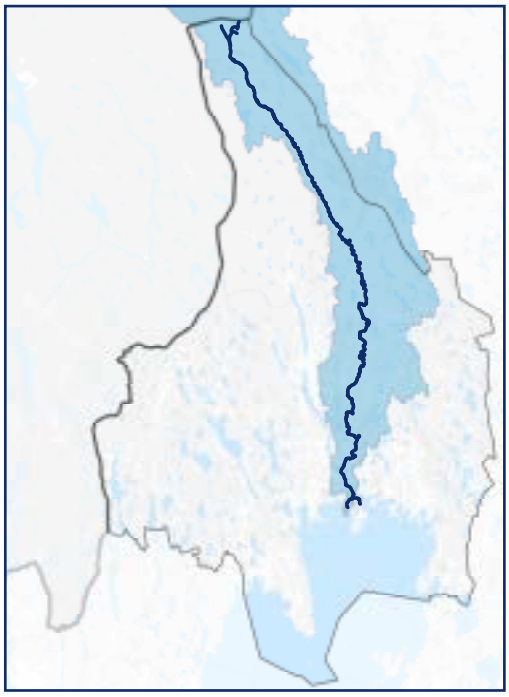
Interreg
North Sea Region
C5a
European Regional Development Fund

EUROPEAN UNION

River Klarälven,. Värmland
- Climate adaptation with a holistic approach

About the case study and the project C5a



Within the international climate adaptation project (Interreg North Sea region, C5a 2019-2022), Värmland conducted a case study. Together with stakeholders surrounding the river Klarälven, we explored how a holistic perspective and cooperation across areas could benefit measures and development work in the area. This to promote collaboration and increase knowledge sharing about the impact of a changing climate on the Klarälven river's flow, regulation and area.

C5a (Cluster for Cloud to Coast Climate Change Adaptation) is a collaborative project in the field of climate adaptation with participants from the Netherlands, Belgium, Germany, United Kingdom, Denmark and Sweden. For more information, see the project's website:
www.northsearegion.eu/c5a

How does the concept Cloud2Coast work in practice?

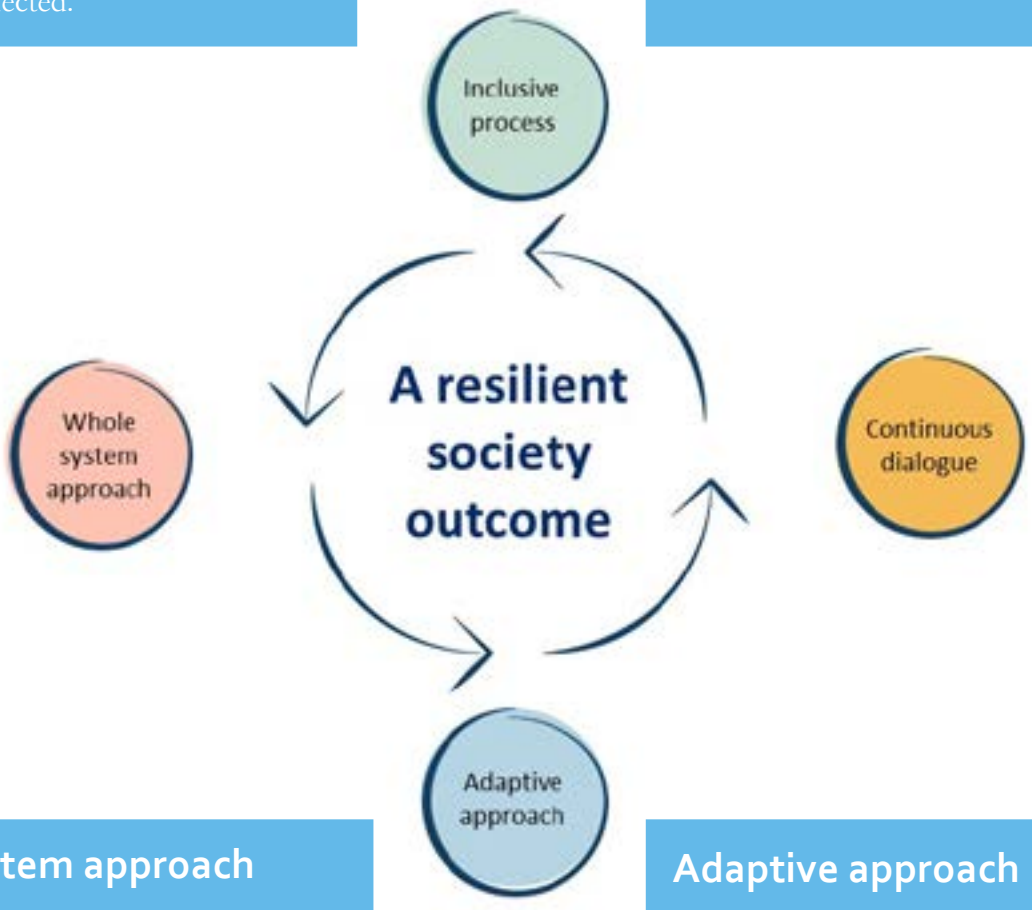
See the explanatory video here!

Inclusive process

- Include more, there are often more like affected than you first think.
- Advocate for joint decisions
- Include not only authorities and public actors but also representatives from all affected.

Continuous dialogue

- Have a continuous dialogue with stakeholders during the process.
- Shared learning.
- Aim for common agreements and decisions.



Whole system approach

- Holistic view
- Broaden your perspective in both subject areas and geographical areas.
- Collaborate between sectors and organizations.
- Extend the time perspective. Different factors can develop and change over time.

Adaptive approach

- Work in a changing process.
- Continuously evaluate and adapt to changing needs and circumstances.
- Work strategically and operationally.

How did we approach the case study?

1

Identify climate-related events that are a challenge or opportunity for different areas of interest.

During the first workshop, the discussions centered around climate effects in the catchment area linked to, for example, snow, high temperatures, drought and fires. Also about the impact of these events on, among other things, nature tourism, electricity networks, ecology, water quality and infrastructure. Both heavy rainfall and high flows were of interest. But also more changes during the year in terms of drought, precipitation patterns and warm years.

There was an interest in looking at the effect of extreme events but also how longer and more structural changes affect different interests. For example, an extended growing season, increased evaporation, changed precipitation patterns and a shorter frost period.

2

Visions and goals

After identifying climate-related events, the focus was turned forward and to the visions for the Klarälven river area. From the perspectives of the various interests that were represented. How do you want the area to look and be like in the future? What are the goal conflicts? How have we taken care of a changing climate? What characterizes a sustainable society in the area?

- The overall conclusion that we came to in this workshop was, that if you have an overall vision ”attractive, sustainable, long-term, etc.” then ”everyone” can stand behind it. If you become more specific ”want to build erosion protection”, ”want to make the river meander” etc., then you see clear goal conflicts, says Karin de Beer, climate adaptation coordinator Länsstyrelsen Värmland.

Some examples of visions and goals that were discussed:

- Better hiking trails along the river and the opportunity to fish for wild salmon. Tourism/Outdoor life.
- Sustainable forestry, attractive for trade and industry and small-scale and diversified businesses. Business.
- The dialogue with power plant actors is good and the opportunities to regulate the river based on different climate-related needs are well developed. Hydropower.
- People must be protected and buildings and infrastructure must not be damaged by climate-related events. New housing and infrastructure are being built on secure land. Land with landslide and landslide risk is remedied with sustainable solutions for existing buildings. Security and infrastructure.
- The morphology reaches good ecological stature. The floating plane is mostly natural. This means that high flows are taken care of by flooding over the plane. This reduces the risk of flooding downstream. Nature conservation water conservation/ecosystem services.
- It is important to find solutions that are good for both nature and people. Build climate-smart and resource-efficient. Spatial planning and development.
- Nature-based and flexible solutions. Have the opportunity to continuously evaluate and change. Climate adaptation

3

Flow modeling, measures and their impact based on two cases

Based on what was discussed during the previous workshops, SMHI (the Swedish Meteorological and Hydrological Institute) a flow modeling of the river Klarälven in a changed climate was made. A selection of the conclusions in the report:

- During the winter months, larger flows than those in the reference period will become more common due to increased temperatures, which means that precipitation will take place more in the form of rain than snow.
- Spring flow at the end of the century will occur earlier than for the reference period.
- According to one scenario, spring flow peaks will also be smaller than those observed in the reference period. Increased temperatures throughout the year cause early snowmelt, while snow cover becomes smaller than normal.
- Increased temperatures and precipitation affect the autumn flow which will increase in the future.
- Highest and lowest flows from the reference period become more rare. The flow that occurs most of the time will be a higher flow than in the reference period.

Based on two cases, two groups discussed and proposed measures, conventional and unconventional, which could solve the problem in each of the cases.

- Case 1, upstream: Landslides threaten road 62
- Case 2, downstream, Karlstad: Floods threaten the city Karlstad

Discussions followed about the impact of the measures on the various visions and interests. And on what effect the measure would have upstream and downstream.
It was found that these are complex issues to work with. Partly because we have different interests and perspectives and partly because it can be difficult to predict what happens in other places in the river during measures upstream and downstream. Different approaches contribute to new thinking and understanding of each other's work.

The groups also stated that collaboration is needed along the entire river and that it would be good to find a way to further work together with issues concerning the river.

What have your participation in this case study given you?

"I have learned more about other people's perspectives. That authorities and municipalities at the overall level have the same goals, about sustainability and that you should have a dialogue, but when you discuss details, it starts to get interesting. I have also realized that it is not interesting to look at mean values, but important to see extreme values and the normal variation. "
- Liisa Larsson, Environmental & nature conservation officer, Hagfors municipality

"It is important to gather different knowledge around and talk through it at an early stage. I like to go back into the future, look at what has happened before, it will surely happen again. What should I prepare for and what does the change look like. I carry the story into the future. Many only look forward and just talk about change, but we have a long history with us that we can use. "
- Claes Kjörk, Water regulation manager, Fortum

To dare to have a discussion about which interests are important in which area. It may be that you can not solve everything, which we as an public authority have a tendency to want to do. It's a lot about legislation and finances, but we will not solve this without collaboration. "
- Malin Lind, National coordinator for climate adaptation, The Swedish Transport Administration

"It has been exciting and challenging to be able to convey and discuss on what has been developed in the overall international project together with all our participants."
- Elin Ljunggren, Project coordinator, Värmland County Administrative Board

"In my work as a climate adaptation coordinator, it has been rewarding to gather the various actors in Värmland to get their perspective and create contacts for future work together."
- Karin de Beer, Climate adaptation coordinator, Värmland County Administrative Board

Thank you to all who participated!

Within the case study, we also had a smaller working group part-financed by SMHI and the authorities' climate adaptation network. The group consisted of representatives from: Värmland County Administrative Board , the Swedish Meteorological and Hydrological Institute, Swedish Geotechnical Institute and the Swedish Transport Administration. The group planned and carried out the case study activities.

Länsstyrelsen Värmland

SMHI

TRAFIKVERKET

SGI Statens geotekniska institut

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