

Climate Change Adaptation – a Challenge Requiring Collaborative Actions

15th EMS Annual Meeting & 12th European Conference on Applications of Meteorology (ECAM)
September 8th 2015, Sofia, Bulgaria

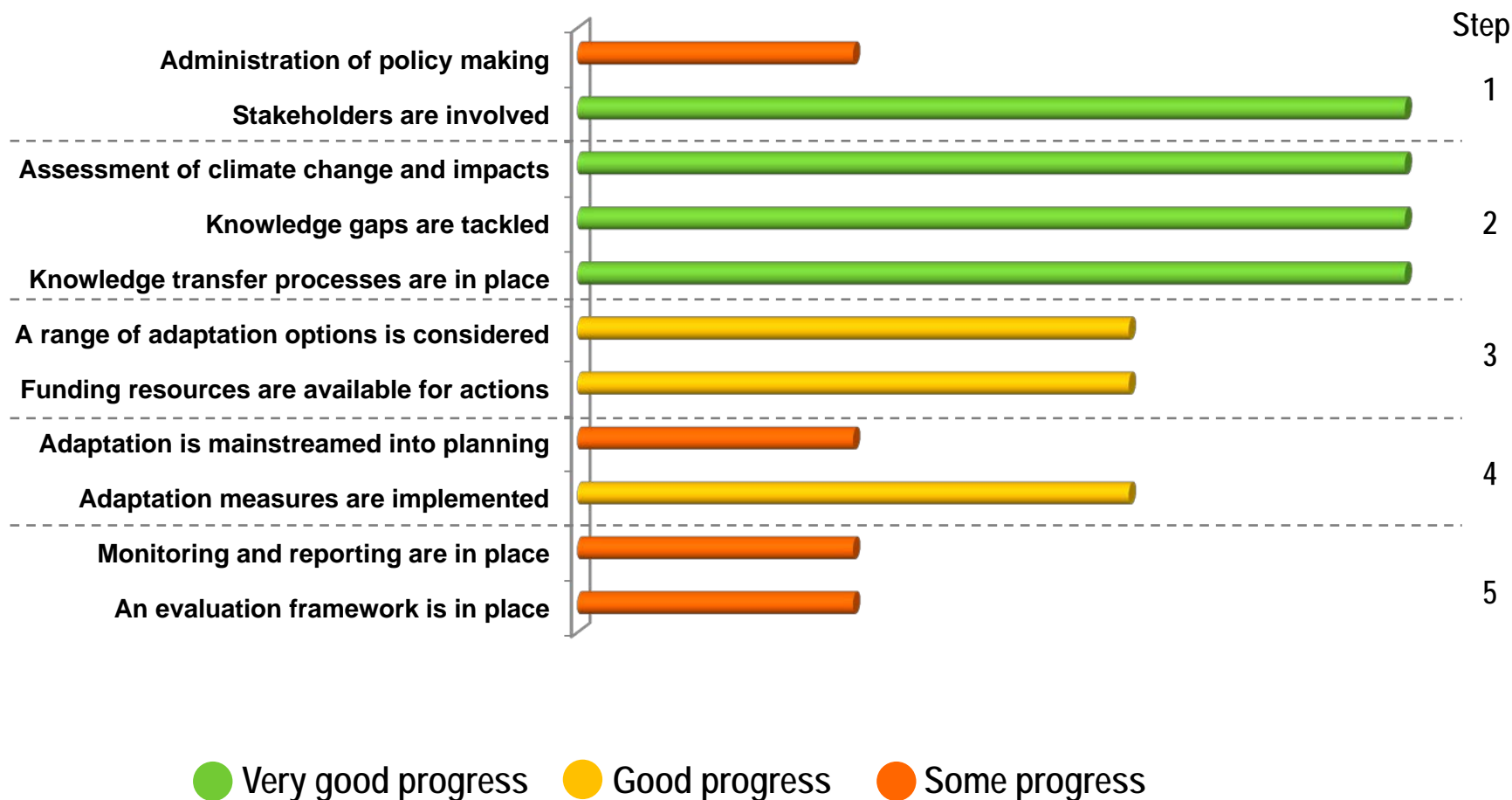
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SMHI / Swedish Meteorological and Hydrological Institute

Today's presentation

- Reaching out to stakeholders – the Swedish model
- Provision of basis to build adaptive capacity and for stakeholders to take action
- Communication and training for tackling knowledge gaps



Adaptation Preparedness Scoreboard – Swedish Fiche 2015





Skanör, south Sweden – sea level more than 1 m over average in 2007

The Swedish 'Model' – a Shared Responsibility

NATIONALLY no authority or department has an overarching responsibility.

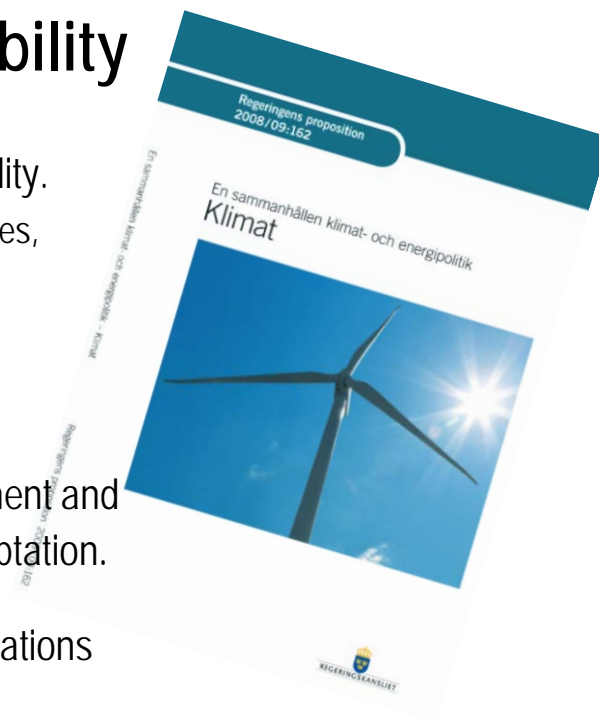
About **30 authorities** have sector responsibilities and work with preventive measures, building knowledge and improving resilience.

REGIONALLY the **regional government offices** have responsibility for coordinating adaptation activities.

Regional Development Councils have a coordinating role for development and regional planning but no expressed responsibility for climate change adaptation.

LOCALLY the **local councils** have legal responsibility for planning regulations and other controls.

ALSO government, businesses, trade associations and citizens.



The Swedish National Knowledge Centre for Climate Change Adaptation at SMHI

- Gathers, compiles and shares knowledge on climate change adaptation
- Broad collaboration with stakeholders in the field of climate change adaptation
- An assignment on behalf of the Swedish Government

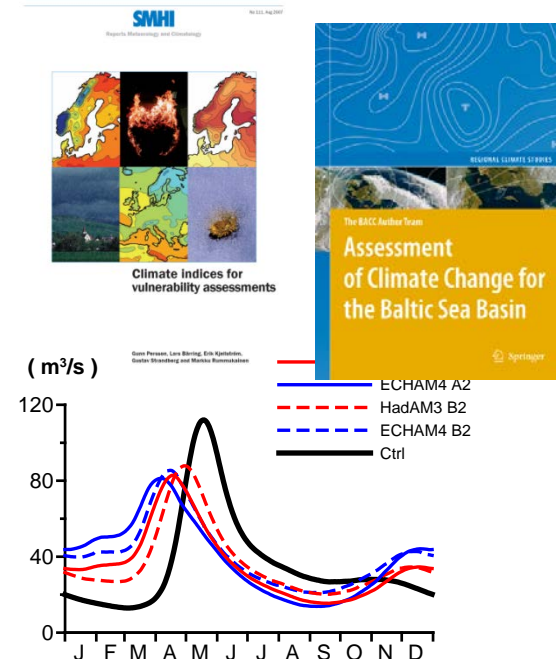
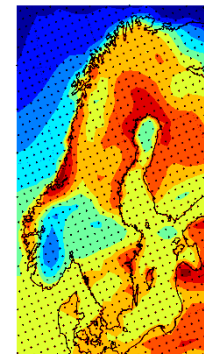
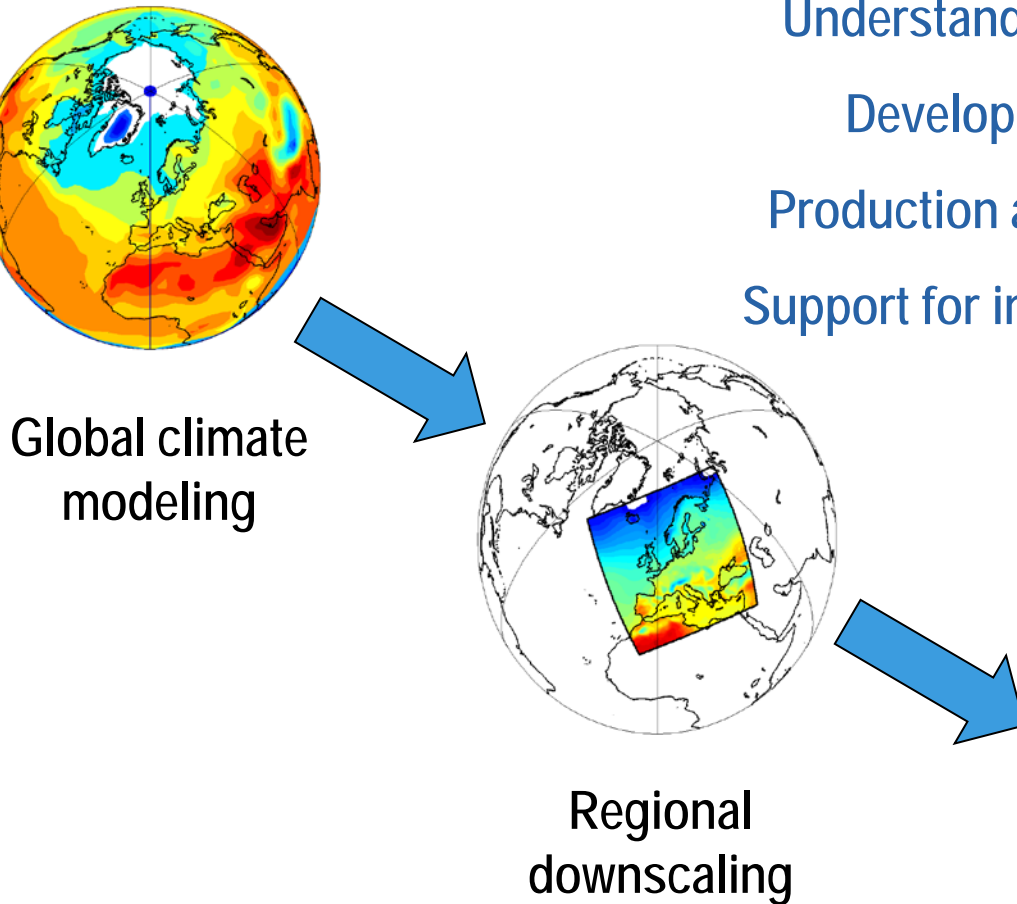


Understanding climate and its predictability

Developing numerical climate models

Production and analysis of climate scenarios

Support for impact studies and work on climate adaptation



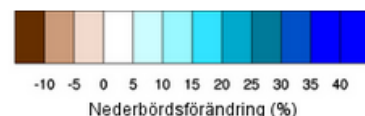
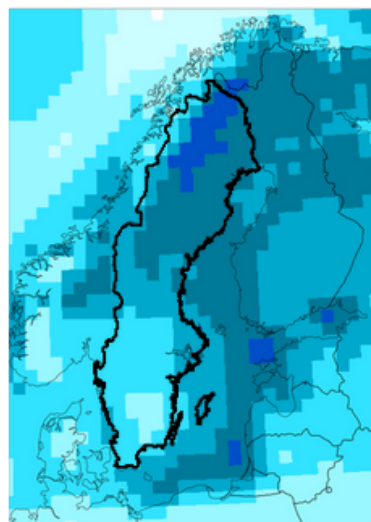
Analysis and further use of our climate scenarios

Distribution of Climate Information

Click in the blue box below to select a geographical area, scenario, season and climate index.

Area	Scenario	Season	Climate index
<input type="radio"/> World	<input type="radio"/> RCP 2.6 (low)	<input type="radio"/> Winter	<input type="text" value="Precipitation"/>
<input type="radio"/> Europe	<input type="radio"/> RCP 4.5 (medium)	<input type="radio"/> Spring	
<input checked="" type="radio"/> Sweden	<input checked="" type="radio"/> RCP 8.5 (high)	<input type="radio"/> Summer	
<input type="radio"/> County	<input type="radio"/> SRES A1B (medium, older)	<input type="radio"/> Autumn	
<input type="radio"/> District		<input checked="" type="radio"/> Year	
<input type="radio"/> River basin			

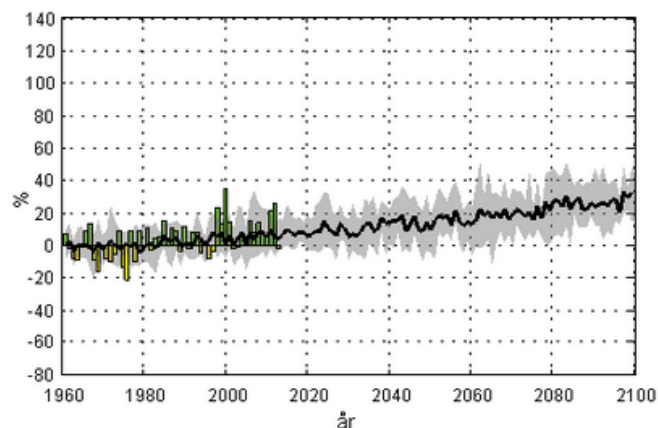
Change in annual precipitation in Sweden, scenario RCP 8.5



Calculated change in annual precipitation (%) for the period 2071-2100 compared with 1971-2000. The map is based on an ensemble with nine climate scenarios for the RCP 8.5 scenario.

The maps below show more information about the ensembles as well as for other time periods.

[Enlarge image](#)



The diagram shows the calculated change in annual precipitation (%) in Sweden during the years 1961-2100 compared with normal (mean for 1961-1990).

The bars show historic data from observations. The green bars show precipitation above normal and the yellow bars show precipitation below normal.

The black line shows the ensemble mean of nine climate scenarios for the RCP 8.5 scenario. The grey field shows the range in variation between the highest and lowest value for the members of the ensemble.

The climate scenarios are produced using the regional climate model RCA4, which has been used with initial conditions taken from different global climate models.

[Enlarge image](#)

[Normal annual precipitation in Sweden](#)

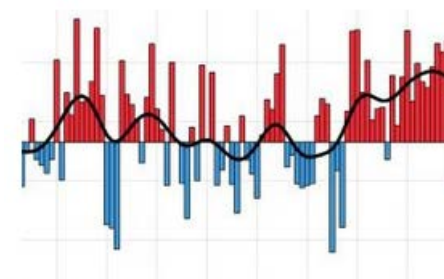
Download the diagram data in Excel format

[Historical data since 1961](#)

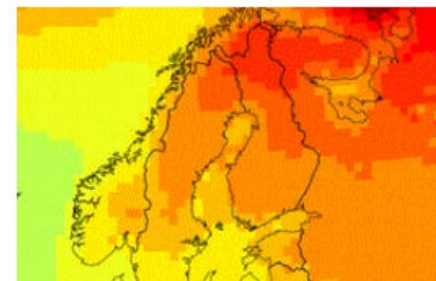
[Scenario data 1961-2100](#)



Climate Research at the Rossby Centre



Climate Indicators



Climate Scenarios

Climate Change Scenarios – average temperature

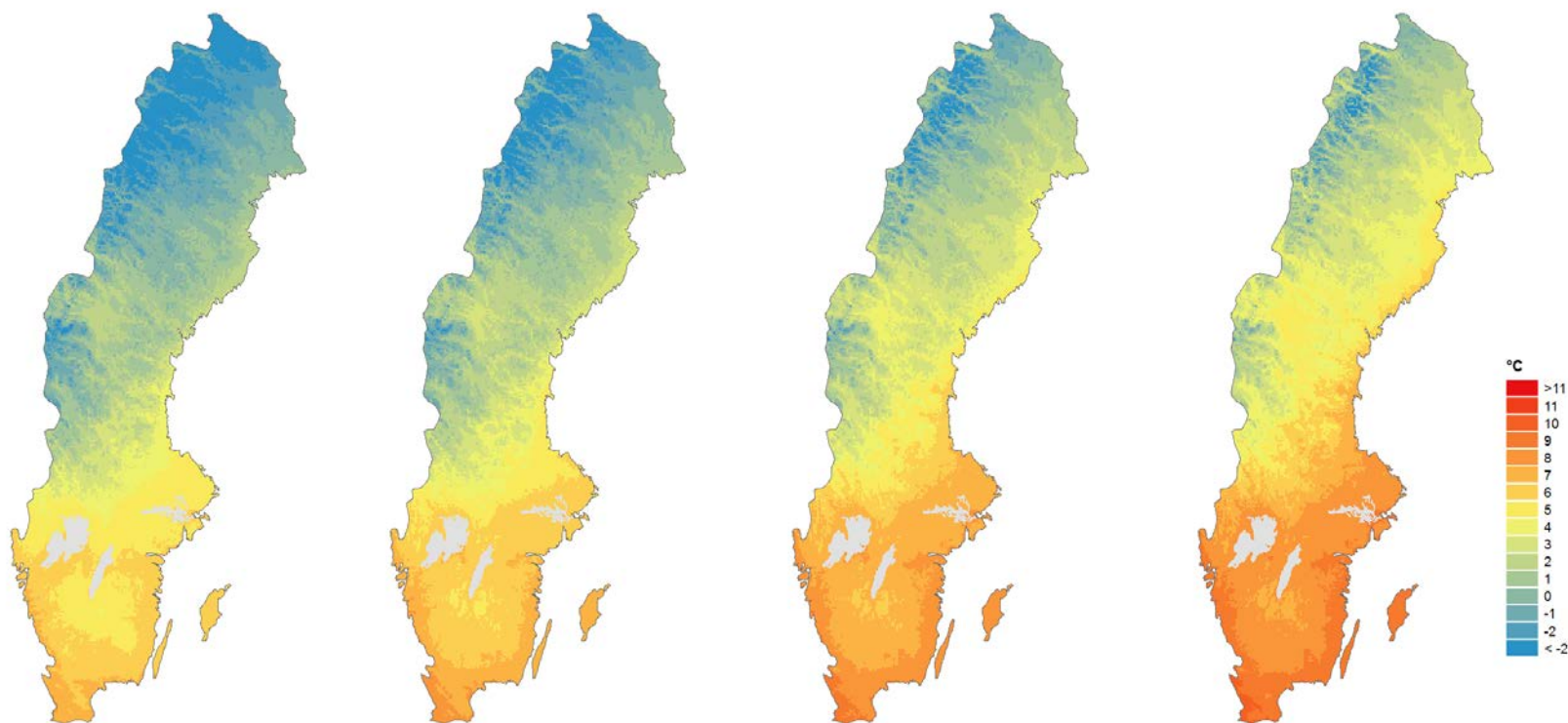
RCP 4.5

1961-1990

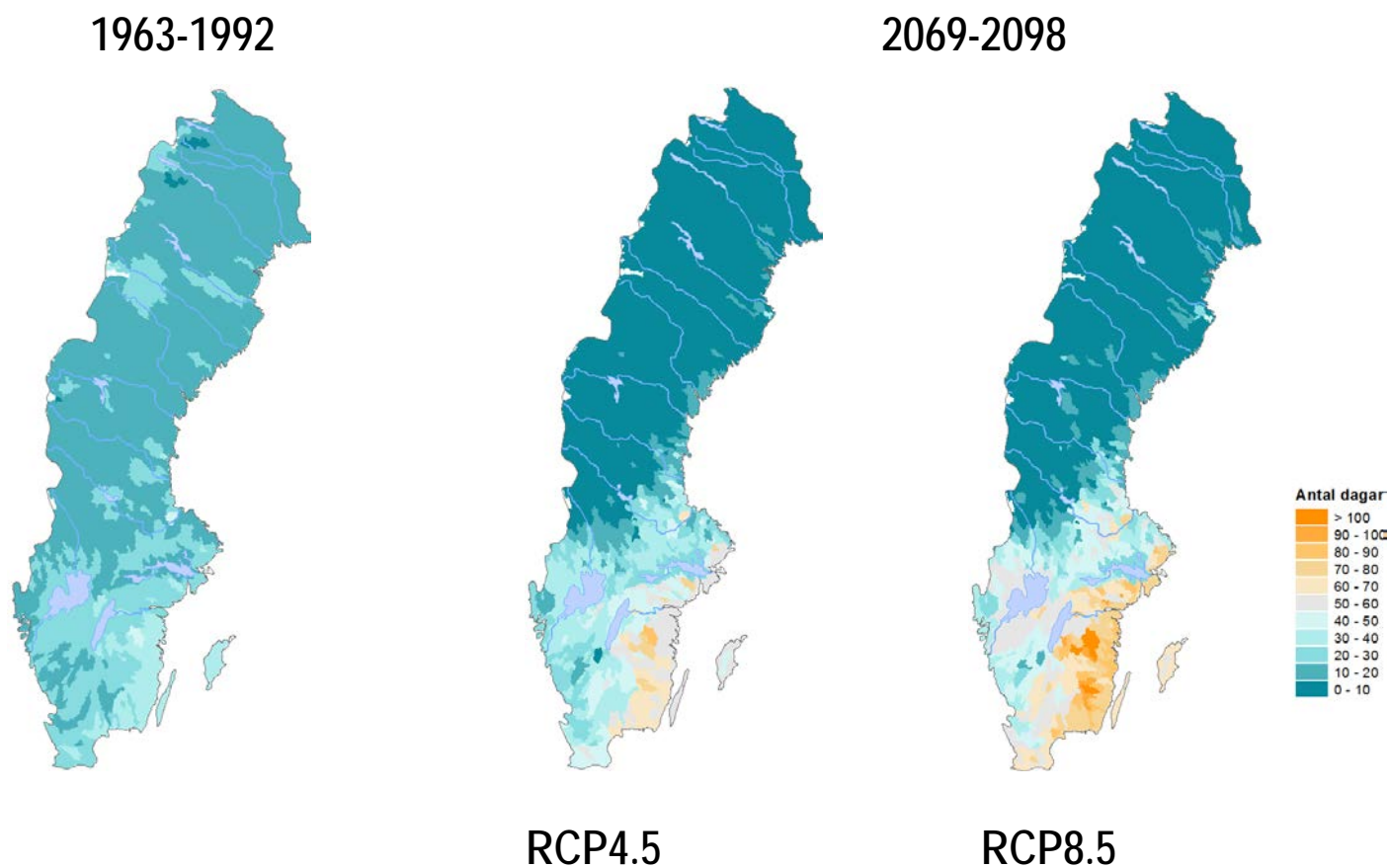
1991-2013

2021-2050

2069-2098

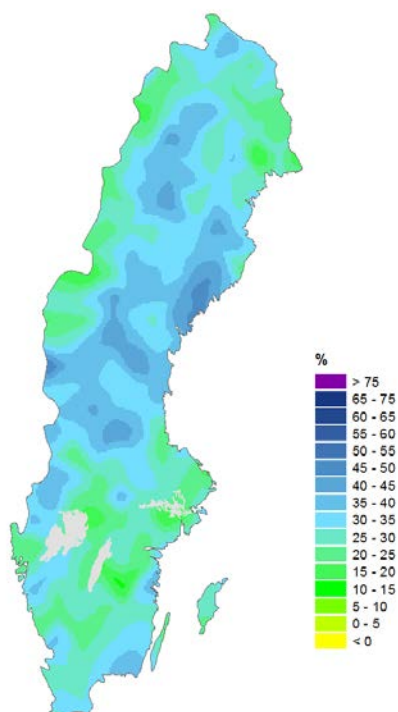


Climate Change Scenarios – days per year with low water flows

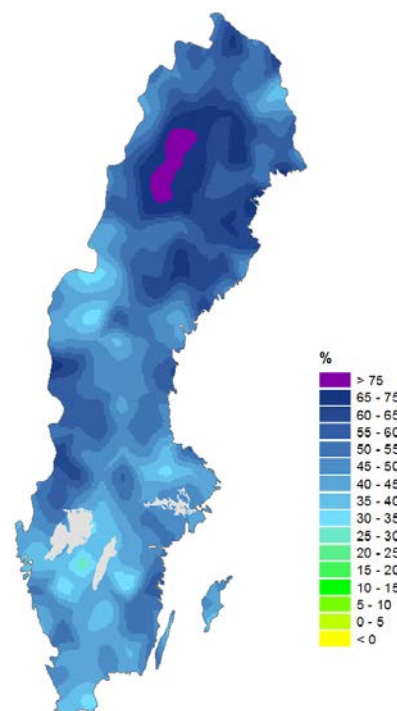


Climate Change Scenarios – Extreme Rainfall of 20 min

Change from 1961-1900 till 2069-2098



RCP4.5



RCP8.5

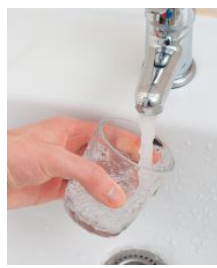
Personal education to complement digital information

- Training courses on climate and adaptation
- Demonstration by visualisation
- Guidelines for use of climate scenarios
- General and specific lectures
- Supporting networks
- Personal support



Existing coordination forums in Sweden

- Agency network for shore erosion
- Committee on dimensioned flows in hydroelectric dams in a changing climate
- Delegation for landslides
- National network for drinking water
- National platform for disaster risk reduction
- National portal for climate change adaptation
- Network for regional government offices
- Network for Making Cities Resilient



National Climate Change Adaptation Portal

- Tool for disseminating information
- Collects updated knowledge
- Provides good examples
- Supports actions
- Cooperation of 16 national authorities
- Cooperation of 21 regional authorities

FÖR ALLA



Organisera klimatanpassningsprocessen

Analysera sårbarhet och strukturera klimatanpassning övergripande.



Åtgärder

Identifiera, välja och genomföra åtgärder.



Följa upp

FÖR KOMMUNER OCH FASTIGHETSÄGARE



Integrera klimatanpassning i kommunen

Lyft in klimatanpassning i kommunens pågående arbete och processer.



För fastighetsägare

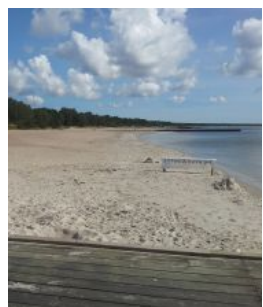
Information och råd för alla fastighetsägare.

Klimatanpassningsportalen

Examples: Climate Change Adaptation in Practice



Climate adaptation of **forestry**, Häradsmarken. Forestry takes up a large part of Sweden's surface. Climate change will likely mean a higher average growth in the forest, while the risk of damage increases. The forest management company Härad Soil AB works in several ways to spread the risk of future damage to the forest: changes in thinning, tree species and planning of deforestation.



Ystad Municipality has long had problems with **erosion along the coast**. Beach erosion is expected to accelerate because of rising sea levels. The solution to the problem was the protection of beaches with sand exposition, known as **beach nourishment**. In 2011 Sweden's first large-scale beach nourishment took place on two beaches outside Ystad.



Storm water management in Malmö. In the district Augustenborg, an open storm water system has been introduced as a measure against regular basement flooding. Since then there has been no flooding despite torrential rain. The measures were part of a larger project to renovate and make the district ecologically sustainable.

Summary supportive & knowledge raising activities

- Dedicated funding by the Swedish Government
- Prominent research at the Rossby Centre
- Establishment of a Knowledge Centre
- Broad collaboration with stakeholders
- Collection and sharing of digital information to facilitate sound decision making
- Communication and education to build adaptive capacity among stakeholders
- A node: National Climate Change Adaptation Portal klimatanpassning.se

Work ahead and future challenges

- Make knowledge, decision support and early warning systems more accessible
- Method for calculating the worst possible short-term precipitation (torrential rainfall)
- Guidelines for dimensioned sea level for different parts of Sweden
- Involve business and civil society in the work to a greater extent
- Customized knowledge support to different parts of society – numerous and well-coordinated efforts are needed.



Thank you for the attention!

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