NEWSLETTER

SEPTEMBER 2022

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 a list of our recent publications!

People Mika Jalava started as a staff scientist at the beginning of September. He continues food systems related research activities, but devotes half of his time to building continuity in WAT scientific computing, data management and modelling. This includes support for other researchers in these matters, so feel free to ask for help.



Five new master's thesis workers have recently started working in WDRG: Suvi Ojala, Eero Alkio, Lisa Sparf, Juho Mäkelä and Heini Karinen.

News piece Our research that investigated the potential of using crop residues and food by-products in livestock and aquaculture production, led by associate professor <u>Matti Kummu</u> and postdoctoral researcher <u>Vilma Sandström</u> are spread by Helsingin Sanomat, more information is <u>here</u>.

Call for abstracts Our associate professor <u>Marko Keskinen</u>, and postdoctoral researchers <u>Mia Pihlajamäki</u> and <u>Irina Mancheva</u> are chairing a working group titled "Watering down policy? Emerging trends in water-related policy implementation" at the <u>YHYS 2022 research colloquium "Messy</u> <u>sustainability: uncertainties in policy implementation"</u> organised in Tampere on November 24th-25th (2022), Call for abstracts is open until September 30th!

Special issue Universide Our Postodoctoral researcher <u>Dandan Zhao</u> is organizing a special issue titled "<u>Mapping Multiscale Water-Energy-Food-Land-Climate Nexus for Delivery of Sustainable Development Goals</u>" on Frontiers in Earth Science journal. Call for submission is open until December!

WDRG organized a Mekong jubileum international Conference to celebrate our research collaboration in Mekong river during the past 20+ years



Latest blog posts

- <u>Match words with deeds: Curbing water</u> <u>risk with the Sustainable Development</u> <u>Goal 6 index</u>
- <u>Water networks, but not the way you</u> <u>think</u>

As a part of the orientation days to new master's students, WDRG set up an "escape room" where each of the puzzles was linked to the group's research topics.



Next newsletter in January!

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New publications See full list at Aalto Research

Sandström, V.et al. (2022)

Food system by-products upcycled in livestock and aquaculture feeds can increase global food supply Nature food.

Horton, A. et al. (2022)

Targeted land management strategies could halve peatland fire occurrences in Central Kalimantan, Indonesia

Communications Earth & Environment, 3(1), 1-11

Chrysafi,, A. et al. (2022)

Quantifying Earth system interactions for sustainable food production via expert **elicitation**

Nature Sustainability, 1-13

Virkki, V. et al. (2022)

Globally widespread and increasing violations of environmental flow envelopes

Hydrology and Earth System Sciences, 26(12)

Varis, O. et al. (2022)

Global human exposure to urban riverine floods and storms River, 1-11

Varis, O. (2022). Africa's water security in the Water International, 1-14 **spatial bias in**

Kallio, M. et al. (2022). Unpacking **dasymetric** environmental model outputs.

Many livestock and aquaculture feeds compete for resources with food production. We gathered data on global food system material flows for crop, livestock and aquaculture production, and analyzed the potential of replacing food-competing feed-stuff. Increasing the use of food system by-products as feed has considerable potential, particularly when combined with other measures, in the much-needed transition towards circular food systems.

A holistic methodology for assessing the potential of fire mitigation strategies is lacking. Here, we use machine learning (convolutional neural network) to develop a model capable of recreating historic fire observations based on pre-fire season parameters. The results show that converting heavily degraded swamp shrubland areas to swamp forest or plantations can reduce fires occurrence by approximately 40% or 55%, respectively.

Using expert knowledge elicitation, we explored interactions among seven variables representing Earth system processes relevant to food production, identifying many interactions little explored in Earth system literature. We found that green water and land system change affect other Earth system processes strongly, while land, freshwater and ocean components of biosphere integrity are the most impacted by other Earth system processes.

Humans exploit rivers and thus compromise riverine ecosystem integrity. Here, we assessed the extent and degree of river flow alterations globally, using two-sided environmental flow envelopes that are based on the presumably natural pre-industrial period. Our results show widespread and increasing violations of the envelopes, especially around the arid mid-latitudes. The increasing trends are expected to amplify future violations, calling for consideration of environmental flows in global research and policies.

Flooding is affecting an increasing number of urban populations. Our global quantification of urban populations' exposure to riverine floods and storm surges in 1990 and 2015 points out how most of the exposure has shifted from low-income to middle-income countries. This mainly owes to rapid economic development in a large proportion of exposed areas. The ongoing growth of human exposure calls for enduring efforts on disaster risk reduction policies and implementation.

> Blauhut, V et al. (2022). Lessons from the need for unifying drought risk management.

& Software, 157, 105511 system sciences, 22(6)

Arnbjerg-Nielsen, K., et al. (2022) To what extent should we 2018-2019 European ensure the explicit inclusion twenty-first century. modelling to correct droughts: a collective of water quality within the WEF nexus - Discussion of 'Water quality - the missing dimension of water in the Environmental Modelling Natural hazards and earth water-energy-food nexus.





ABattamo, A. Y. et al. (2022) A framework for assessing freshwater vulnerability along China's Belt and Road Initiative: An exposure, sensitivity and adaptive capacity approach

Environmental Science & Policy, Hydrological Sciences Journal, 1-4132