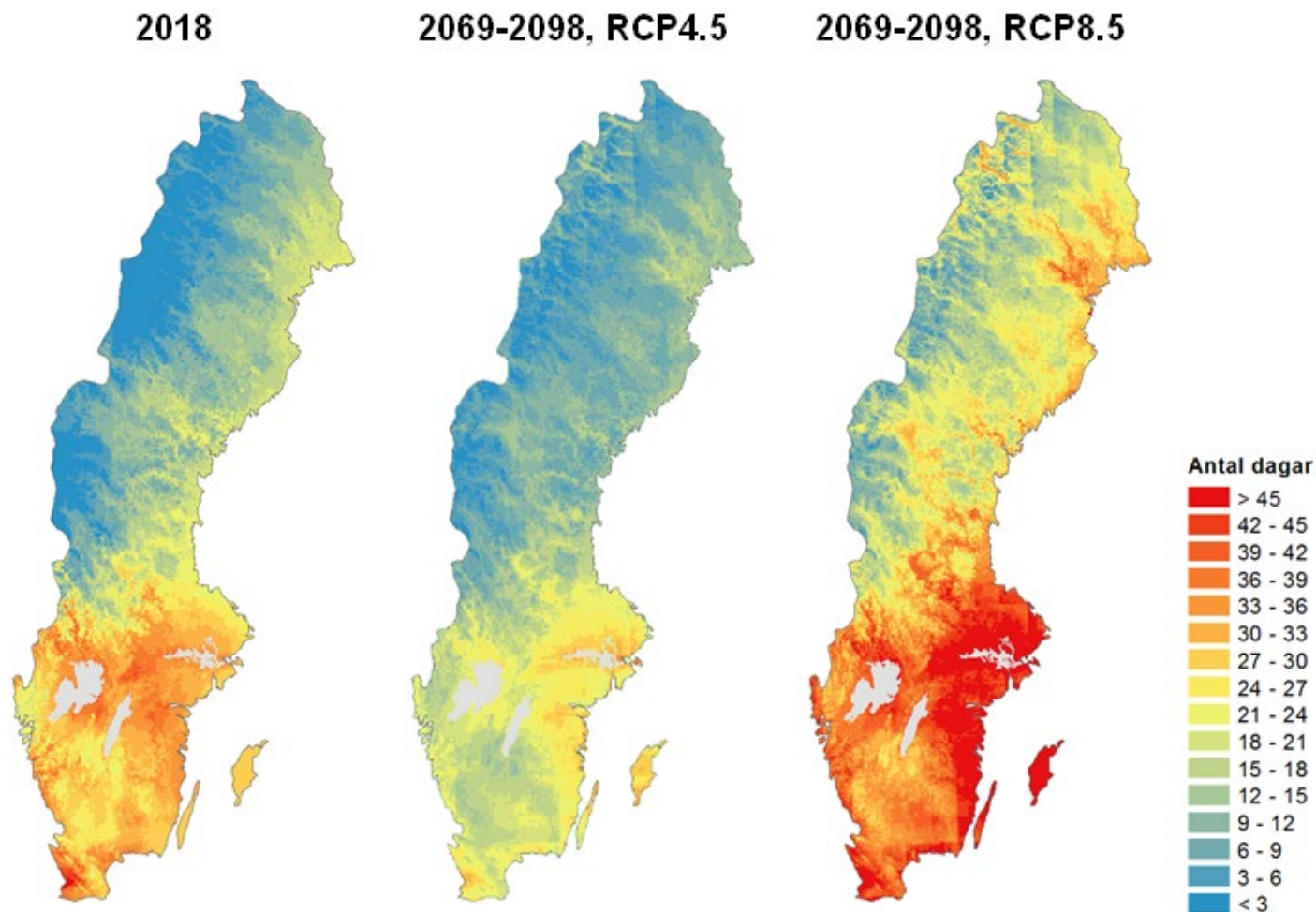
2018



Antal dagar



Antal varma dagar



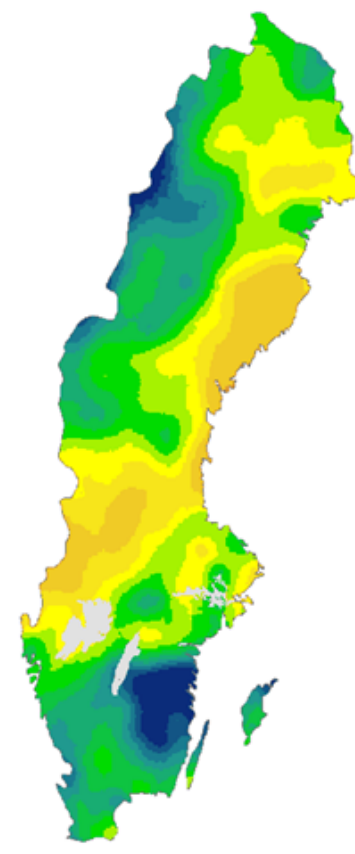
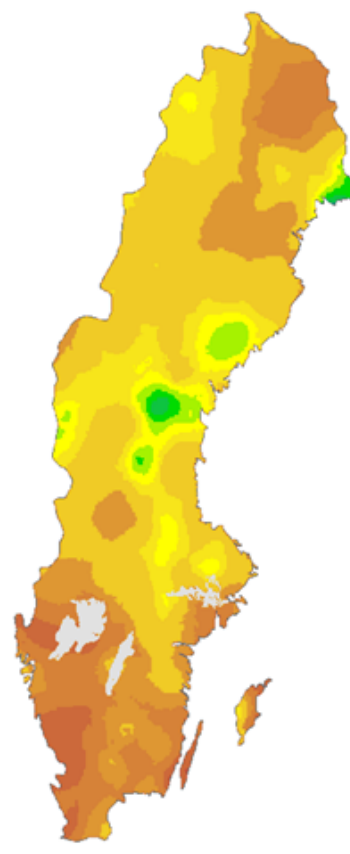
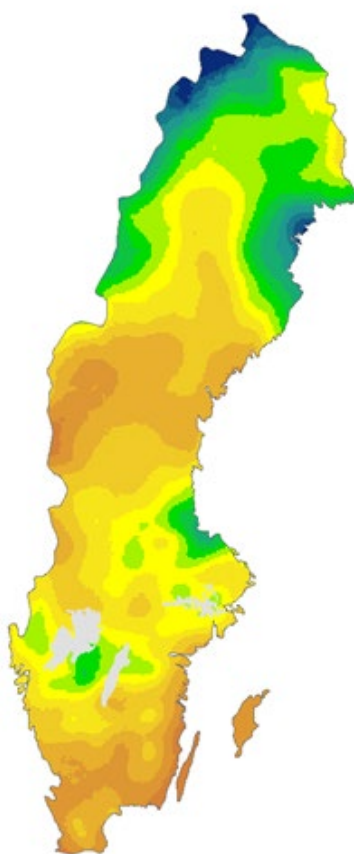
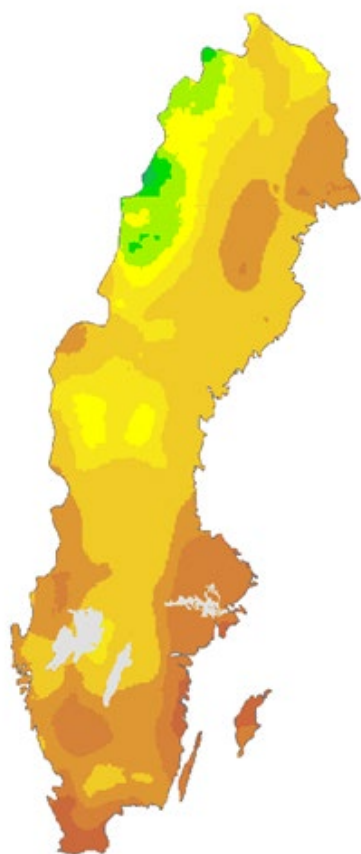
Månadsvis nederbördsavvikelse 2018

maj

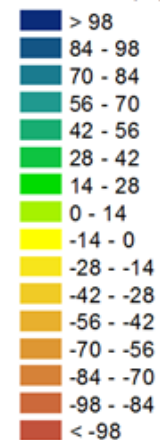
juni

juli

augusti



Avvikelse (%)



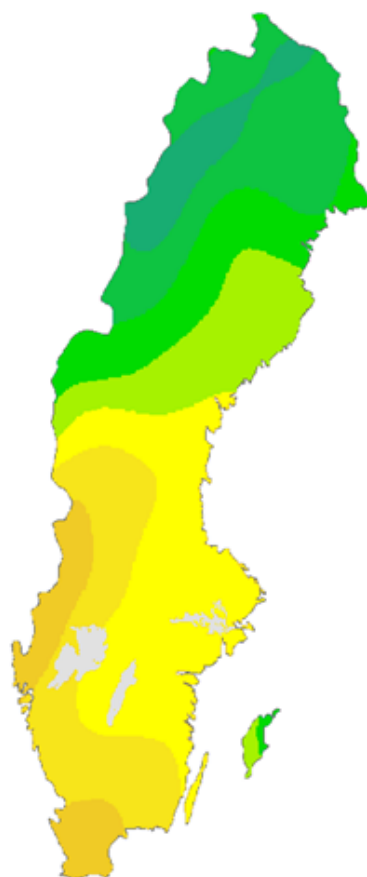
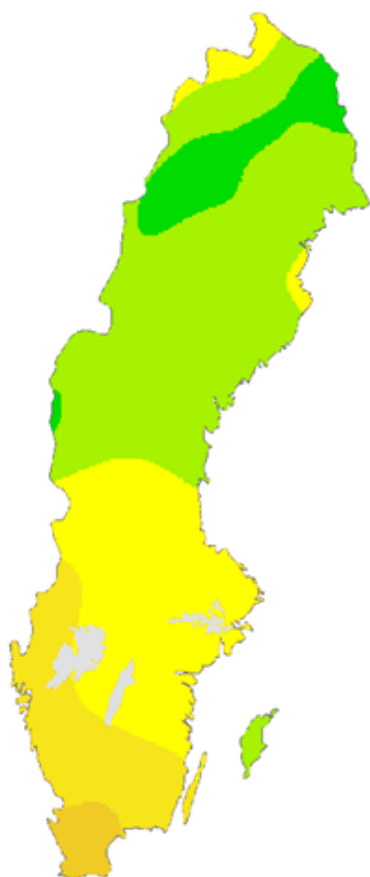
Ensembler för nederbördsförändring (jja)

Min RCP4.5

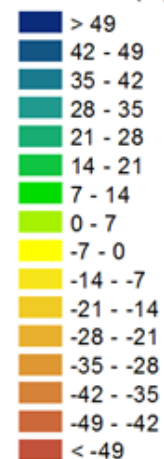
Min RCP8.5

Max RCP4.5

Max RCP8.5



Avvikelse (%)



Årsklimatindex Uppsala län

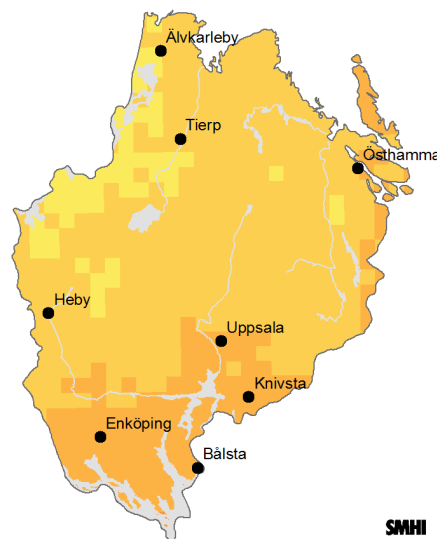
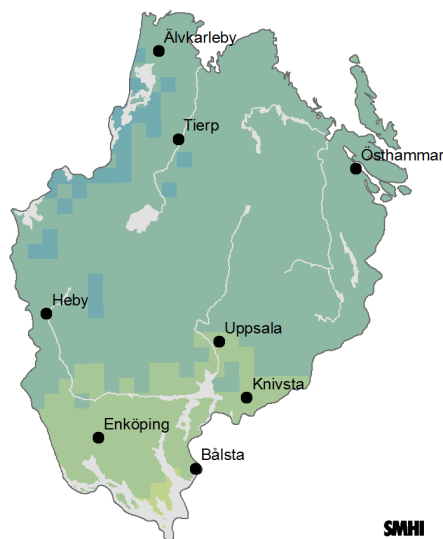
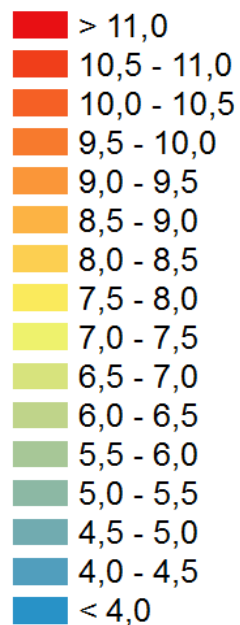
Årsmedeltemperatur

Observerat 1961- 1990

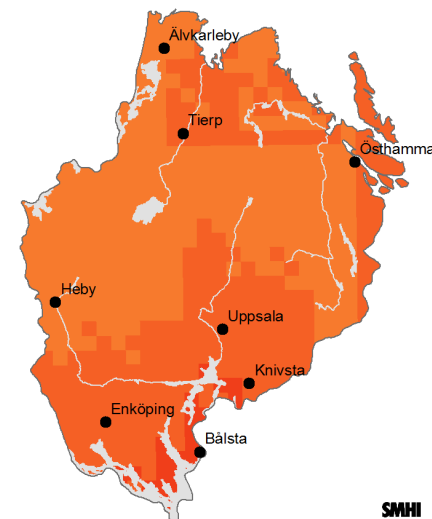
Beräknat 2069- 2098
på RCP4,5

Beräknat 2069- 2098
på RCP8,5

Temperatur (°C)



Ca +3 grader



Ca +5 grader

- Hösten varar längre
- Våren kommer tidigare
- Vintern blir kortare och sommaren längre

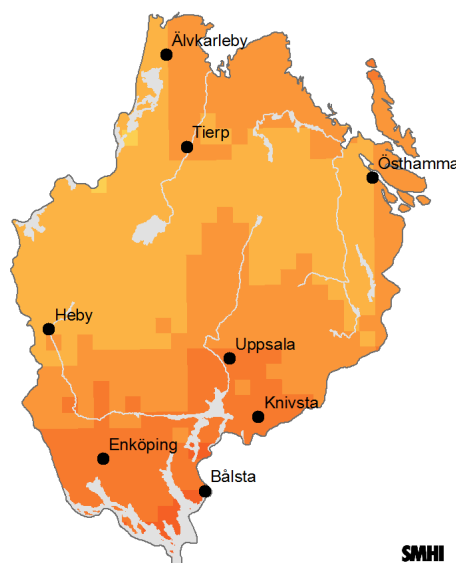
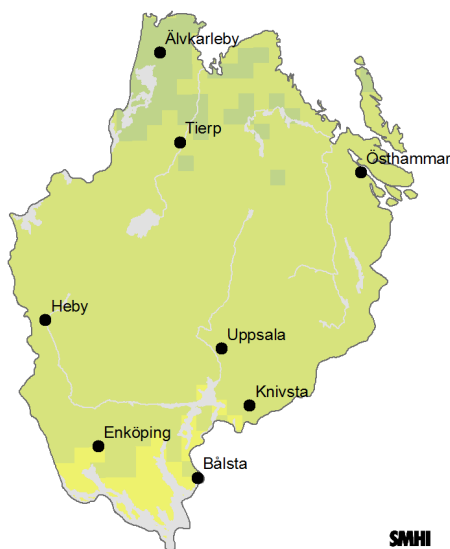
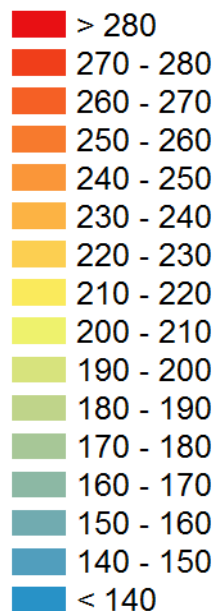
Vegetationsperiodens längd

Observerat 1961-1990

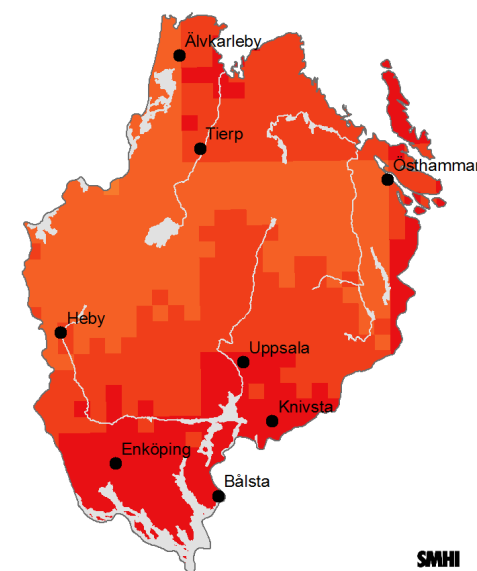
Beräknat 2069-2098
på RCP4,5

Beräknat 2069-2098
på RCP8,5

Antal dagar



Ca +50 dagar



Ca +90 dagar

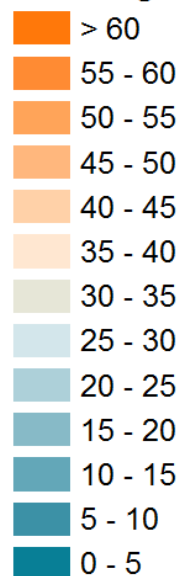
Antal dagar med låg markfuktighet

Beräknat 1961- 1990

Beräknat 2069- 2098
på RCP4,5

Beräknat 2069- 2098
på RCP8,5

Antal dagar

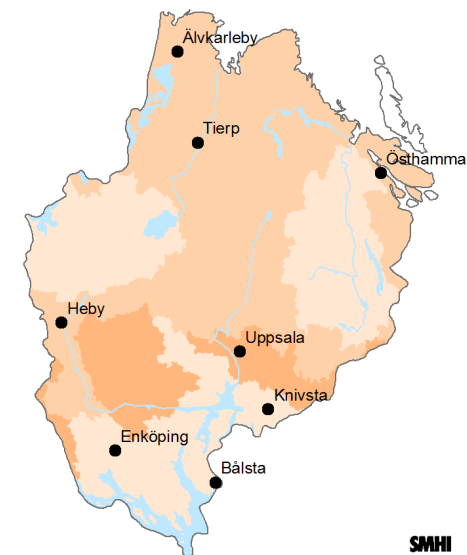


SMHI



SMHI

Ca 25-35 dagar

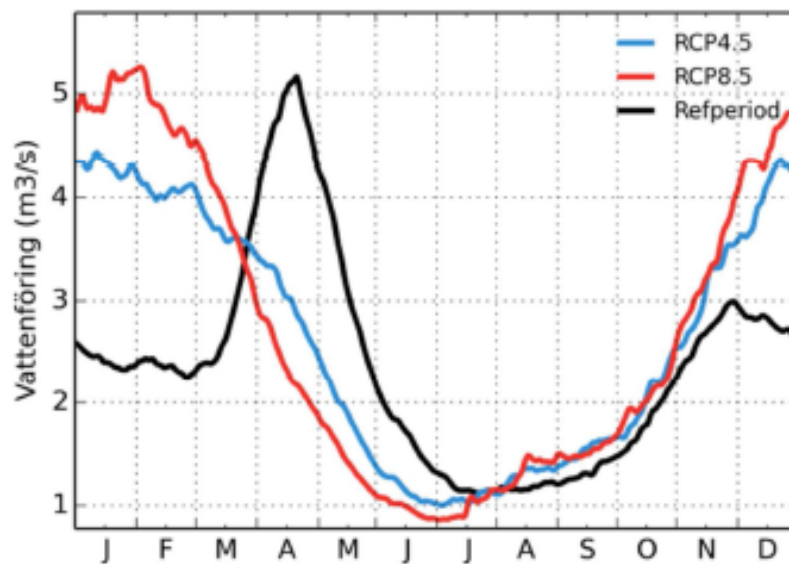


SMHI

Ca 35-45 dagar

Tillrinningens årsdynamik

Fyrisån Vattholma

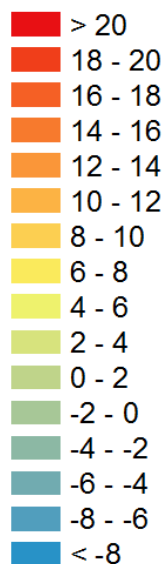




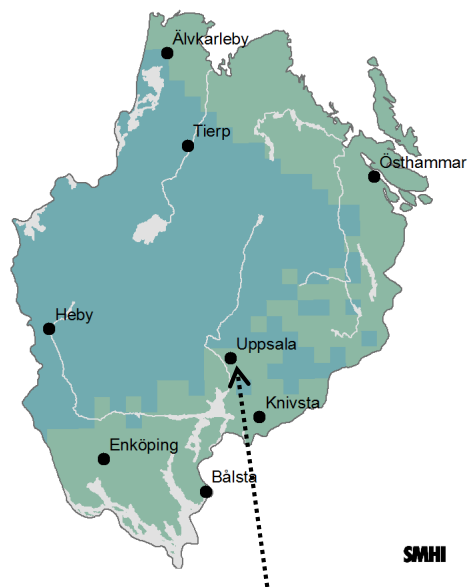
Vinterklimatindex (december–februari)

Medeltemperatur vintertid

Temperatur (°C)



Observerat 1961- 1990



Köld Uppsala
1875-01-24 -39,5°

SMHI

Beräknat 2069- 2098
på RCP4,5



SMHI

Ca +4 grader

Beräknat 2069- 2098
på RCP8,5



SMHI

Ca +6 grader

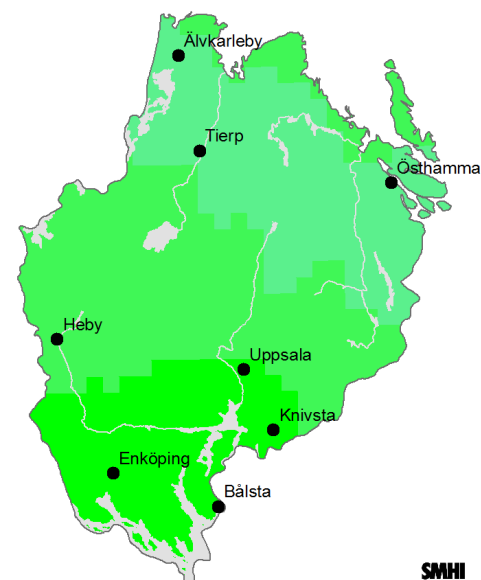
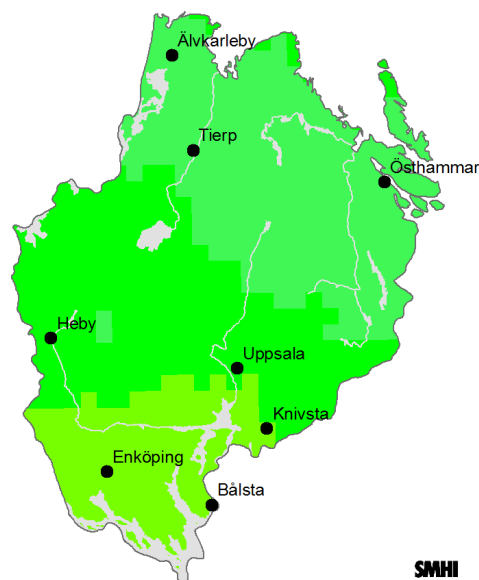
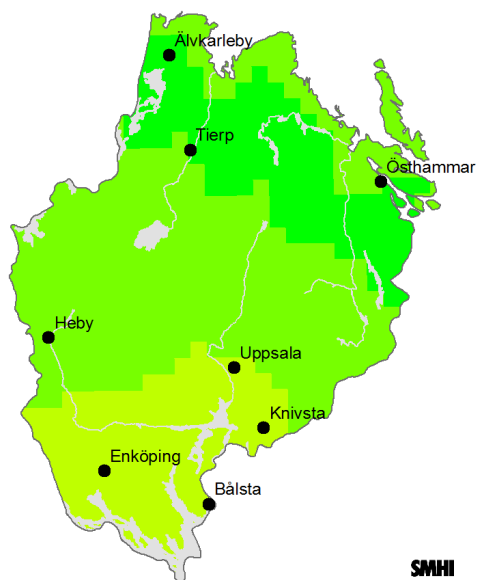
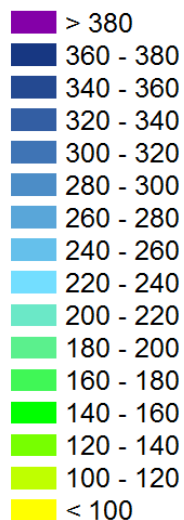
Medelnederbörd vintertid

Observerat 1961- 1990

Beräknat 2069- 2098
på RCP4,5

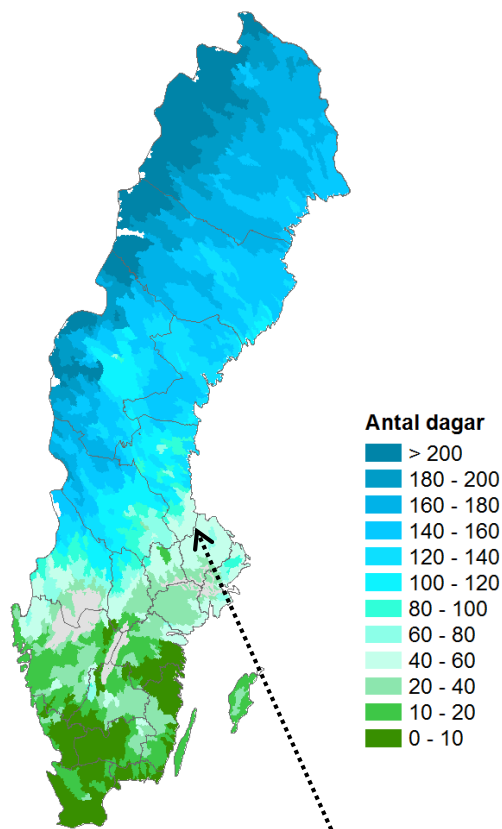
Beräknat 2069- 2098
på RCP8,5

Nederbörd (mm)

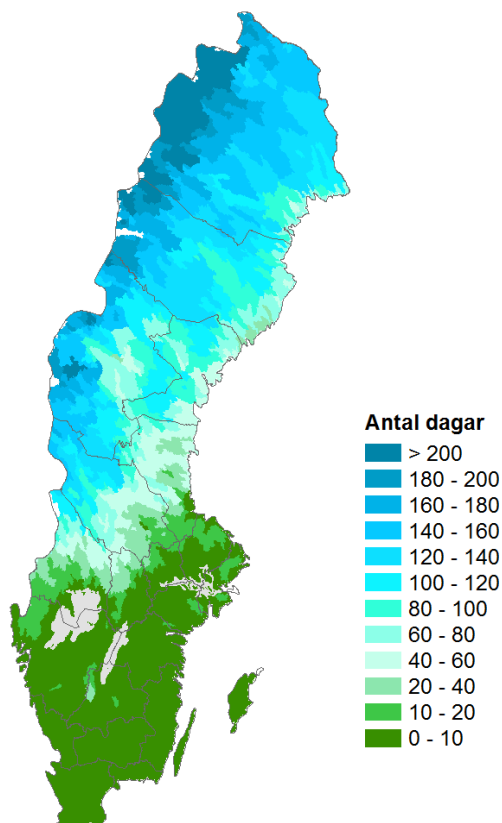


Antal dagar med snötäcke, minst 20 mm – Sverige

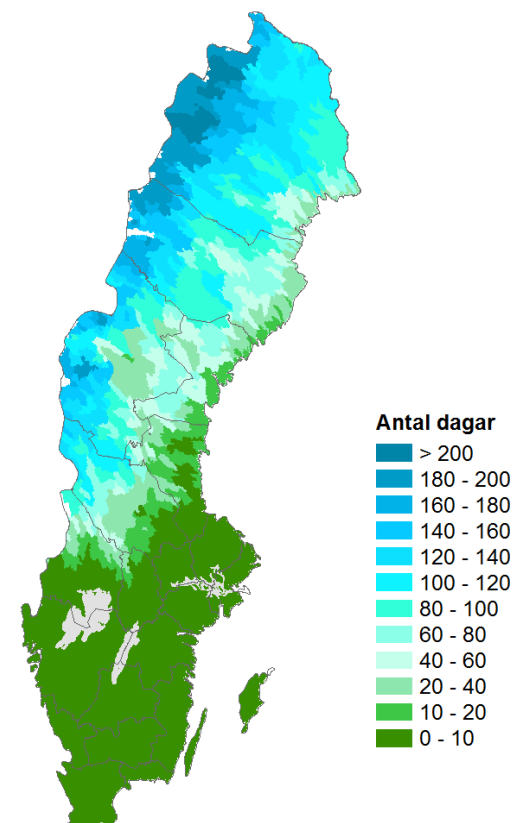
Beräknat 1961- 1990



Beräknat 2069- 2098
på RCP4,5

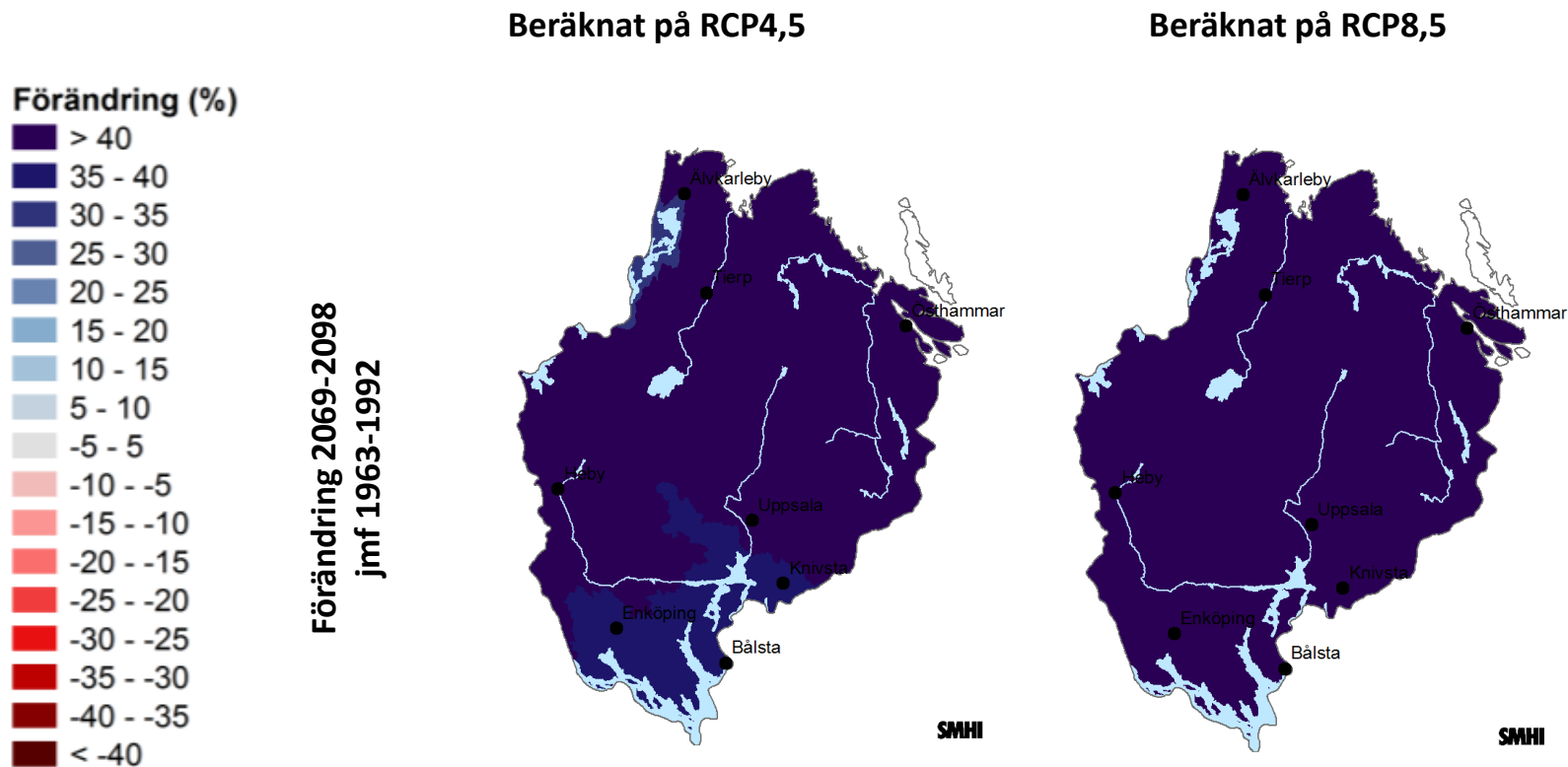


Beräknat 2069- 2098
på RCP8,5



Lokala snömängder Untra
1956-02-15 118 cm

Medeltillrinning vintertid





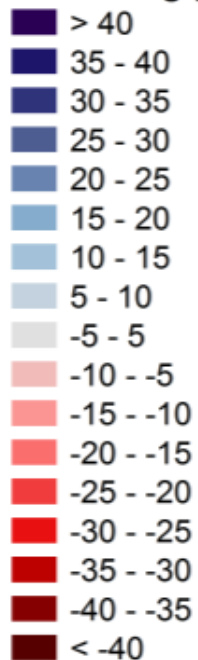
23.04.2014

Medeltillrinning vår

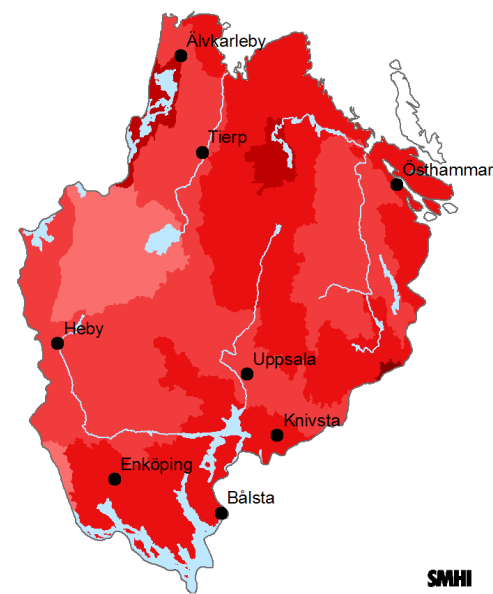
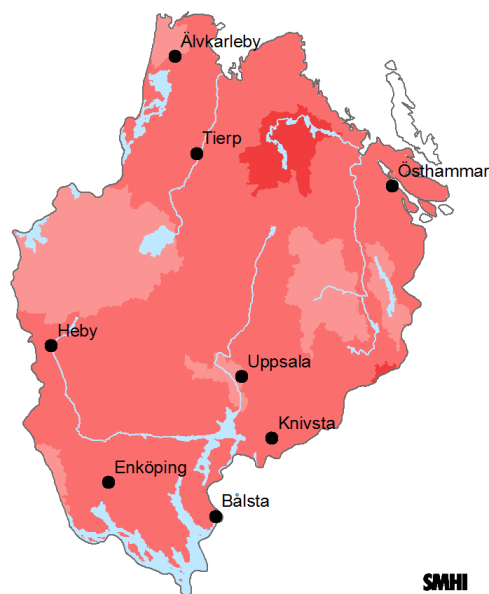
Beräknat på RCP4,5

Beräknat på RCP8,5

Förändring (%)



Förändring 2069-2098
jmf 1963-1992





Sommarklimatindex **(juni–augusti)**

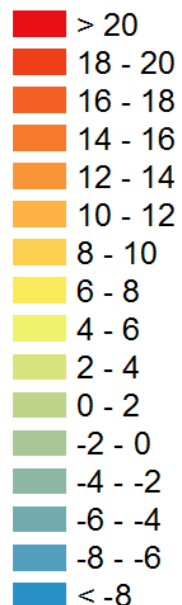
Medeltemperatur sommartid

Observerat 1961- 1990

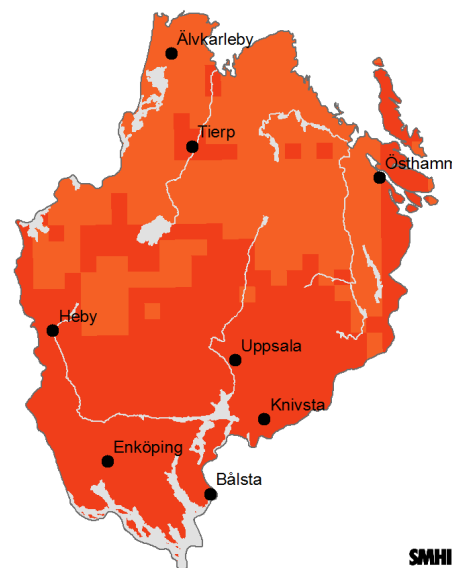
Beräknat 2069- 2098
på RCP4,5

Beräknat 2069- 2098
på RCP8,5

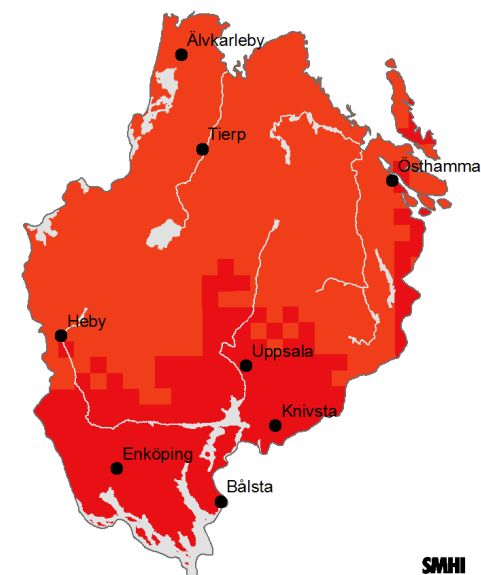
Temperatur (°C)



SMHI



SMHI



SMHI

Ca +3 grader

Ca +5 grader

Värme Ultuna*
1933-07-09 38,0°

* Svenskt värmerekord

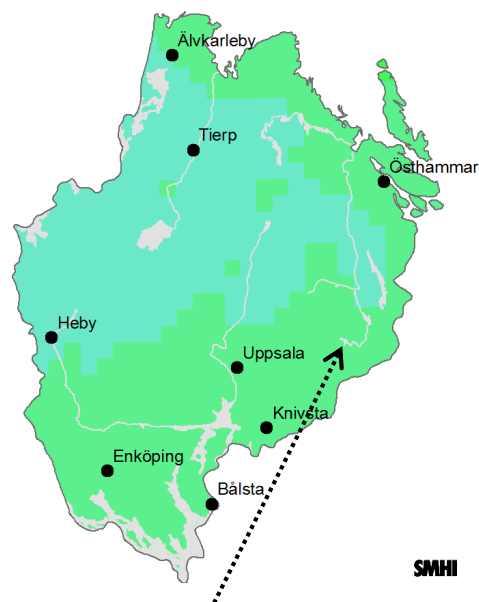
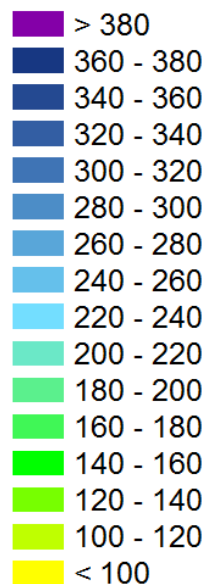
Mängden nederbörd sommartid

Observerat 1961- 1990

Beräknat 2069- 2098
på RCP4,5

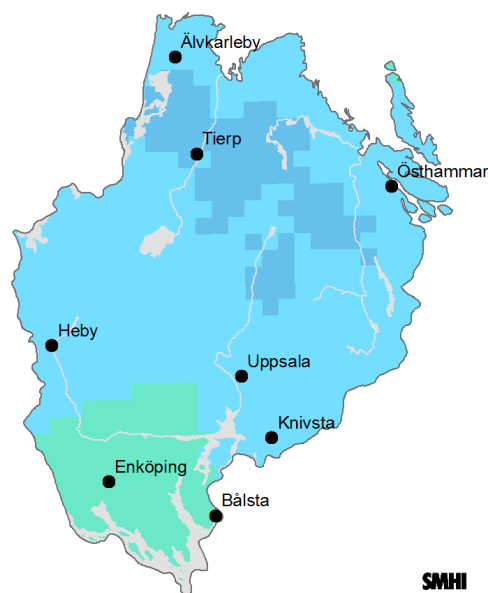
Beräknat 2069- 2098
på RCP8,5

Nederbörd (mm)

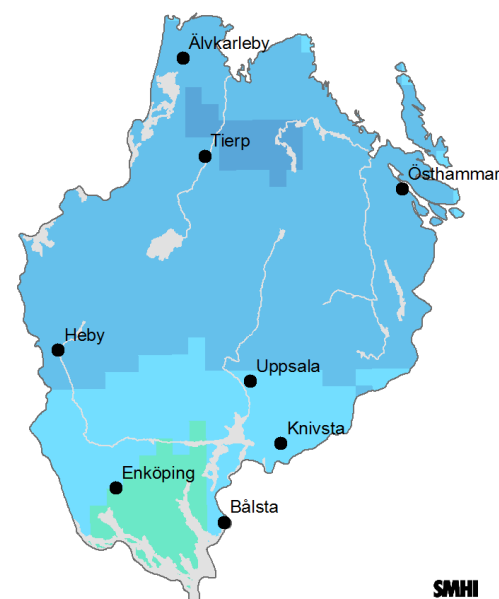


Nederbörd Lövsta
1989-07-13 133,5 mm

SMHI



SMHI



SMHI

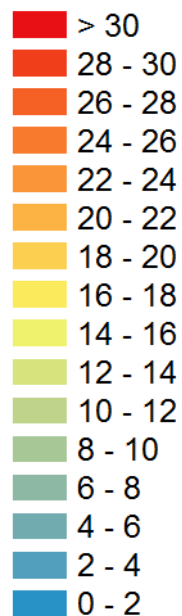
Värmeböljans längd i dagar

Observerat 1961- 1990

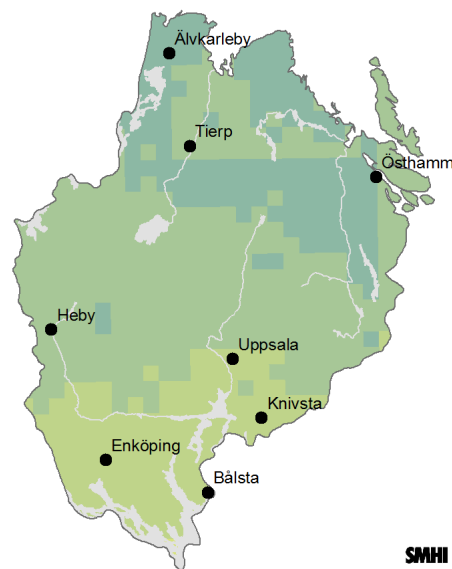
Beräknat 2069- 2098
på RCP4,5

Beräknat 2069- 2098
på RCP8,5

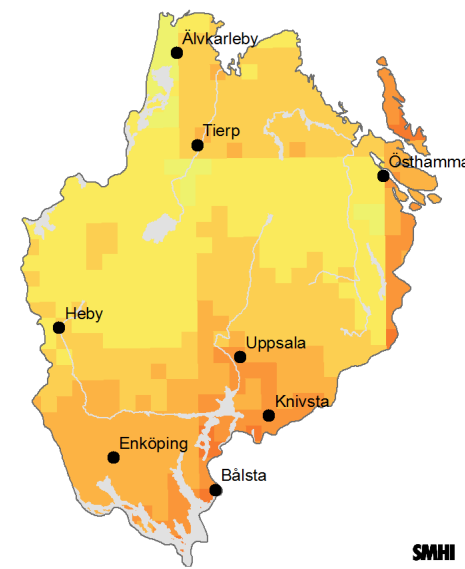
Antal dagar



Ca 3 dagar



Ca 7 dagar



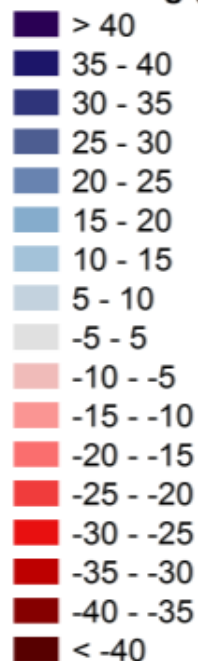
Ca 20 dagar

Medeltillrinning sommar

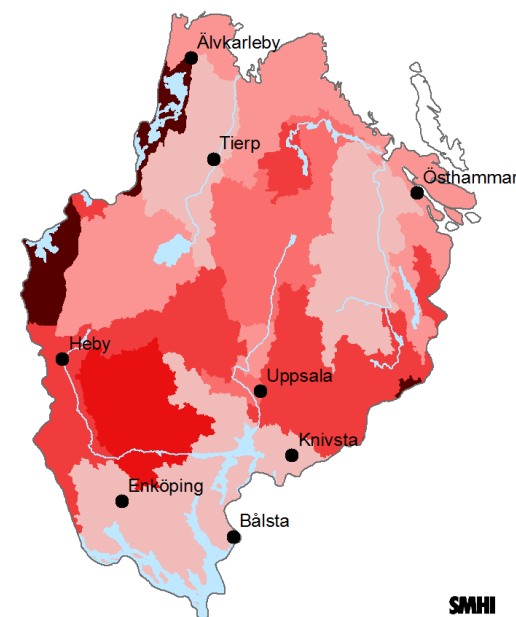
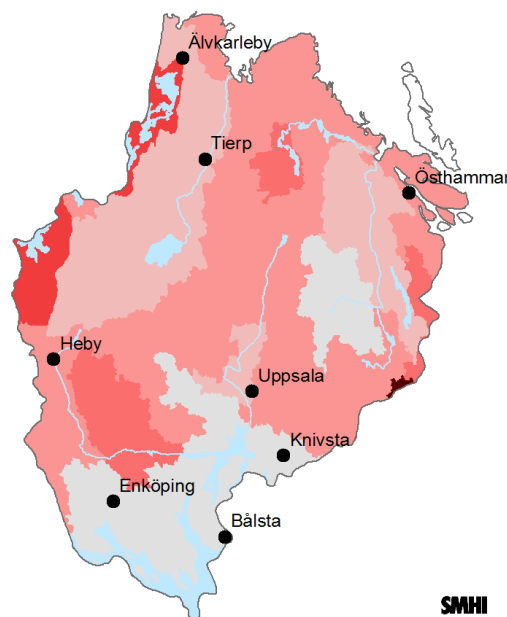
Beräknat på RCP4,5

Beräknat på RCP8,5

Förändring (%)



Förändring 2069-2098
jmf 1963-1992





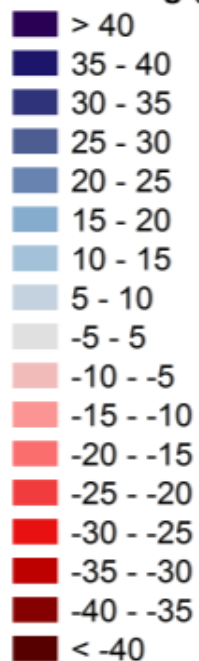
Höstklimatindex (september–november)

Medeltillrinning höst

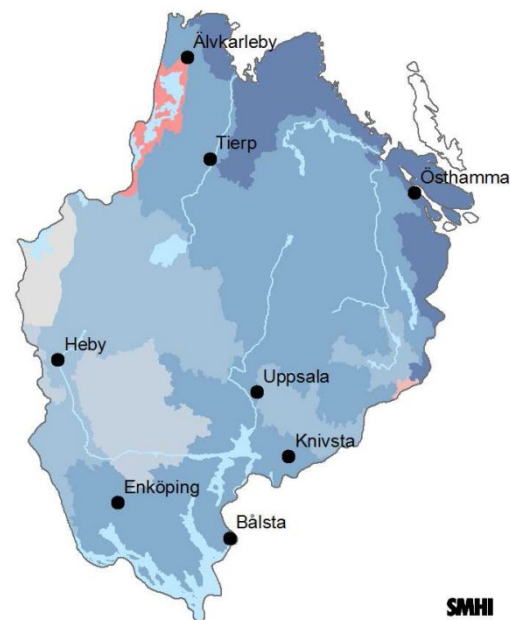
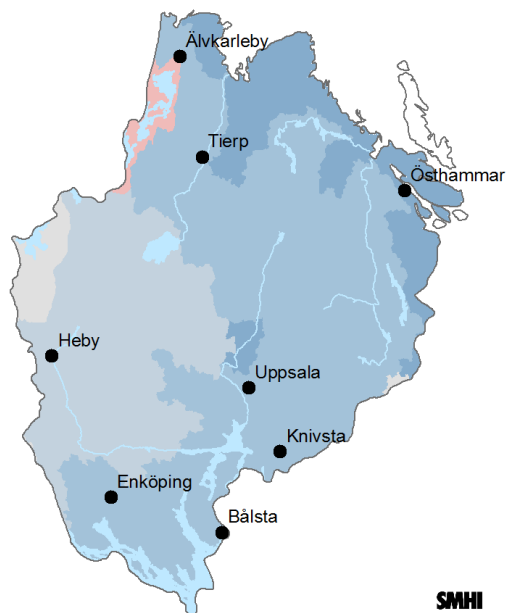
Beräknat på RCP4,5

Beräknat på RCP8,5

Förändring (%)



Förändring 2069-2098
jmf 1963-1992



A photograph of a garden bed. In the foreground and background, there are green leafy plants, possibly chard or spinach, with large, slightly wavy-edged leaves. The ground between the plants is covered with a layer of dry straw or mulch. The soil is dark brown and appears slightly moist. The text is overlaid on the image in white, bold font.

Exempelsamling klimatanpassning:

<https://www.smhi.se/klimat/klimatanpassa-samhallet/exempel-pa-klimatanpassning>

**Exempel på ökad robusthet, resiliens,
motståndskraft...**

Robustare grödor: kulturgrödor





Resiliens, robusthet och mångfald sprider riskerna

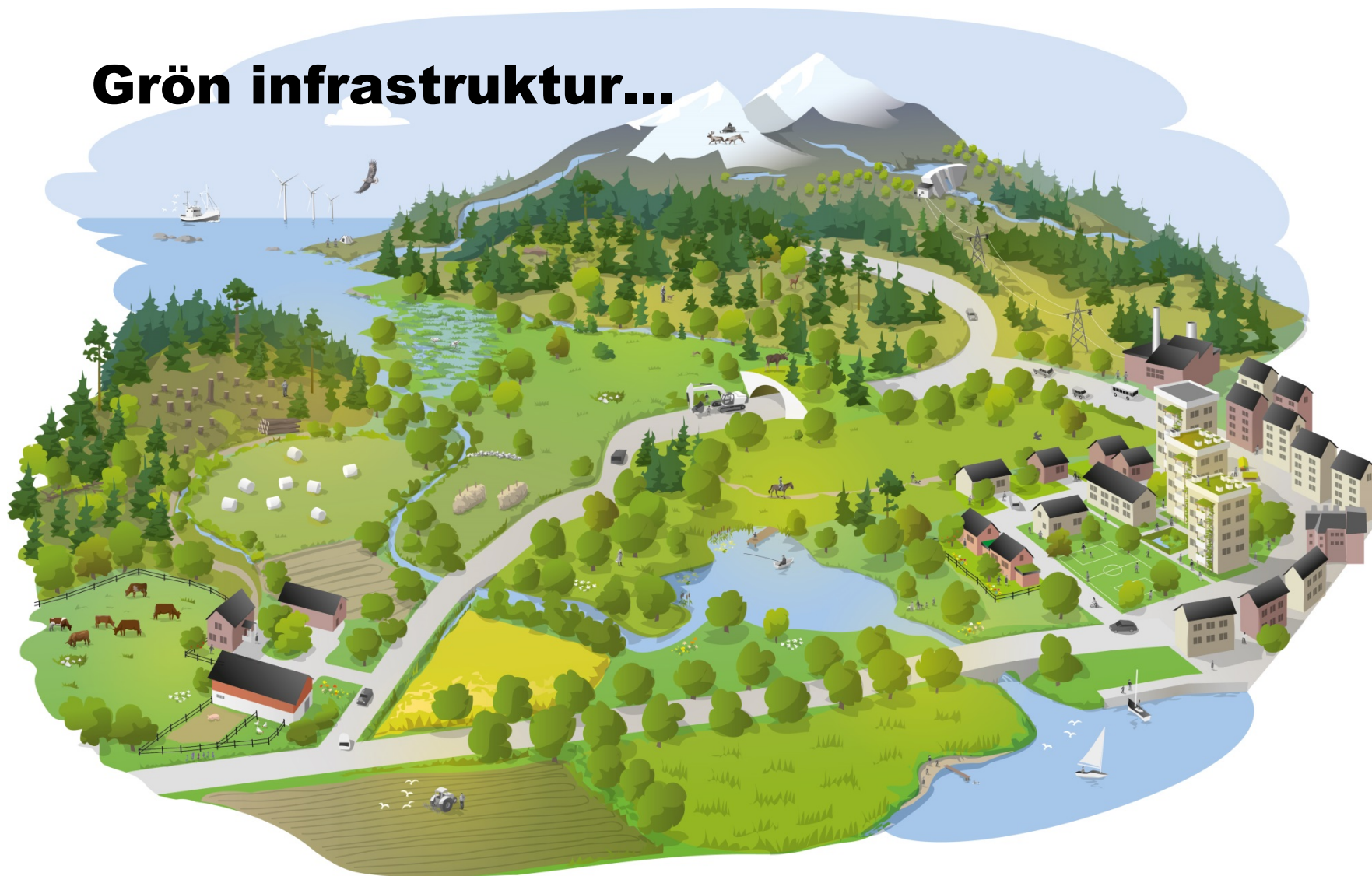


Bilder från Hånsta Östgårde, Uppland, tagna av Kjell Sjelín, visas med tillstånd

EKO SYSTEM TJÄNSTER



Grön infrastruktur...



Gröna infrastrukturer...



...och samhällsstrukturer...

