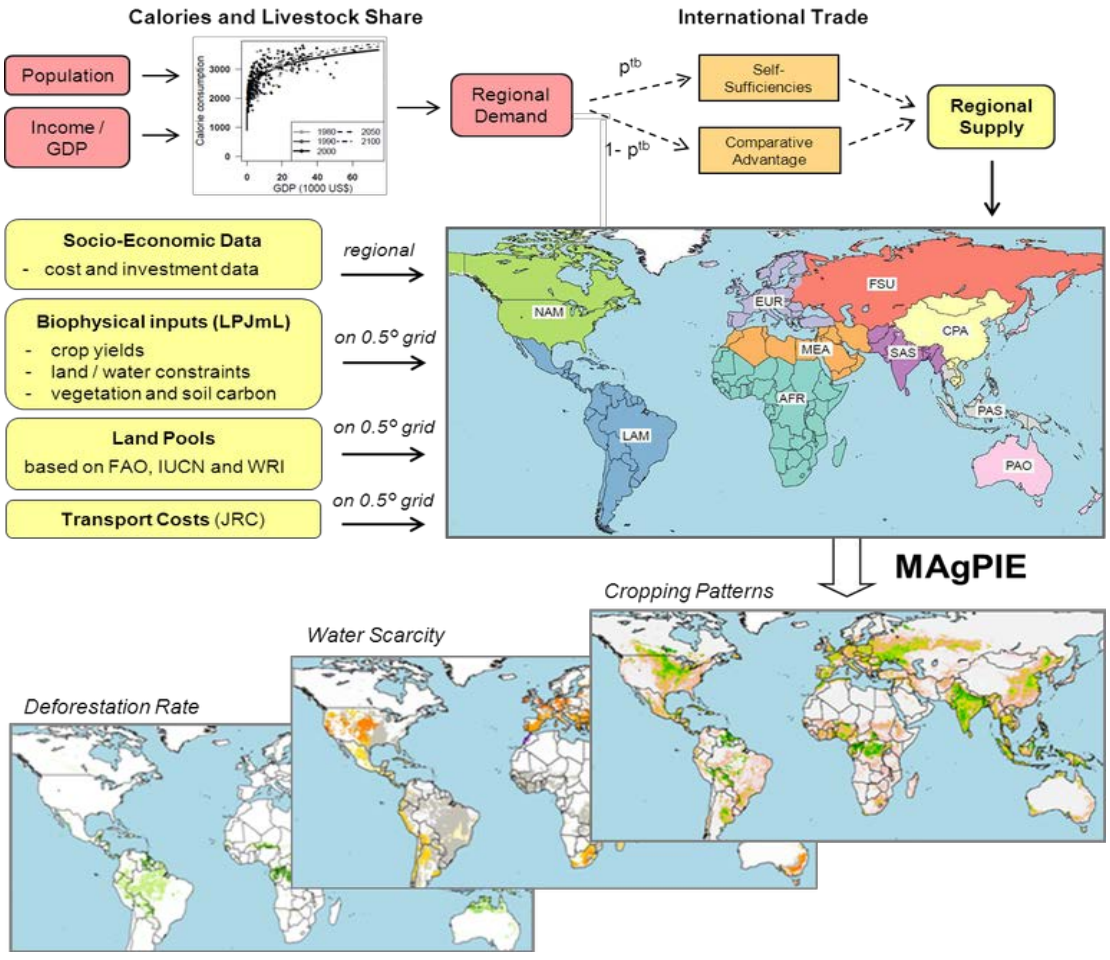
The model

MAgPIE

The Model of Agricultural Production and its Impact on the Environment (MAgPIE) is a **global land use allocation model** to derive long-term scenarios. Based on developments in population, economy, technology and climatic conditions, MAgPIE derives spatial-explicit land use patterns, crop yields and total costs of agricultural production at the grid scale.



Spatial and temporal coverage

Spatial coverage: Global

Spatial resolution: Detailed grids

Temporal scale: Until 2100 in 5-year time steps

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement NO 689150 SIM4NEXUS

MAgPIE

SIM4NEXUS

Nexus coverage

Interactions between food, water, land, climate and (bio)energy, as well as several other cobenefits (nutrient pollution, air pollution, production costs) in the agricultural sector. It includes socio-economic dynamics of the food value chain, international food availability, food trade, impact of biophysical resources (land, water, nutrients) on the agro-economic system, climate-induced changes in physical blue water availability and water-use, economic water-scarcity indicators, yield patterns of irrigated and non-irrigated agricultural production, bioenergy production and competition for biophysical resources, full endogenous interaction between food, water and bioenergy as well as optimization of resource use.

Inputs

- Population
- Income
- Bioenergy demand
- Historical land-use patterns
- Biophyiscal crop yield patterns
- Water use for crop production
- Water availability
- Production Costs

Outputs

- Cropland pasture and forest area
- Crop and livestock production
- Bioenergy production
- Water usage
- Irrigation area
- Water shadow price
- Greenhouse Gas Emissions
- Food demand for plant products and for animal-based products

Recent applications

- Bonsch, Markus, Florian Humpenöder, Alexander Popp, Benjamin Bodirsky, Jan Philipp Dietrich, Susanne Rolinski, Anne Biewald, et al. 2014. “Trade-Offs between Land and Water Requirements for Large-Scale Bioenergy Production.” GCB Bioenergy, November, n/a – n/a. doi:10.1111/gcbb.12226.
- Popp, Alexander, Florian Humpenöder, Isabelle Weindl, Benjamin Leon Bodirsky, Markus Bonsch, Hermann Lotze-Campen, Christoph Müller, et al. 2014. “Land-Use Protection for Climate Change Mitigation.” Nature Climate Change 4 (November): 1095–98. doi:10.1038/nclimate2444.

Further information

MAgPIE website

Documentation

Contact:

Alexander Popp
popp@pik-potsdam.de

Benjamin Bodirsky
bodirsky@pik-potsdam.de

PIK