CLIMAAX: Efficient climate risk analysis for improved adaptation

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Introduction

The aim of **CLIMAAX (CLIMAte risk and vulnerability Assessment framework and toolboX)** is to

- provide financial, analytical, and practical support to enhance regional climate and emergency risk management and to
- contribute to the harmonization of climate risk assessment across the EU through the creation of a framework for climate risk assessment and a toolbox for its execution.

These tools have been tested in Finland, where we conducted a risk analysis on **wildfires in Southwest Finland**.

Materials and methods

For the wildfire risk analysis, we used Canadian **Fire Weather Index (FWI)** data from five EURO-CORDEX regional climate models under the RCP4.5 scenario.

We combined the FWI with an **indicator for fuel availability** (abundance of burnable vegetation derived from ESA land cover data) to compute a fire danger index.

For the final risk analysis, we then combined the fire danger index with the **population density** and the **amount of people living in the woodland-urban interface (WUI)** using Pareto analysis to identify the areas of highest risk in the region.

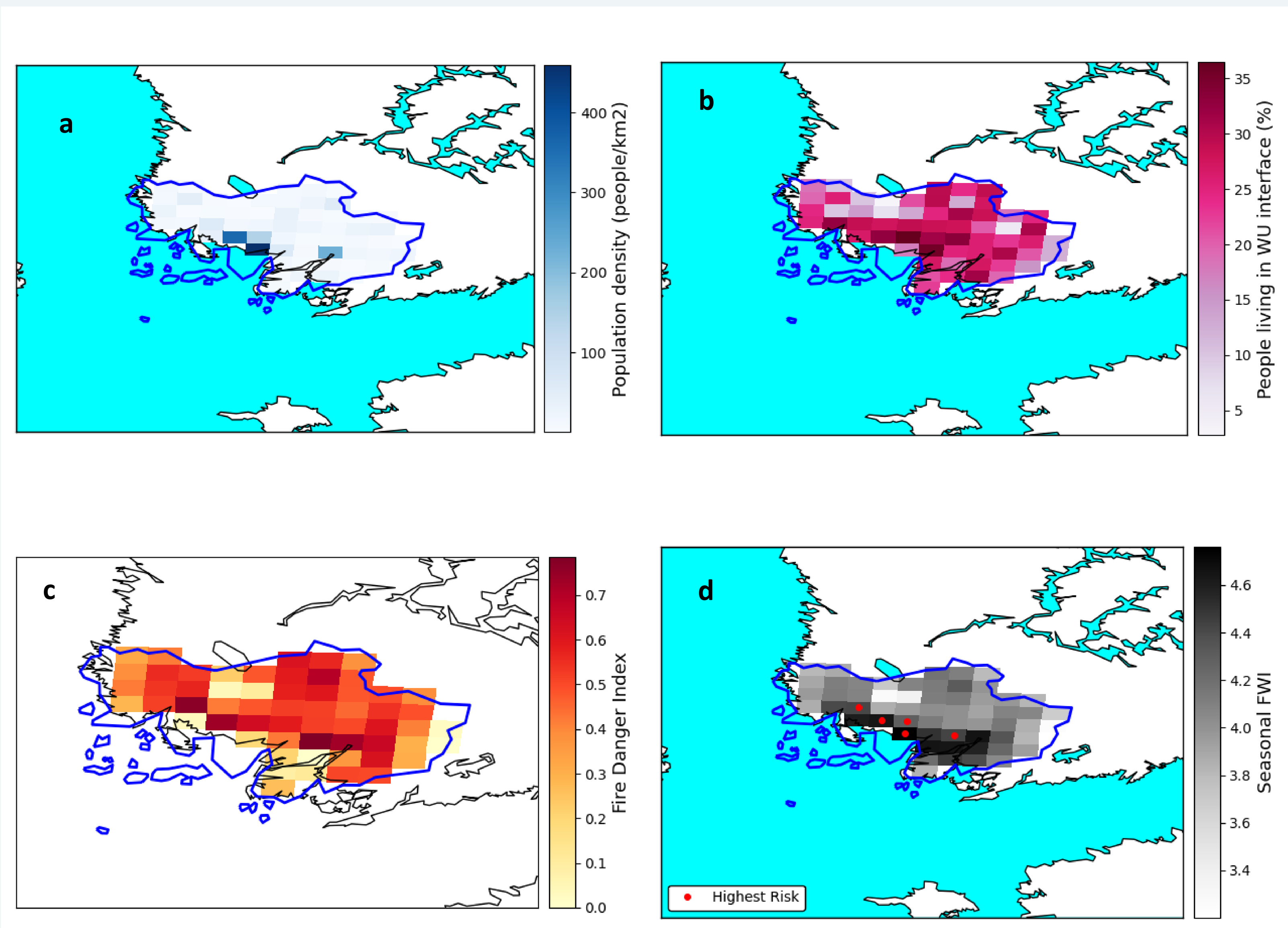

Figure 1: Visualisation of the fire risk analysis: We used Pareto analysis to combine the population density (a), the percentage of people living in WUI areas (b), and the fire danger index (c). The areas of highest risk are indicated with red dots in (d). For reference, the seasonal (MJJAS) average fire weather index is shown as well (d, grey shading).

Furthermore, we analysed if the length and intensity of the wildfire season changes in future climate projections. To this end, we defined a **regional fire weather day**, where the FWI exceeds a given threshold in a given percentage (here 50%) of the region. As FWI threshold we used half of the (model-specific) 95th percentile of all FWI values in the region.

We compared the historical period (1975-2005) to mid-century (2039-2068) and end-of-century (2069-2098) projections. As short-term preparedness of the Finnish rescue service was one of the most important goals of this analysis, we focused most on the mid-century results.

Results

The results indicate **an increase in regional fire weather days during spring** and, to a lesser extent, autumn, while during the summer months the number decreases.

Potential causes for increased wildfire risk in spring include

- reduced winter snow cover;
- more frequent melting of snow during winters due to higher temperatures and/or
- decreased snow albedo.

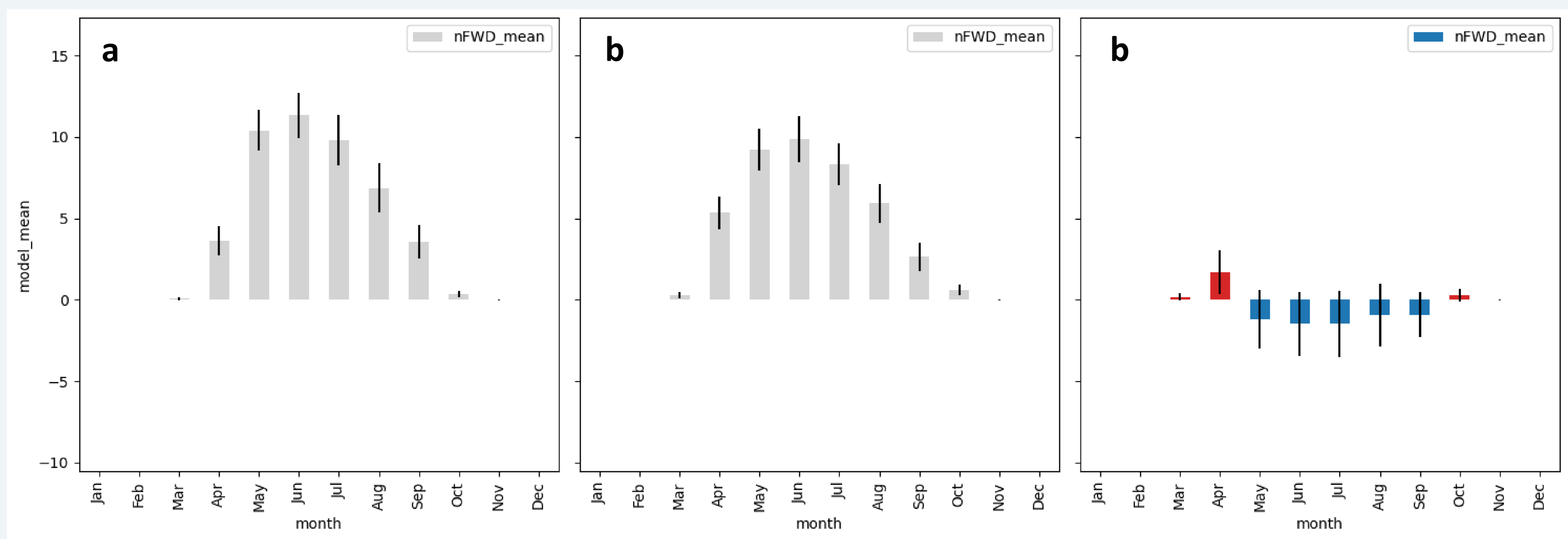

Figure 2: Model average of regional fire weather days in Southwest Finland. (a) historical period (1975-2005), (b) mid-century (2039-2068), and (c) absolute change.

Recommendations

Combined with other research, we can provide practical recommendations for stakeholders, e.g., forest owners or rescue services:

- Clearing out forests before spring;
- Allocation of resources to areas with debris (high-risk areas);
- Awareness-raising activities and communication campaigns with the residents;
- For **areas with higher population density** and number of people living in WUI areas: allocation of fire and rescue service resources to high-risk areas;
- For **areas with less population and less resources**: e.g. drone operations for quicker detection and better situational awareness, scouting peoples' capabilities in advance (to be able to help in case of need), providing small sets of fire extinguishing gear in/near high risk areas.

While the results are indicative and we need to evaluate the suitability of the models further, the CLIMAAX tools are an asset in the creation of relevant regional climate risk assessments.

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More about the project: www.climaax.eu

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