Water and Development Research Group

WDRG is a multi- and interdisciplinary research group, working rigorously on various aspects of water. Our research themes vary from "water for food" to the "role of power and politics in water management". WDRG has a strong modeling knowledge on big data and spatial analysis from local to global scale.

Papers

See next page for the full list of our recent publications!

Project

Maa-ja vesitekniikan tuki has awarded the DigiVesi project of the Water and Environmental Engineering research group five years of funding, with the aim of making use of new digitalisation opportunities in both the group's research and education. More information could be found **here**.

People

In 13th May, our **doctoral c**andidate **Amy Fallon** defended her thesis *Keep it Complex: Critical perspectives on water governance for dynamic social–hydrological systems* in Aalto University, her thesis is available **here**.

In 27th May, our doctoral candidate **Marko Kallio** defended his thesis *Towards more useful water information – methods for fine-scale spatial estimation* in Aalto University, his thesis is available **here**. He is currently working as a postdoc researcher in our team, aiming to creating multi-model representations of water quality and water quantity in the context of water scarcity.

In 10th June, our doctoral candidate **Kinnunen Pekka** defended his thesis *Resilience perspectives in global food systems: Exploring variability, localness and diversity* in Aalto University , his thesis is available **here**.

Julia Renko (M.Sc. Econ) a new Phd candidate, studying the role of problem-based learning pedagogy in integrating sustainability to engineering education under the supervision of Distinguished Prof. Olli Varis. Her work is closely linked to the academic networks and educational activities of Aalto Sustainable Global Technologies Programme.

WDRG members had several oral presentations at the EGU General Assembly 2022:

Varis et al. Geography of World's Water Risks

Virkki et al. Global blue and green water cycles exit from pre-industrial variation – freshwater change planetary boundary exceeded?

Zhao et al. Quantifying economic-social-environmental trade-offs and synergies of water-supply constraints: An application to the capital region of China

Latest blog posts

- A simple solution for disaster water treatment
- The Devil is in the Details: Opportunities and Harms of Water Hyacinth around Lake Victoria

Next newsletter in September!

Sustainable Global Technologies (SGT) Studio course projects 2022 united Aalto students with international partners to work on cases related to refugees' well-being, bioethanol, flood mitigation and the autonomy of an indigenous community. The SGT programme is coordinated by WDRG members.

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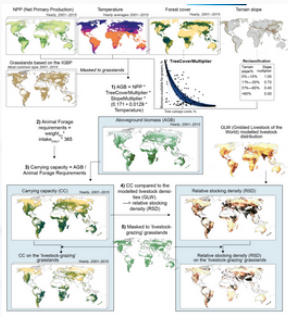
New publications

See full list at Aalto Research

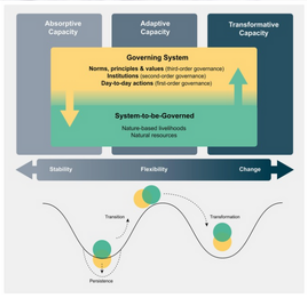
Piipponen, J et al. (2022)
Global trends in grassland carrying capacity and relative stocking density of livestock
Global Change Biology. 16174

We developed a robust method to estimate trends and inter-annual variability (IV) in global livestock carrying capacity (number of grazing animals a piece of land can support) over 2001–2015, as well as relative stocking density (the reported livestock distribution relative to the estimated carrying capacity [CC]) in 2010. CC decreased on 27% of total grasslands area, mostly in Europe and southeastern Brazil, while it increased on 15% of grasslands, particularly in Sudano-Sahel and some parts of South America.



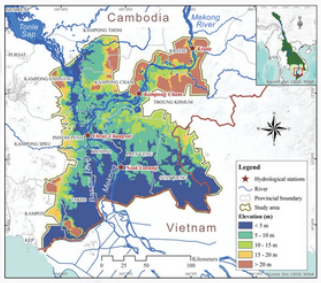
Fallon, A. et al. (2022)
Bringing resilience-thinking into water governance: Two illustrative case studies from South Africa and Cambodia
Global Environmental Change . 75, 102542.

Using a theoretical multiplicity approach, we explore how the theories of social-ecological systems (SES), resilience and interactive (water) governance can provide new insights for water governance studies. We propose a resilience–governance framework that captures the partly overlapping but distinct characteristics from these three theories. We illustrate the framework with two case studies – the Tonle Sap Lake in Cambodia and a small sub-catchment of the Limpopo River Basin in South Africa – to provide two distinct examples of the possibilities of resilient governance.



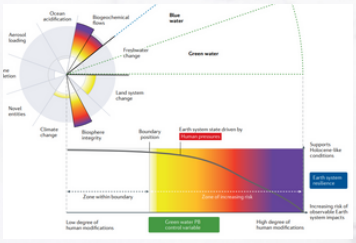
Horton, A. J et al. (2022)
The Cambodian Mekong floodplain under future development plans and climate change
Natural Hazards and Earth System Sciences. 22, 967-983.

We attempt to conduct a cumulative assessment of basin-wide hydropower dam construction and irrigation expansion, as well as climate change, implications on discharge, and flood changes in the Cambodian Mekong floodplain. Our results show that the monthly and seasonal hydrological regimes (discharges, water levels, and flood dynamics) will be subject to substantial alterations under future development scenarios, which is calling for actions to mitigate these changes as well as planning potential adaptation strategies.



Wang-Erlandsson, L et al. (2022)
A planetary boundary for green water
Nature Reviews Earth & Environment, 1-13

Green water — terrestrial precipitation, evaporation and soil moisture — is fundamental to Earth system dynamics, yet it hasn't been explicitly considered in the planetary boundaries framework that demarcates a global safe operating space for humanity. We propose a green water planetary boundary and estimate its current status. Our provisional estimate indicates that the extensive human perturbation of green water, through e.g. land use and climate change, has considerably transgressed the proposed planetary boundary.



Mazac, R et al. (2022)
Incorporation of novel foods in European diets can reduce global warming potential, water use and land use by over 80%
Nature Food. 3, 286-293.

Du, Y et al. (2022)
Local and non-local drivers of consumption-based water use in China during 2007–2015: Perspective of metacoupling
Journal of Environmental Management, 312, 114940

Du, Y et al. (2022)
How far are we from possible ideal virtual water transfer? Evidence from assessing vulnerability of global virtual water trade
Science of the Total Environment, 828, 154493

Korhonen-Kurki, K. et al. (2022)
Empirical insights into knowledge-weaving processes in strategic environmental research
Journal of Environmental Policy & Planning, 1-16.