Short summary of the Adapt-FIRST approach to climate change risk analysis

What is Adapt-FIRST?

It's a four-year research project funded by the Research Council of Finland that ends on 31 August 2024. The project applies impact models to estimate how climate change may affect different natural and human systems of relevance in Finland and to see how adaptation can modify those outcomes.

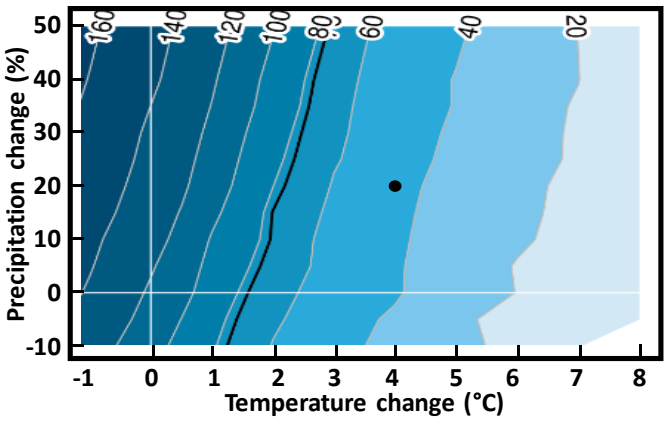
What are impact models?

Climate impact models are computer models that simulate the behaviour of systems that are sensitive to climatic variables such as temperature or rainfall. In Adapt-FIRST, the systems of interest concern aspects of forests, agricultural crops, human health, water resources and winter recreation. The project applies a novel type of model analysis for examining climate change impacts and adaptation.

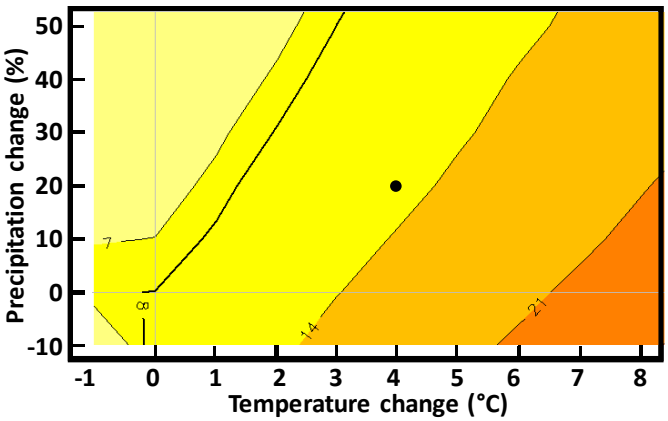
What's novel about the Adapt-FIRST analysis?

The future is uncertain, and this applies both to the future climate as well as to other non-climate factors affecting climate change impacts (such as the number and types of people exposed to climate change effects). In Adapt-FIRST we conduct a sensitivity analysis, using a common approach, to explore the modelled behaviour of different systems across a large range of future conditions. We present the results on impact response surfaces (IRS) like these.

No. days with snow depth > 20 cm, Vuokatti



No. days with high fire danger (FWI >17), Kajaani



Why impact response surfaces?

Three reasons. ***First***, an IRS offers an instant visual impression of how a system indicator responds to changes in driving factors relative to the present-day (where the zero lines intersect). The examples show modelled responses of two completely different indicators, plotted similarly for combined changes in temperature and precipitation. Annual number of days with snow depths suitable for cross-country skiing are shown on the left; annual number of days with a high danger of forest fire on the right. ***Second***, with such a surface it is possible to explore impacts of a specific climate projection, by locating its temperature and precipitation changes on the IRS and reading off the impact (for example, black dots mark a projection of 4°C warming and 20% precipitation increase). ***Third***, if multiple climate projections are expressed probabilistically, it becomes possible to explore the likelihood of a certain impact being exceeded.

What does this have to do with adaptation?

There are two avenues we can explore for adaptation. ***First***, the IRS informs about potential impacts of climate change, and using this with a range of scenarios can tell us about the timing of impacts and the urgency to act through adaptation. ***Second***, most of the Adapt-FIRST impact models can simulate adaptation measures. Examples include forest management, water regulation or crop substitution. The effect of adaptation is seen in altered sensitivity, resulting in a different IRS.

Prepared by T.R. Carter & S. Fronzek, with IRS plots from Adapt-FIRST hydrological & forest fire impact model runs, June 2024