

## Third workshop in the case study



On November 10, the third and final workshop was organized with the case study group in the C5a project. The participants took their starting point in two different cases to discuss in groups possible measures to handle the problem stated in each case. Subsequently, the proposed measures were linked to a number of overall target images that were developed during previous workshops in the case study. During the workshop, SMHI presented the results of a flow modulation carried out on behalf of the project. The meeting was also visited by Paul Sayers from the UK who told more about the Cloud 2 Coast concept.

## Results from flow modulation

During the most recent workshop, SMHI presented the results of the flow modeling carried out on behalf of the project. The purpose of the flow modeling was to deepen knowledge about how common different types of flows will be in the future and what effects they can have on e.g. sediment transport and stakeholders along the River Klarälven.

A flow analysis for the current and future climate was performed for the Edforsen catchment area in the River Klarälven. The analysis of different types of flows was based on the hydrological model S-HYPE, which is a special set of the HYPE model according to Swedish conditions. The modeling was run with current weather conditions and two different emission scenarios for future periods.

### Conclusions

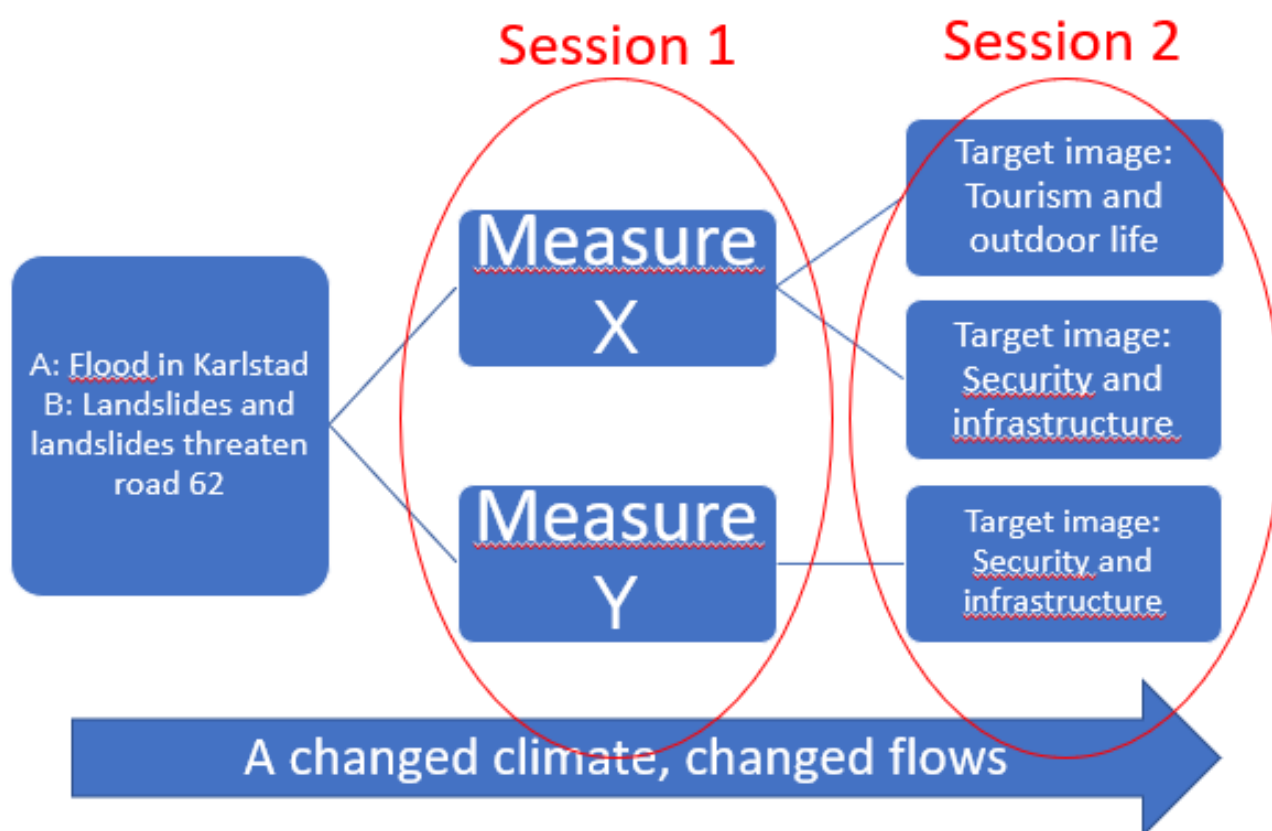
- During the winter months, larger flows than those in the reference period will become more common due to increased temperatures, which means that precipitation will take place more in the form of rain than snow.
- Spring flow at the end of the century will occur earlier than for the reference period. 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 the snow cover becomes smaller than normal.
- Summer flow will not be affected by climate scenarios due to a balanced effect on increased precipitation during the summer with a longer growing season and evaporation.
- Increased temperatures and precipitation affect the autumn flow which will increase in the future.

## Workshop with two cases

Based on two cases, the participants were divided into two groups where the focus during the first session was on devising proposed measures, large and small, that could solve the problem formulation in each case.

- **Case 1, upstream: Landslides and landslides threaten road 62**
- **Case 2, downstream, Karlstad: Floods threaten Karlstad**

During session two in the workshop, the groups continued to work with the measure proposals that were developed during session one, but now by analyzing the measures' impact on different target images / interests that exist, and considering what effect the measure would have upstream and downstream.



## Reflections

- Both working groups stated 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 operations upstream and downstream.
- The fact that there are different approaches contributes 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 work further together with issues concerning the river.

## Reflections from the case study working group

**Kenth Henriksson,  
The Swedish Transport Administration**

“Educational to jointly discuss solutions with areas of activity other than one’s own. You get a completely different insight into the impact and difficulties they face. Good knowledge from the ”live projects”.

Positive that it is a case study so we are not bound by our formal roles. One can discuss more openly. And it requires discussion if we are to find ways in the future to look at the whole when we choose solutions. Because there is someone who has to pay more in some way when you have conflicts of interest and we have to choose.

A very good network. I have now received inputs to several actors that I can benefit greatly from in my sustainability work. So I am happy to be involved and try to find ways forward in sustainable development. ”

**Hjördis Löfroth,  
SGI**

“Educational to participate in discussions and get to share other perspectives and knowledge than the one you have. Greater understanding of the various aspects that must be taken into account in climate adaptation measures. Realize what an advantage it would be and at the same time what difficulties can arise when many actors have to work together to find optimal measures, which benefit many different interests. ”

## What happens now?

In 2021, a dissemination webinar will be arranged for a wider target group where we share experiences and results from the work. The invitation to the webinar will come at the beginning of 2021. Planning is also underway to possibly arrange additional workshops. The main project C5a is ongoing until 2022.

## Facts about the case study and the C5a project

Värmland County Administrative Board in Sweden is participating in C5a, an international project taking place between 2019-2021 . The project deals with climate change adaptation. Within the project Värmland is conducting a case study about River Klarälven on water flow and regulation in a changing climate.

We want to investigate how a holistic perspective and cooperation across subject areas benefits measures in the River Klarälv area. The goal of the case study is, among other things, knowledge sharing between stakeholders in the River Klarälven area, which contributes to a holistic perspective. This will increase knowledge about the impact of a changed climate of the river flow of Klarälven, regulation and area and increase collaboration across subject areas and geographical areas. It will also integrate a holistic perspective in the planning of measures in the River Klarälven area.

Within the case study, we also have a working group funded by Swedish Meteorological and Hydrological Institute (SMHI) and the authorities’ climate adaptation network. The group consists of representatives from: Värmland County Administrative Board, SMHI, The Swedish Geotechnical Institute (SGI), The Swedish Transport Administration. The group works to plan and carry out the case study’s activities and compile the results.

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