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Emerging Pollutants: Protecting Water Quality for the Health of People and the Environment

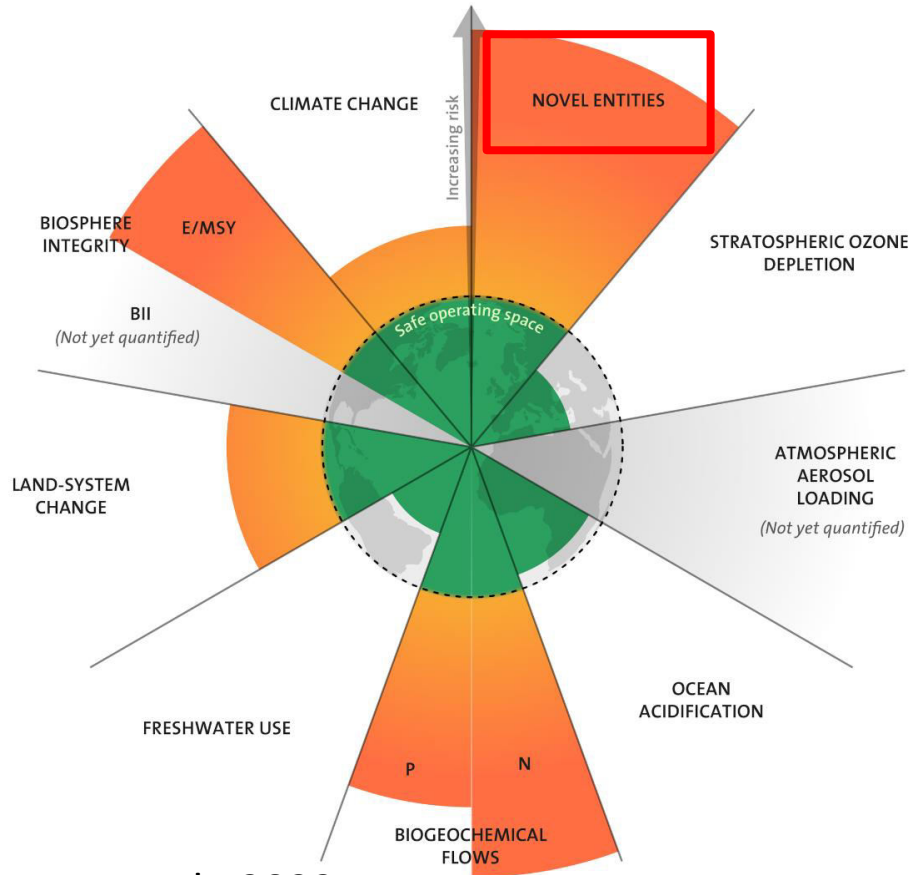
Spatial-temporal monitoring of pesticides in the streams for the development of Ecohydrological Nature-based Solutions

Paweł Jarosiewicz, PhD

19 January 2023, 11:30 CET

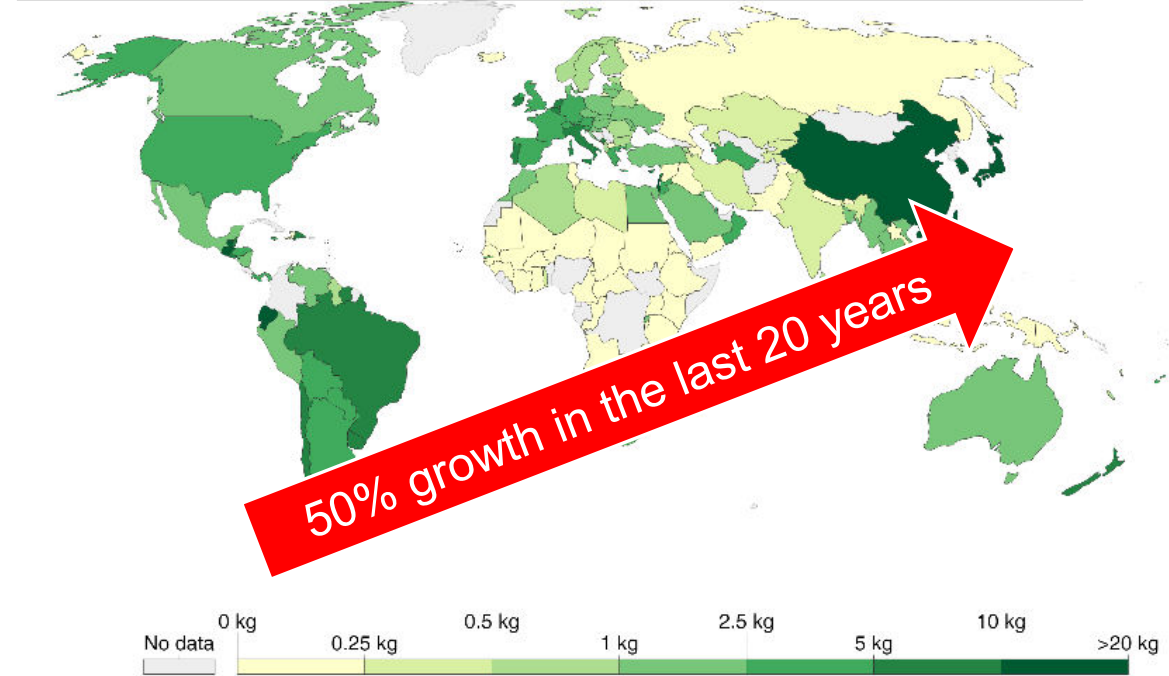


Planetary boundaries and pesticides



Pesticide use per hectare of cropland, 2017
Average pesticide application per unit of cropland, measured in kilograms per hectare.

Our World
in Data



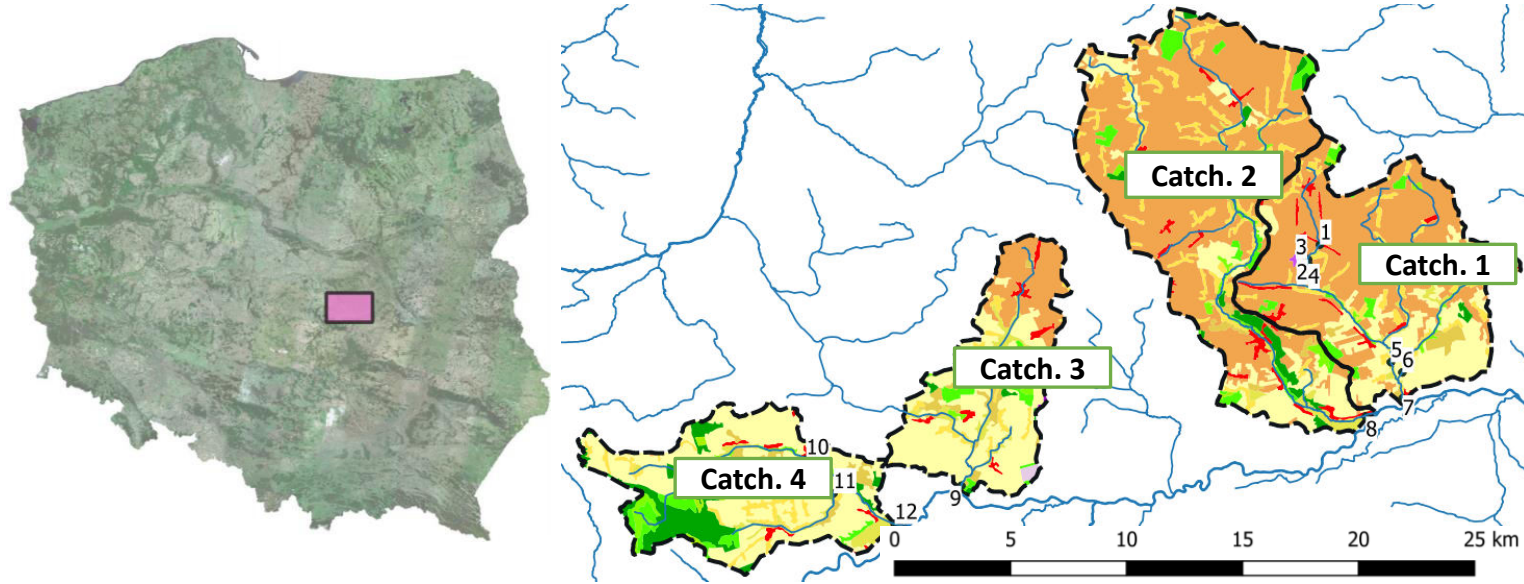
Source: UN Food and Agricultural Organization (FAO)

OurWorldInData.org/pesticides/ • CC BY

Persson et al., 2022

Research area

- All the watercourses selected for monitoring are classified as type 17, a sandy lowland stream on old-glacial formations
- The area is geologically homogeneous
- Precipitation and temperature:
2018 – 394.7 mm / 10,45 °C
2019 – 559,2 mm / 9,90 °C



	Sampling points	Catchment area [km ²]	Main river	KM
Catch. 1	7	162,0	RYKOLANKA	58,0
Catch. 2	1	225,4	MOGIELANKA	73,8
Catch. 3	1	92,3	ROKITNA	27,1
Catch. 4	3	114,3	LUBOCZANKA	37,9





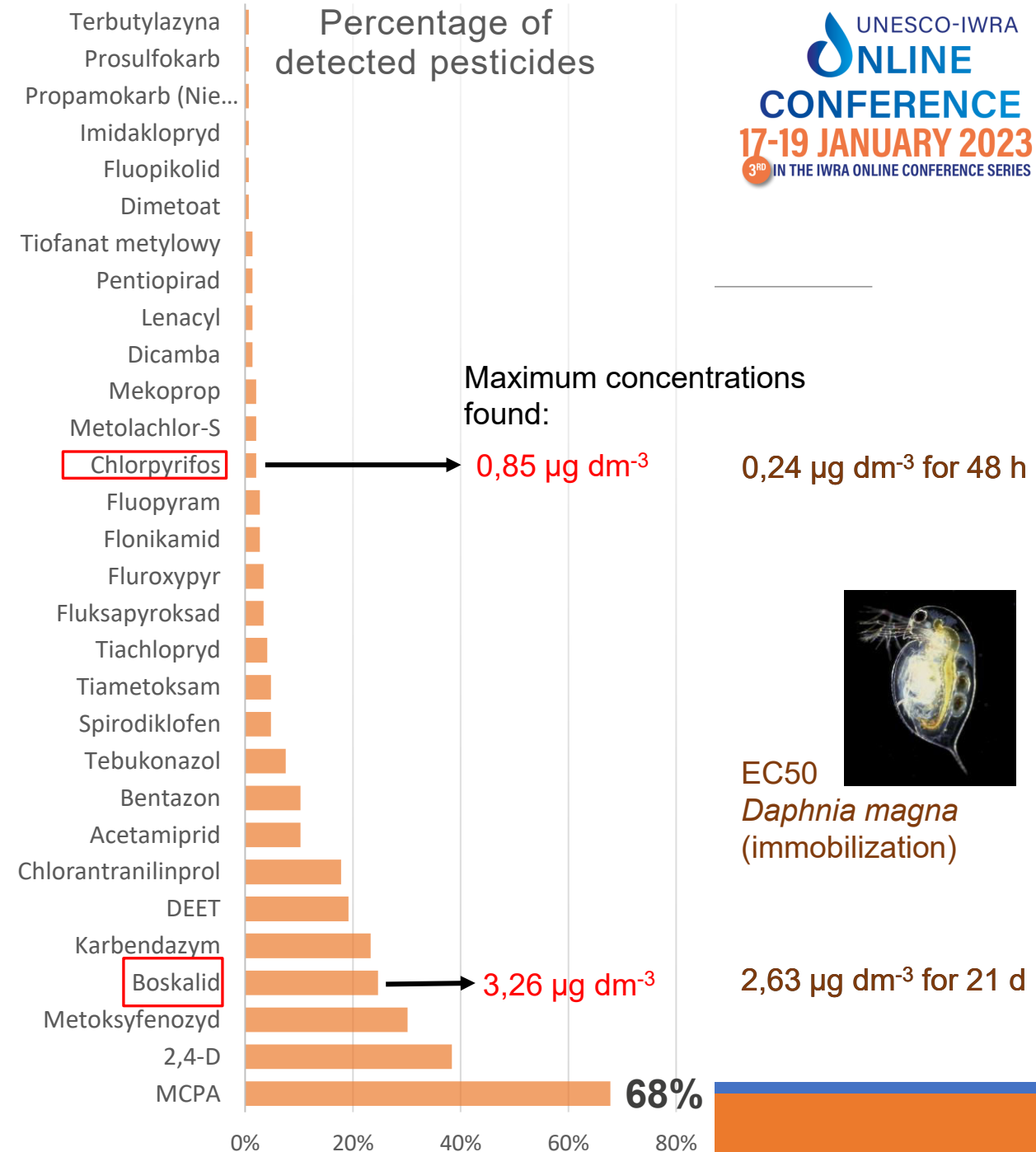
	Catch. 1	Catch. 2	Catch. 3	Catch. 4	color
Anthropogenic lands	3,5	2,7	3,9	2,5	
Arable land	21,9	11,7	50,5	57,3	
Horticulture	58,7	62,9	20,7	0,1	
Forest and natural ecosystems	4,2	9,9	7,0	25,4	

Table: Share of individual land cover classes by data of Corine Land Cover (2018) expressed as a percentage in the areas of the studied catchments

Results

- WFD includes a list of **45 priority substances**, among them, there are **24 pesticides**.
- From 2020, none of them are in use in EU
- **30 pesticides** were found in this study (on 95 measured). In **82%** of samples the presence of at least one pesticide was confirmed (n=144).

Chlorfeninfos	Alachlor	Chloropiryfos	Endosulfan
Aldrin	Symazyna	Isodrin	Atrazyna
DDT	Endrin	Izoproturon	Heptachlor
Cybutryna	Cypermetyrna	Bifenoks	Dikofol
Antracen	Diuron	Aklonifen	Dieldrin
Trifluralina	Dichlorfos	Chinoksyfen	Terbutryna



Ecohydrological Nature-based Solutions

How to boost Ecohydrological Nature-Based Solutions in water quality management

Paweł Jarosiewicz^{1,2}✉, Stefano Fazi³, Maciej Zalewski^{1,2}

SSBS in Przedbórz Commune, Poland – Authors: K. Izydorczy, W. Frątczak, M. Zalewski (2017);
UNESCO Ecohydrology Demosite – Pilica River Catchment

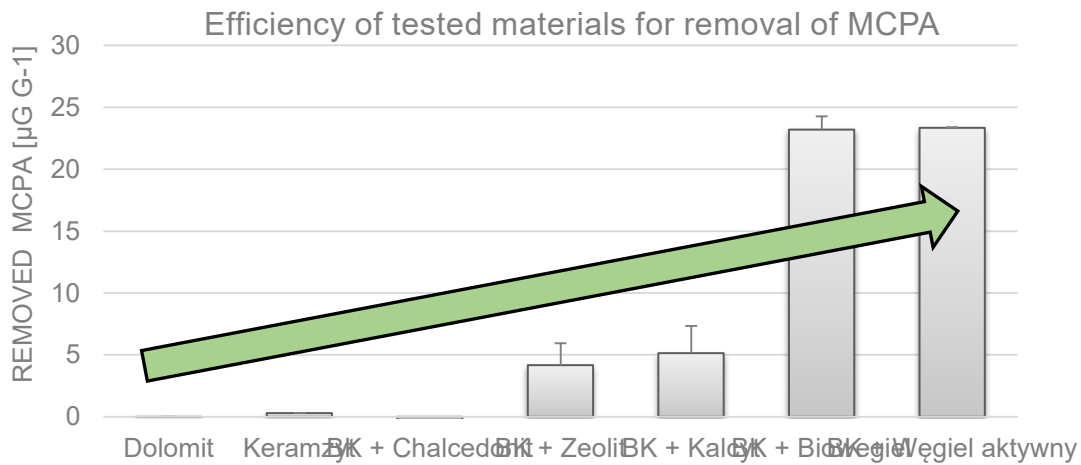


Jarosiewicz et al., 2022;
Jarosiewicz, Zalewski 2021 - Patent

EH-NbS from testing to implementation



CONCOURS LÉPINE INTERNATIONALE
PARIS 2018



Sorption efficiency for MCPA ($\mu\text{g g}^{-1}$) of the tested materials. Expanded clay, dolomite and BioKer with the addition of chalcedonite, zeolite, calcite, biochar and activated carbon were tested.

Key result and a message to take home

- 30 pesticides have been found, the presence of which is correlated with the land use (apple orchards) ($R_s = 0.91$; $p < 0.05$). **Existing threat is not addressed by the monitoring programme (WFD).**

What do we need?

- More **Nature-based Solutions** in Water Management – **Let the Nature do the Job**
- Better monitoring and better policy - to protect water resources from pesticides – **Let the People do the Job**

Please visit UNESCO Ecohydrology demosites platform:
<http://ecohydrology-ihp.org/demosites/>

THANK YOU!



@P_Jarosiewicz

E: p.jarosiewicz@erce.unesco.lodz.pl