UNESCO-IWRA ONLINE CONFERENCE
17-19 JANUARY 2023
3RD IN THE IWRA ONLINE CONFERENCE SERIES

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

Global hot spot areas of antibiotics loading to aquatic systems

Preliminary findings

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Thursday, January 19th, 2023, 11:00 CET

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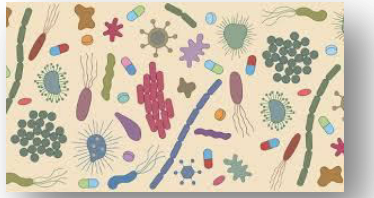
Aquatic pathways of antimicrobial resistance



Antimicrobial resistance

- WHO: One of top10 global public health threats, SDG 3?
- Overuse antibiotics & other … cause more frequent mutations bacteria … → resistant to antibiotics …
- > 1 M deaths/yr (2019)
- Tuberculosis, HIV …

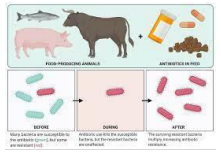
Antimicrobial resistance in aquatic systems

- Presence of resistant genes, organisms, antibiotics
- Antibiotics interact with bacteria other organisms → resistant bacteria, ….
- Pathways to humans: water supply, water contact, fishery …
- What is the significance of this pathway???

Global Antibiotics Loading Model (WorldQual/WaterGAP)

Human *antibiotics* consumption/excretion

Livestock *antibiotics* consumption/excretion



Sewered

Non-sewered

Treated

Untreated

Sanitary options
Septic tanks, Pit toilets, other

Non-sanitary options

Hanging latrines

Open defecation

Degradation in catchment

Transport with surface runoff

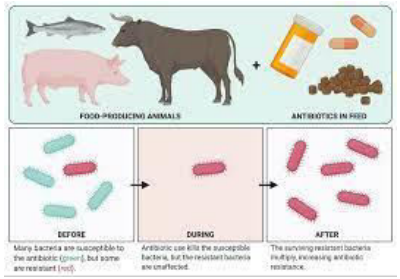
Degradation in catchment
Surface & soil

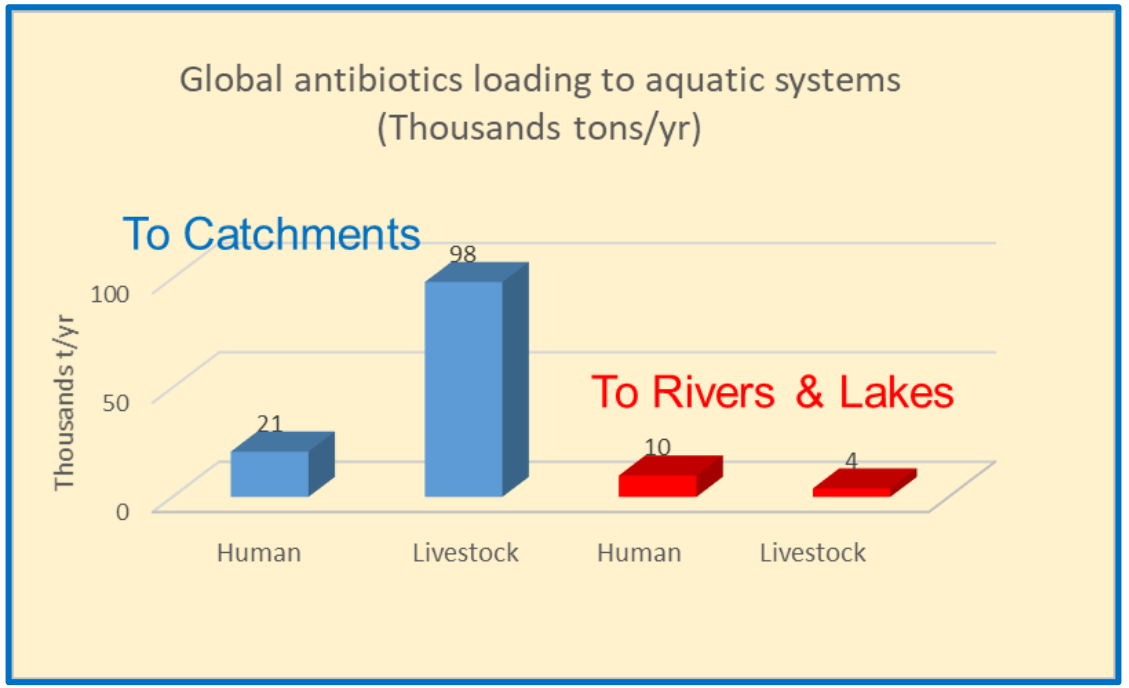
Transport with surface runoff

River

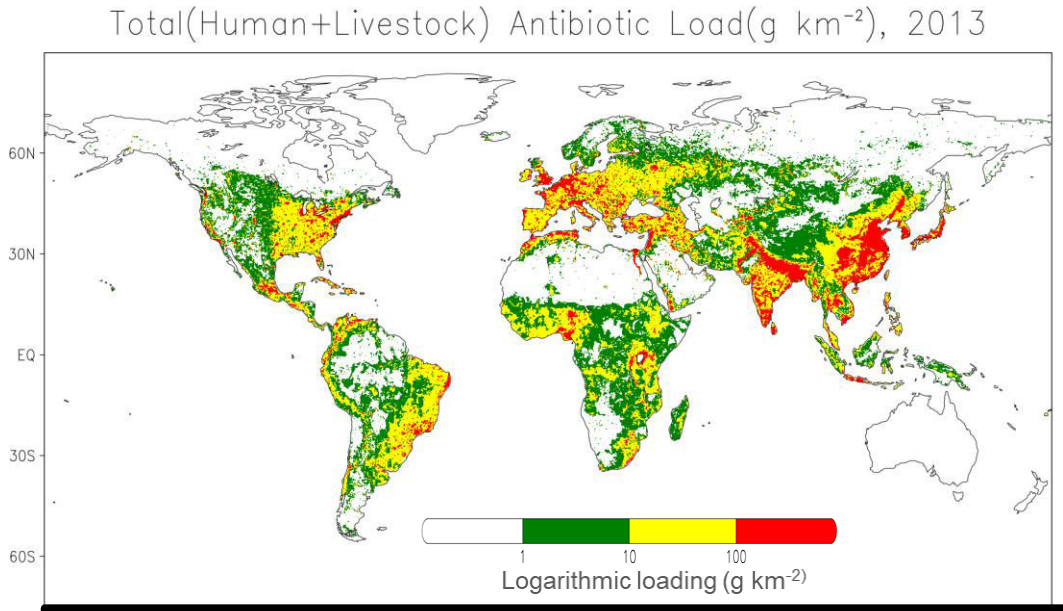
Result: Loading of total antibiotics to freshwater systems

→ Global sums





Result: Loading of total antibiotics to freshwater systems → global hot spot areas (red)



- Main hot spot areas: High pop. density areas (urban & rural) → related to human antibiotic consumption, low removal by wastewater treatment, low/no treatment coverage
- Antibiotics loading lower in most low pop. density rural areas → catchment retention of antibiotics
- Some rural areas have hot spots related to intensive use of antibiotics for livestock (e.g. China, Europe)

Sum Up

Antibiotic loadings to freshwater systems are widely distributed → Hot spot areas present on all continents

Task: Deep dive into hot spot areas; linkage of loadings with water concentrations and risk of spreading antimicrobial resistance via rivers & lakes