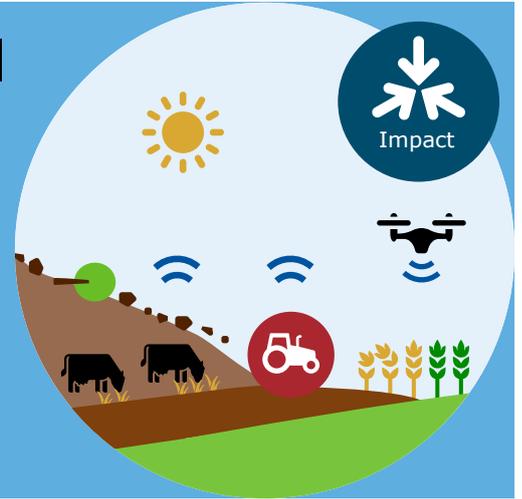


Climate impact on agricultural labour productivity

An approach to quantify the impact of climate change on agricultural labour productivity

Emerging DS/AI methods



Data Driven Discoveries in a changing climate (D3C2)

Objective: This project aims to develop, test and implement a methodology to quantify the risks of climate change on agricultural labour productivity.

Activities and results

Climate impact on agricultural labour productivity (CIALP) is a collaborative programme between researchers from Wageningen Economic Research and Wageningen Environmental Research. In CIALP, experience on how to process and prepare big climate data and analyses of labour data from socioeconomic databases were used in machine learning models.

We combined machine learning model approaches with many geospatial predictors, such as distance to cropland, climate and accessibility) to downscale subnational labour statistics. Based on that, we created high-resolution maps that show the geospatial distribution of agricultural workers in India. These maps were combined with a heat metric. We used wet bulb globe temperature, a thermometer covered in a wet cloth, to measure the body temperature of workers. Under current and future climatic conditions, we first wanted to establish how many workers are affected by heat stress. Secondly, we wanted to quantify the related loss in productivity. The main activities consisted of a literature review, data processing, model development and quantitative analysis.

Achievement

We managed to develop and implement a data processing pipeline to analyse the impact of heat stress on agricultural labour productivity at grid level. This approach was tested for India but can easily be applied to other regions or at global scale in follow-up research. We used machine learning to create a high-resolution map with the location of agricultural workers. The output of the machine learning exercise makes it possible to better assess the impact of climate change on labour productivity and provide information for climate adaptation policies.

The collaboration between Wageningen Economic Research and Wageningen Environmental Research led to new insights as well as an increase in joint internal capacity and knowledge in the domain of climate change and socio-economic assessment. These results would not have been possible without a contribution of the investment programme.

Outlook

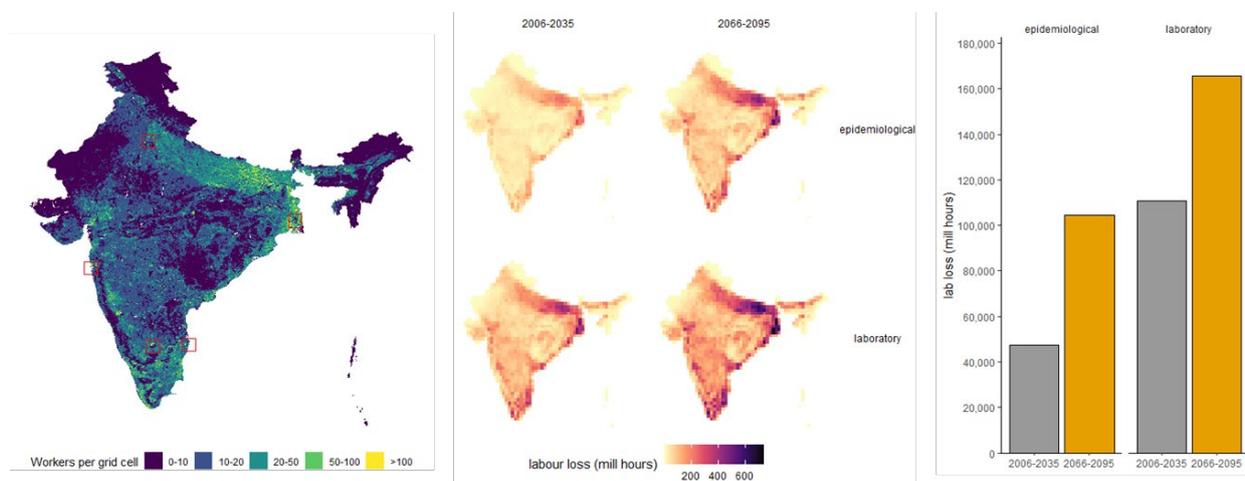
We successfully applied for follow-up funding from the investment programme for 2023 to prepare a scientific paper. We are currently working on this, and we aim to have it ready by the end of 2023. Ideally, we would have finished this paper at the end of the project. However, reaching joint understanding about the main questions of the project and the development of an analytical approach

that combined the skills of both research institutes, took more time than expected. This is perhaps not surprising as collaboration between institutes that are active in different domains (socioeconomic and biophysical in this case) takes time to develop.

It is also expected that this project will support future collaboration between both institutes in topics within the same domain. EU's Horizon Europe is an example of a programme within which Wageningen Economic Research and Wageningen Environmental Research could work well together. We also aim to expand components of this project that are valuable as a stand-alone product. One example is the creation of regional and global maps with the location of agricultural workers.

Lessons learned

The main lesson of the project is that we discovered and shared available knowledge and capacity in the domain of climate change and climate adaptation. For Wageningen Economic Research, it was very valuable to know that Wageningen Environmental Research has the experience and knowledge to process very large datasets with gridded climate data and projections. At Wageningen Economic Research, this data is often used as input for modelling, but there is no internal capacity to prepare such datasets. For Wageningen Environmental Research, it was interesting to learn more about approaches and data used for socioeconomic climate assessments and modelling.



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