

Sustainable irrigation may harm other development goals, study shows

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Pursuing sustainable irrigation without significant irrigation efficiency gains could negatively impact environmental and development goals in many areas of the world, a new study has found.

Over-extraction of groundwater for [crop irrigation](#) is one of the main causes of groundwater depletion in regions including Mexico, North East China, northern Africa, the Middle East, and the Midwest, south and west US.

The research, from Purdue University and the University of New Hampshire, examined how water use at a local level is shaped by large-scale effects such as changing population, affluence, climate, and technology. It is published today in the journal *Environmental Research Letters*. Lead author Dr Jing Liu, from Purdue University, said: "Our findings show that pursuing sustainable [irrigation](#) - targeting future water security - cannot be done in isolation. It is important to consider its interaction with other [sustainable development goals](#).

"In fact, without significant simultaneous improvements in the productivity of [irrigation water](#), it could cause a rise in food prices and additional cropland expansion. Our modelling shows that this in turn would lead to a further 800 thousand undernourished people, and an additional 0.87

gigatons of carbon emissions."

In water-focused economic models, ignoring geophysical variations within an economy can give misleading projections of local water demand and supply.

To overcome this, the researchers used a gridded global model of crops, land use, and [carbon emissions](#), known as SIMPLE-G. They combined this with the global Water Balance Model to investigate the implications of pursuing sustainable irrigation in terms of food security and land use change.

Dr Liu said: "Our results suggest that, to achieve United Nations' Sustainable Development Goals (SDGs), what is needed are policies that simultaneously address the socio-economic and ecological elements of the problem.

"It's also crucial to distinguish between sustainable irrigation and the overall conservation of the irrigated land. To ensure food security, irrigation should be encouraged wherever and whenever it is environmentally sustainable, so the key is to improve the spatial and temporal allocation of [water](#) used for irrigation."

More information: Achieving Sustainable Irrigation Water Withdrawals: Global Impacts on Food Security and Land Use, *Environmental Research Letters* (2017). DOI: [10.1088/1748-9326/aa88db](https://doi.org/10.1088/1748-9326/aa88db), iopscience.iop.org/article/10.1088/1748-9326/aa88db

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