

New scenarios for the Finnish agriculture and food sector in a changing climate

Agriculture in Finland is already being affected by a warming climate and future projections suggest that warming will continue at a much faster rate than the global average. Adapting to and mitigating climate change pose major challenges for agriculture. How the agriculture and food sector responds to different changes brought by climate change will depend on how markets, technology and society as a whole develop. Such socioeconomic changes will determine how exposed and vulnerable societies are to a changing climate. They also affect the possibilities to adapt to these changes and to mitigate the greenhouse gas emissions that are causing climate change in the first place.

No one can be sure how socioeconomic development will proceed in the future, but we can construct scenarios that describe different possibilities. A newly published article¹ led by researchers at Natural Resources Institute Finland (Luke) and the Finnish Environment Institute (SYKE) does just that. The [article](#), in the journal *Regional Environmental Change*, paints four alternative pictures of possible future socioeconomic developments that could be important for Finnish agriculture under a changing climate. The titles of these future pathways offer a clue to the differences in possibilities:

- SSP1: Sustainability—Taking the green road
- SSP3: Rocky road—Regional rivalry
- SSP4: Inequality—A road divided
- SSP5: Fossil-fuelled development—Taking the highway

The four pathways² are based on the global “Shared Socioeconomic Pathways” (SSPs). These are among the five global future pathways of socioeconomic development during the 21st century that are being used worldwide in climate change research and by the Intergovernmental Panel on Climate Change (IPCC) for assessment. The global SSPs are described in part using words, as narratives, and in part using numbers, such as projections of population, economic development and urbanisation.

In order to make these relevant for the agriculture sector in Finland, it was necessary to extend the global SSPs, describing in more detail those key socioeconomic drivers of importance for the sector. To do this, a workshop was held where about 30 national stakeholders were consulted. They represented a range of interests and activities in the sector. There were guided group discussions on the four different SSPs, each describing very different conditions for the development of the agri-food economy up to 2050 and beyond. Discussions focused on five themes: diet, the food industry, agricultural and horticultural production, technology and environment, considering these from the perspective of consumers, producers and policy makers.

Based on the workshop discussions, four SSP narratives were constructed describing the projected socioeconomic context for Finnish agriculture. These are mainly consensus interpretations, but they also account for important minority perspectives that were expressed. Some of the interesting messages to emerge included:

¹ Lehtonen et al. (2021) Shared socioeconomic pathways for climate change research in Finland: co-developing extended SSP narratives for agriculture. *Regional Environmental Change* 21, 7 (2021).
<https://doi.org/10.1007/s10113-020-01734-2>

² Note that a fifth, SSP2 Middle of the Road is missing from the list. Projections for SSP2 fall between the other four SSPs and were not used in the Finnish study.

- The state of the environment, even if it deteriorates under some SSPs, would still remain more valued in Finland than in most other regions of the world.
- Agricultural support, though reduced, would still be necessary in Finland under all SSPs.
- SSPs foreseeing limitations on world trade would present opportunities to diversify domestic production.
- Any pathway in which livestock production decreases and plant-based diets increase would lead to a significant reduction of cultivated land in Finland.

“Having a set of descriptive scenarios such as these that were co-produced with stakeholders provides an excellent basis as well as credibility for investigating climate change and Finnish agriculture in the coming years” commented Research Professor **Heikki Lehtonen** from Luke, lead author of the article. “An obvious next step would be to convert these descriptions into numerical format so that they can be used in models of the agricultural production and food economy in Finland”. Lehtonen is also greatly encouraged that the Finnish narratives co-developed with Finnish stakeholders appear to align nicely with a set of narratives constructed for the agricultural sector in Europe. “Eur-Agri-SSP” narratives were co-produced with more than 100 stakeholders across Europe and recently published in the journal *Global Environmental Change*³, where Lehtonen was a co-author.

The Finnish narratives were constructed as part of a broader national study⁴ on scenario development based on the global SSPs co-ordinated by another of the co-authors, Research Professor **Timothy Carter** of SYKE, and involving SYKE, Luke and the Finnish Meteorological Institute. Both the Finnish and European SSP narratives contribute to an expanding worldwide literature reporting uses of the SSPs that was recently reviewed in the journal *Nature Climate Change*⁵, where Carter was a co-author.

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³ Mitter H, et al. (2020) Shared socio-economic pathways for European agriculture and food systems: the Eur-Agri-SSPs. *Global Environmental Change* 65:102159., <https://doi.org/10.1016/j.gloenvcha.2020.102159>

⁴ The study was part of the PLUMES (Pathways linking uncertainties in model projections of climate and its effects) project funded by the Academy of Finland: <https://www.syke.fi/projects/plumes>

⁵ O’Neill BC, et al. (2020) Achievements and needs for the climate change scenario framework. *Nature Climate Change* 10: 1074-1084, <https://doi.org/10.1038/s41558-020-00952-0> also summarised in Finnish at: [https://nc.yha.cloudnc.fi/Syke/fi-FI/Ajankohtaista/Tutkijat_arvioivat_ilmastonmuutoksen_vai\(59125\)](https://nc.yha.cloudnc.fi/Syke/fi-FI/Ajankohtaista/Tutkijat_arvioivat_ilmastonmuutoksen_vai(59125))