

INTERNATIONAL JOURNAL OF WATER RESOURCES DEVELOPMENT

Special Issue

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Title: *Advancing Sustainability and Managing Rebound Effects in Irrigated Agriculture - Insights from Governance, Behavioural and Economic Perspectives*

Description of the Special Issue

This Special Issue is dedicated to how resource users and policy makers implement and adapt to technological innovations (e.g., drip and sprinkler irrigation, alternative climate-resilient crops) in irrigated agriculture. In particular, it explores pathways towards sustainable irrigation practices that avoid potential rebound effects. It is based on the scientific sessions of the LANDSCAPE 2024 conference on this topic, which was held in Berlin in September 2024.

Irrigation plays an important role in the economic development of many countries, both in the Global North and South. This role is increasing in response to the growing demand for food, driven by the global population increase and a shift towards more bio-based products. Sustaining agricultural production, particularly in regions undergoing transformative changes, is crucial as it serves as an important source of income for impoverished rural communities. Developing and improving irrigation are major ways for ensuring food provision, providing rural people with employment, and thus, mitigating poverty in many areas of the world. Irrigation has also been proposed as a key practice to address an extended drought.

The use of innovative technologies in irrigation may increase farm productivity and improve resource use efficiency and environmental sustainability. However, efficiency improvements in irrigation water use may come with rebound effects – adaptive changes in the behavior of farmers and consumers that may lead to increased water consumption. Common practices include an increase in irrigated area and a switch to more water-intensive crops. Publications included in this Special Issue will explore the adoption of technological innovations and their governance using examples from across the world. The authors will critically analyse the impact of innovations, including rebound effects and the different economic, behavioural and governance mechanisms that explain them.

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***Prof. Dr. Ahmad HAMIDOV**, who will co-lead this Special Issue, is a researcher at the Leibniz Centre for Agricultural Landscape Research (ZALF) in Germany and has extensive experience in conducting research related to natural resource management (e.g. water, land, and pasture) in Central Asia. His research interests include sustainability assessment of land and water resources, water-energy-food nexus, community-based natural resource management, irrigation governance, and climate change. He uses various scientific methods, such as participatory impact assessment, focus group discussions and participatory observation. In the past, he also served as guest editor for the International Journal of the Commons (<https://thecommonsjournal.org/articles/10.5334/ijc.1053>).*

2 most relevant publications

- ***Hamidov A, Kasymov U, Djumaboev K & Paul C (2022) Rebound effects in irrigated agriculture in Uzbekistan: A stakeholder-based assessment. Sustainability 14 (14), 8375.***
- ***Hamidov A, Daedlow K, Webber H, Hussein H, Abdurahmanov I ... Helming K (2022). Operationalizing water–energy–food nexus research for sustainable development in social-ecological systems: an interdisciplinary learning case in Central Asia. Ecology and Society 27(1):12.***

***Dr. Ulan KASYMOV**, who will co-lead this Special Issue, is a senior researcher at the Chair of Ecosystem Services, International Institute Zittau, TUD Dresden University of Technology. He is also a guest researcher at the Resource Economics Group, Humboldt-Universität zu Berlin. Ulan is trained as an agricultural economist and has 15 years of experience in research on environmental governance, institutional economics and rural development in Central Asia and Mongolia. Currently, he is involved in MORE STEP research project in Mongolia funded by the German Ministry of Education and Research (BMBF). The aim of the*

transdisciplinary study is to analyse the socio-ecological dynamics in the Mongolian steppe ecosystem in order to identify irreversible processes (tipping points) and thus prevent them at an early stage. Ulan analyses the existing policies on grassland sustainable use and conservation.

2 most relevant publications

- *Hamidov A, **Kasymov U**, Allahverdiyeva N & Schleyer C (2024). Governance of technological innovations in water and energy use in Uzbekistan. *International Journal of Water Resources Development* 40(1), 123–139.*
- *Schmidt S, Hamidov A & **Kasymov U** (2024) Groundwater governance in Uzbekistan through the lenses of social-ecological systems and informational governance. *International Journal of the Commons* 18 (1), 203–217.*

Dr. Carsten PAUL, who will co-lead this Special Issue, is a researcher at the Leibniz Centre for Agricultural Landscape Research (ZALF) in Germany. He is an environmental scientist with more than 10 years experience in assessing sustainability impacts of agricultural land use options. He quantifies impacts on the provision of ecosystem services and the efficiency of resource use, using both desk-based and stakeholder-based formats. With regard to efficiency gains in agriculture, he is particularly interested in feedbacks between the technical and human systems. Rebound effects in agriculture are a focus of his research.

2 most relevant publications

- *Paul C, Techen A-K, Robinson JS, Helming K (2019). Rebound effects in agricultural land and soil management: Review and analytical framework, *Journal of Cleaner Production* 227:1054-1067.*
- *Hamidov A, Kasymov U, Djumaboev K, **Paul C** (2022). Rebound effects in irrigated agriculture in Uzbekistan: A stakeholder-based assessment. *Sustainability* 14 (14), 8375.*

Prof. Dr. Katharina HELMING, who will support the review process, is vice-director of the Leibniz Centre for Agricultural Landscape Research (ZALF) and professor for Sustainability Assessment at the University for Sustainable Development Eberswalde, Germany. Katharina is trained as an agronomist and soil scientist and she has 30 years experience of research on agriculture, soil conservation and sustainable land use in Europe, USA, China and Central Asia. Her current research is about societal aspects and anticipatory sustainability assessment of soil management.

2 most relevant publications

- *Löbmann M, Maring L, Prokop G, Brils J, Bispo A, Bender J, **Helming K** (2022). Systems Knowledge for Sustainable Soil and Land Management. *Science of the Total Environment* 822:153389.*
- *Paul C, Techen A-K, Robinson JS, **Helming K** (2019). Rebound effects in agricultural land and soil management: Review and analytical framework, *Journal of Cleaner Production* 227:1054-1067.*

Prof. Dr. Sergio VILLAMAYOR-TOMAS, who will support the review process, is research professor at the Environmental Science and Technology Institute (ICTA) at the Autonomous University of Barcelona (UAB). Trained as a political scientist he has devoted most of his career to study community-based water management as led by

water user associations in Spain and Mexico. His current research explores framings around modernization and the connection between modernization and socio-ecological transformations in Spain.

2 most relevant publications

- **Villamayor-Tomas, S., Iniesta-Arandia, I., & Roggero, M.** (2020). *Are generic and specific adaptation institutions always relevant? An archetype analysis of drought adaptation in Spanish irrigation systems.* *Ecology & Society*, 25(1).
- **Hoffmann, P., & Villamayor-Tomas, S.** (2023). *Irrigation modernization and the efficiency paradox: a meta-study through the lens of Networks of Action Situations.* *Sustainability Science*, 18(1), 181-199.