UNITED RESEARCH FORUM
(CONNECT WITH RESEARCH WORLD)

4th International Congress on Earth and Geological Sciences

July 21-22, 2025 | Paris, France

Wenjiao Shi

Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China

Crop water use and crop redistribution

The Huang-Huai-Hai region accounts for 80% of China's wheat production, leading to severe groundwater depletion and substantial environmental impacts. Here we present an optimization framework for wheat redistribution to reduce both water requirements and environmental impacts without compromising production. Our results show that environmental footprints can be reduced—blue water by 16%, grey water by 21%, and greenhouse gas emissions by 19%)—while enhancing resource use efficiency, with irrigation water productivity improving by 21% and nitrogen use efficiency by 11%. Maintaining current production levels is achievable with these adjustments. Furthermore, allowing a 17–18% decrease in wheat production could result in a groundwater depth increase of 9.03–9.38 m by 2030, ensuring sustainable groundwater use. In regions experiencing groundwater depletion, blue water, grey water and greenhouse gas emissions could decrease by over one third. Our findings offer an alternative strategy for promoting sustainable agriculture in regions facing groundwater depletion worldwide.

Keywords: Crop water use, crop redistribution, groundwater depletion, nitrogen use efficiency, greenhouse gas emissions, sustainable agriculture

Biography

Dr. Wenjiao Shi's research focuses on global change and agricultural systems, with an emphasis on sustainable agriculture in the context of global change and the Anthropocene. Her work addresses three key scientific questions:

How does agriculture respond to climate change?

How does agriculture impact resources and the environment?

How can agricultural systems be optimized to adapt to climate change while mitigating resource depletion and environmental degradation?

These studies are of great significance in achieving several United Nations Sustainable Development Goals (SDGs), including SDG 2 Zero Hunger, SDG 6 Clean Water and Public Health, and SDG 13 Climate Action.

ISBN: 978-1-917892-13-1

doi.org/10.51219/URForum.2025.Wenjiao-Shi