TECHNISCHE UNIVERSITÄT DRESDEN

UNITED NATIONS UNIVERSITY
UNU-FLORES
Institute for Integrated Management of Material Fluxes and of Resources

CAWR
Center for Advanced Water Research

Benefits and risks of wastewater reuse

Interfaces of urban waters –

on pathways of compounds (nutrients and micropollutants)

Peter Krebs

World Water Week

Stockholm, 27 August 2017

Urban sanitation – today

Provide hygienic conditions for users

Efficiently transport wastewater (including sewage and stormwater) out of residential and industrial areas

Treat wastewater to protect receiving water according to precautionary principle

Discharge stormwater directly to receiving waters (in separate systems) or infiltrate it to groundwater

Emergency exit to prevent WWTP from overloading in combined systems

Urban flooding “accepted” with a predefined frequency

Urban sanitation – today

When properly designed and operated –

it works

for the purpose it was designed for !

Urban sanitation – tomorrow

Additionally

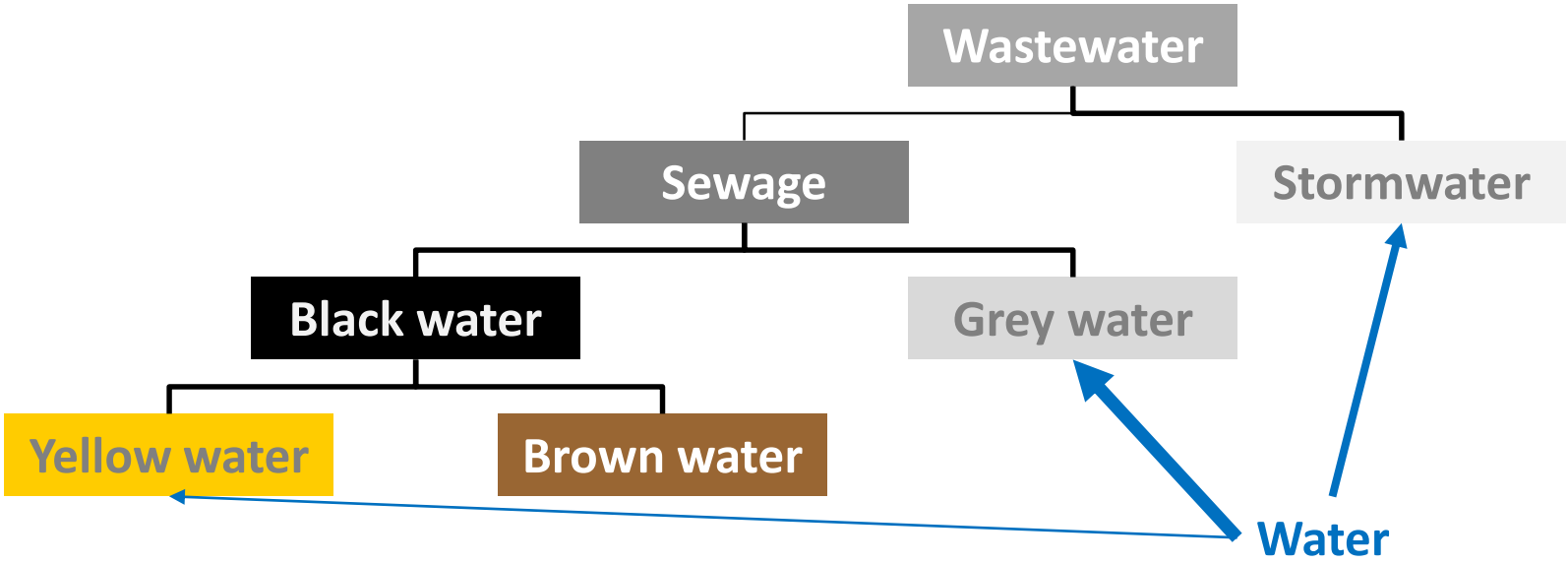
Minimise impacts to receiving waters

New compounds, e.g. pharmaceuticals, heavy metals, micro-pollutants in general

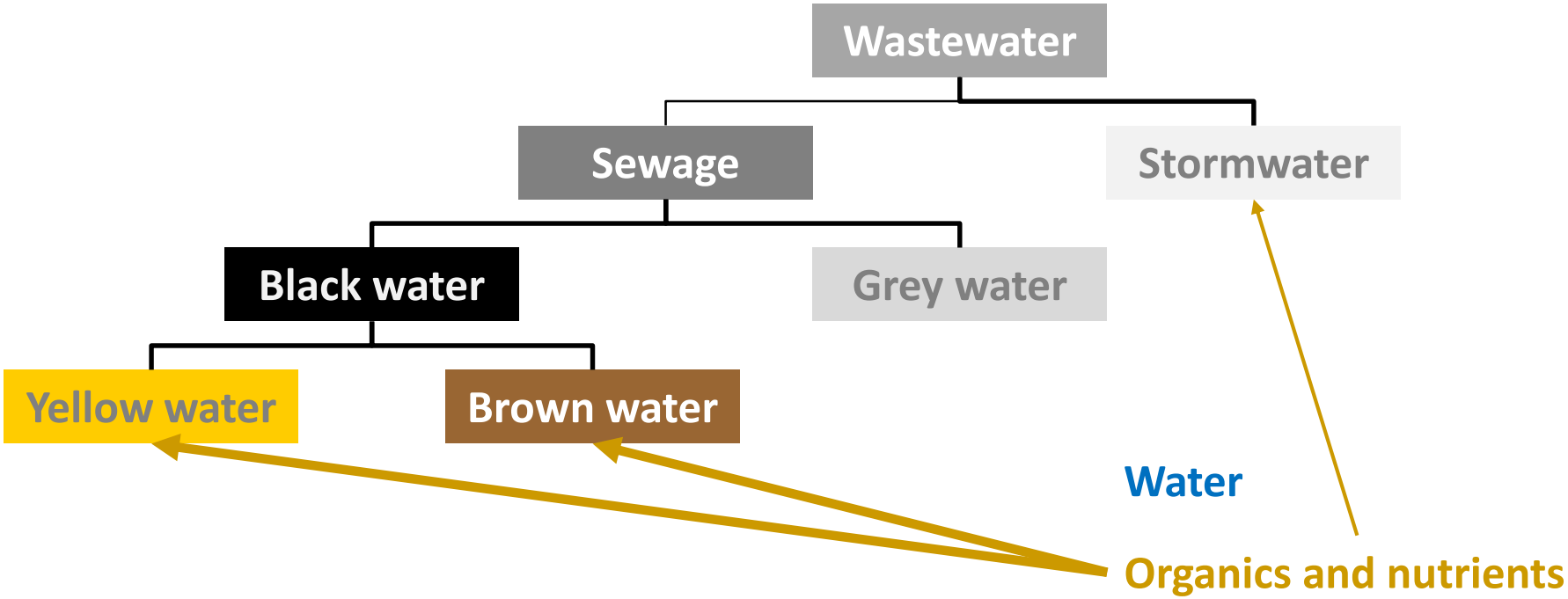
P-recovery

Water and wastewater reuse

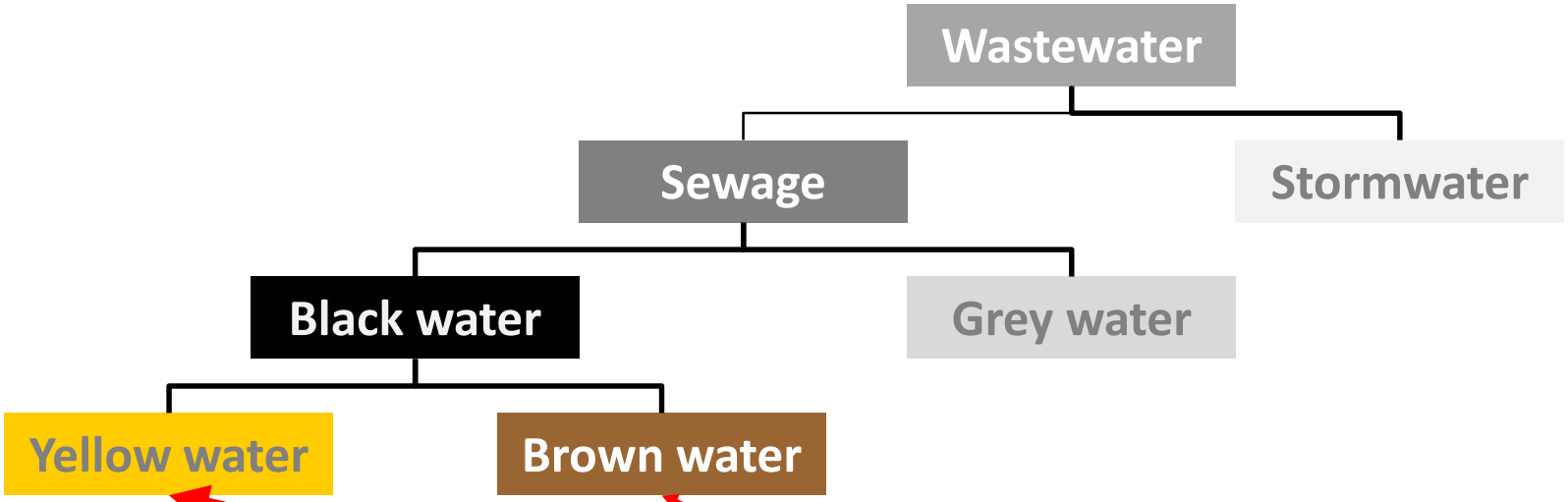
Wastewaters



Wastewaters



Wastewaters

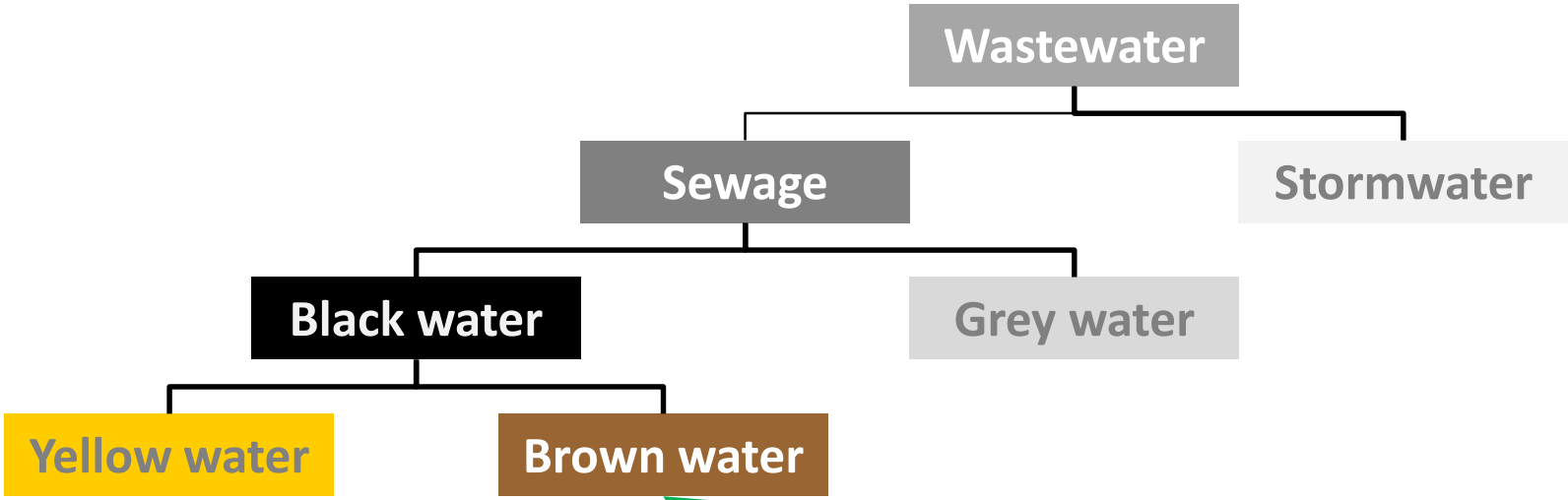


Water

Organics and nutrients

Pharmaceuticals

Wastewaters



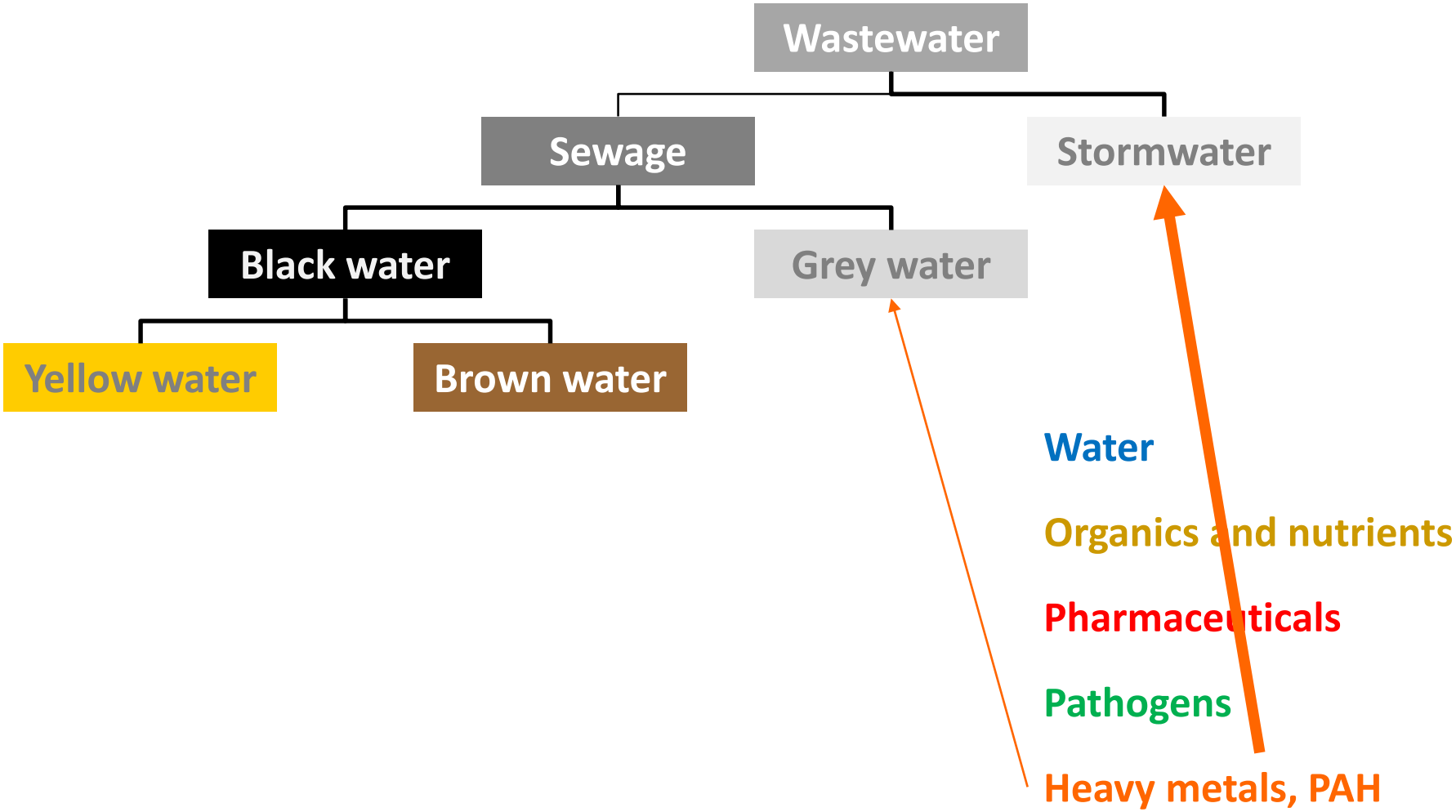
Water

Organics and nutrients

Pharmaceuticals

Pathogens

Wastewaters



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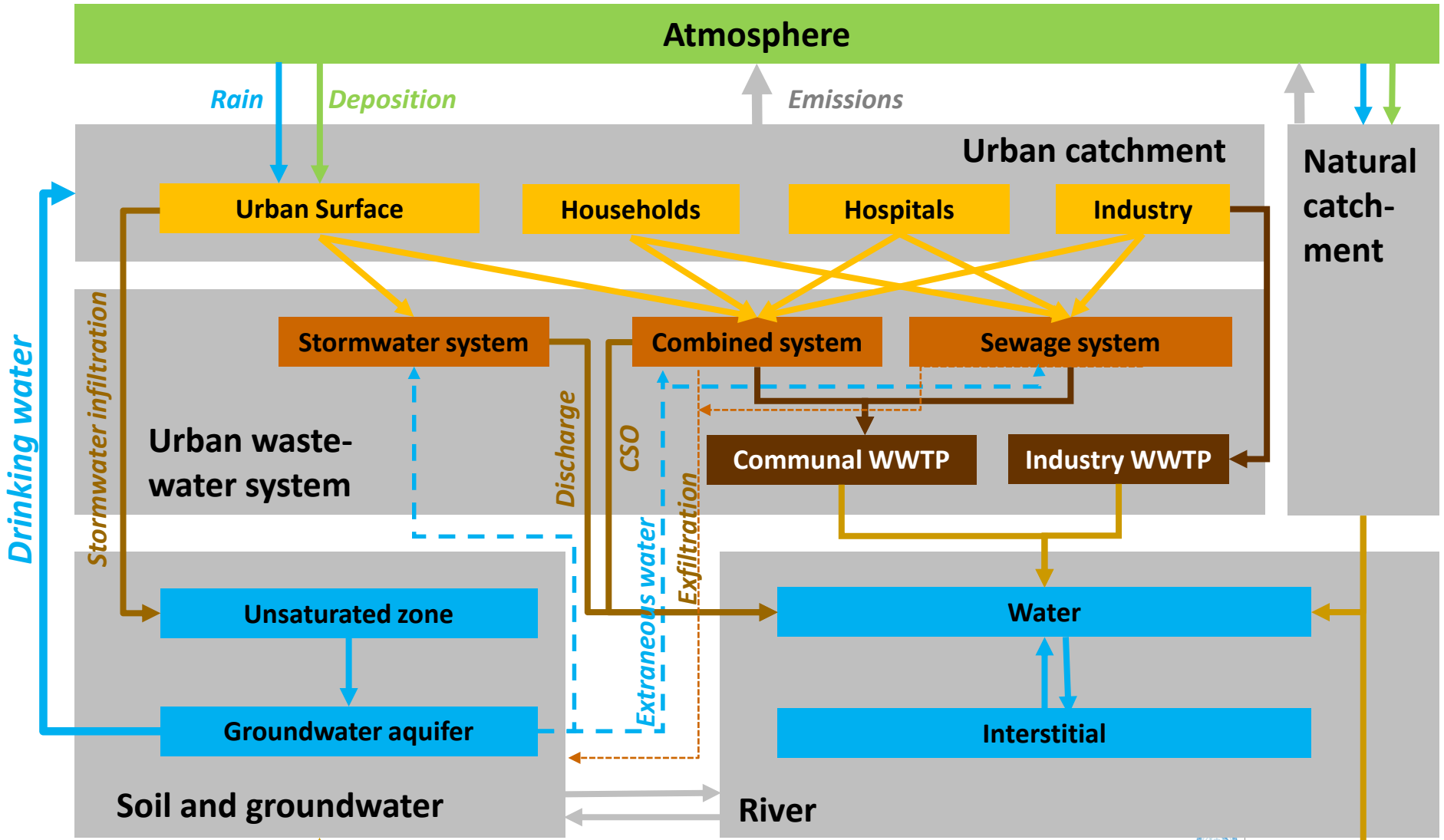
The system and its interfaces



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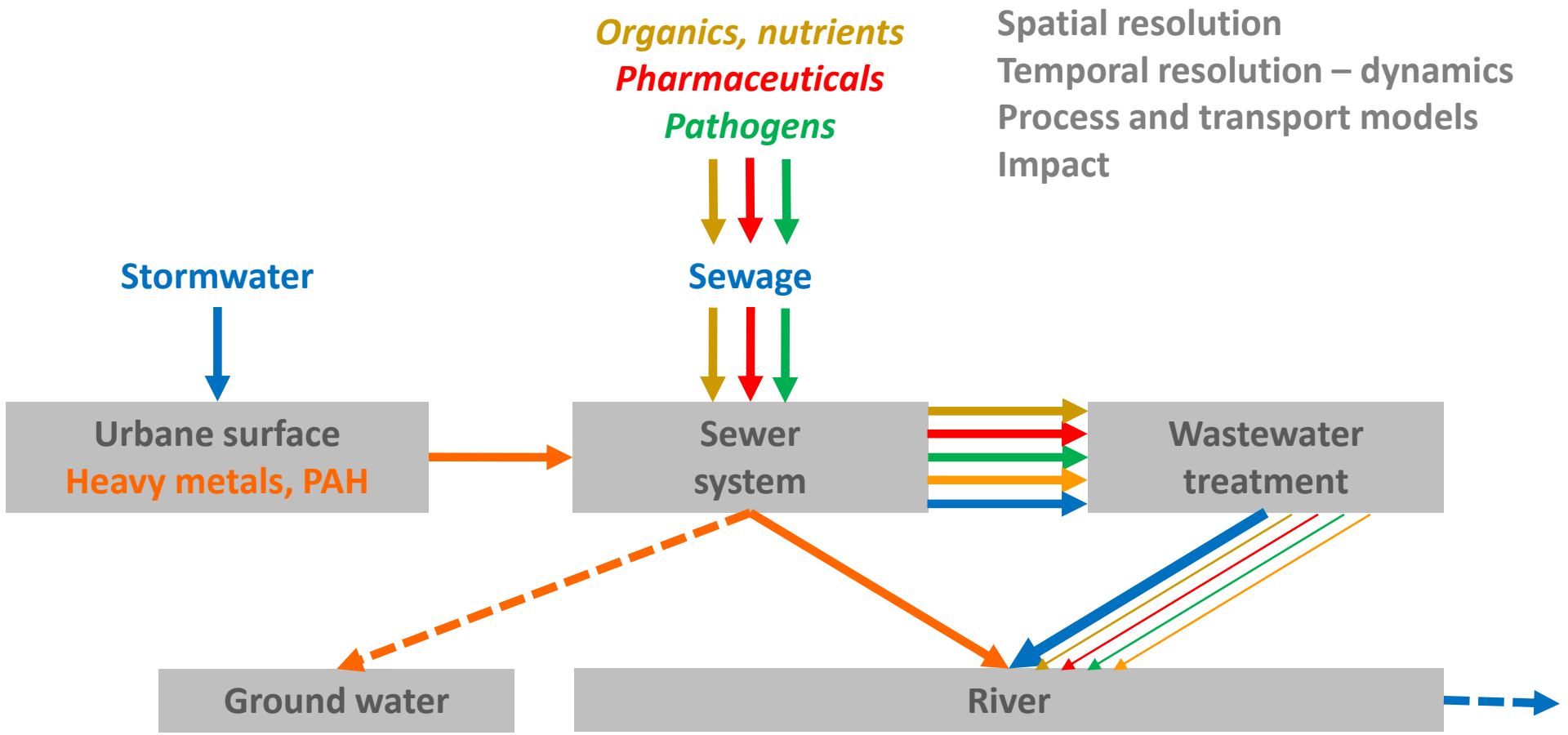
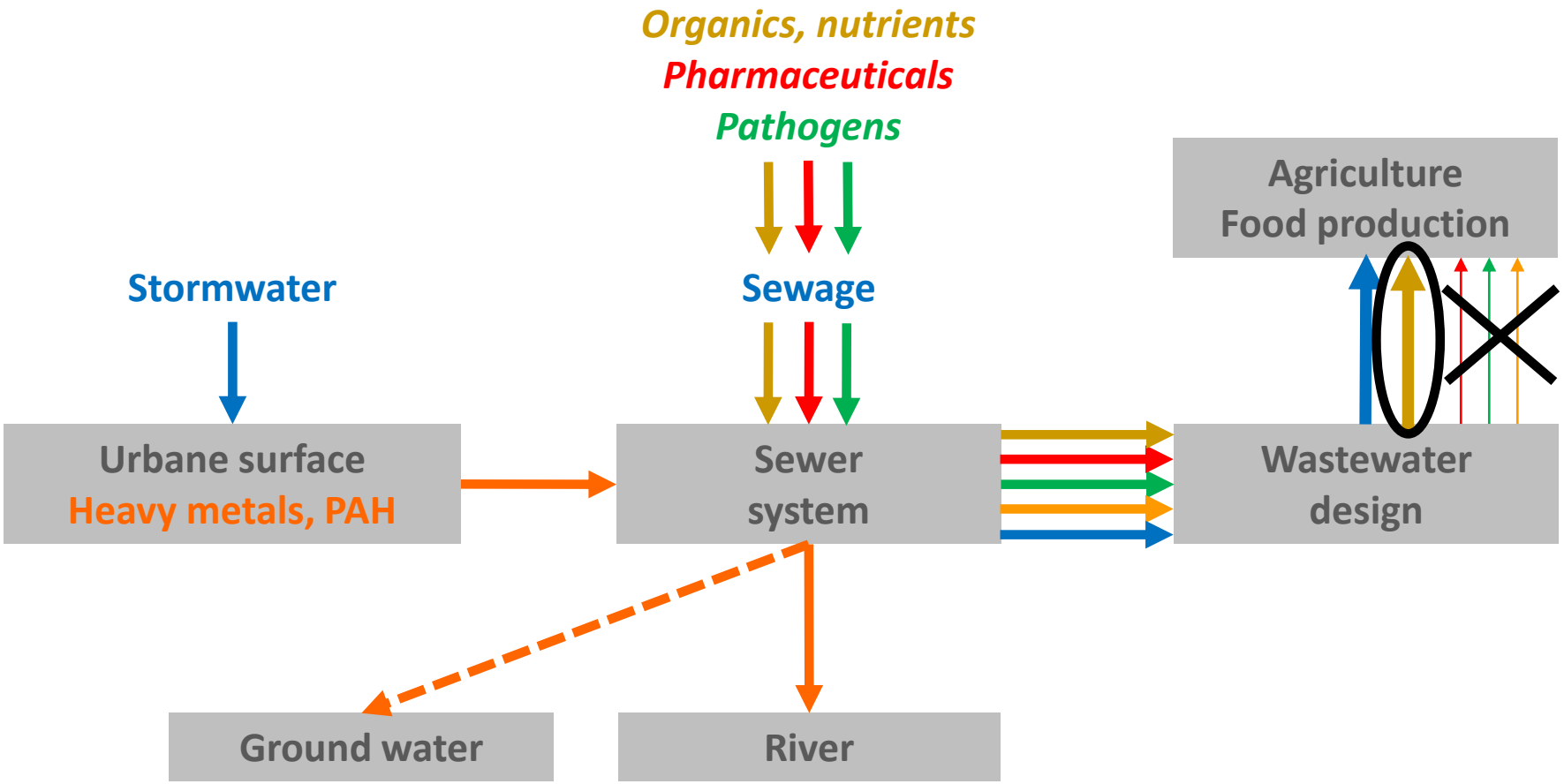
Flux analysis of water, nutrients and pollutants



Spatial resolution
Temporal resolution – dynamics
Process and transport models
Impact

Irrigation – Use for food production



BUT → Soil degradation?

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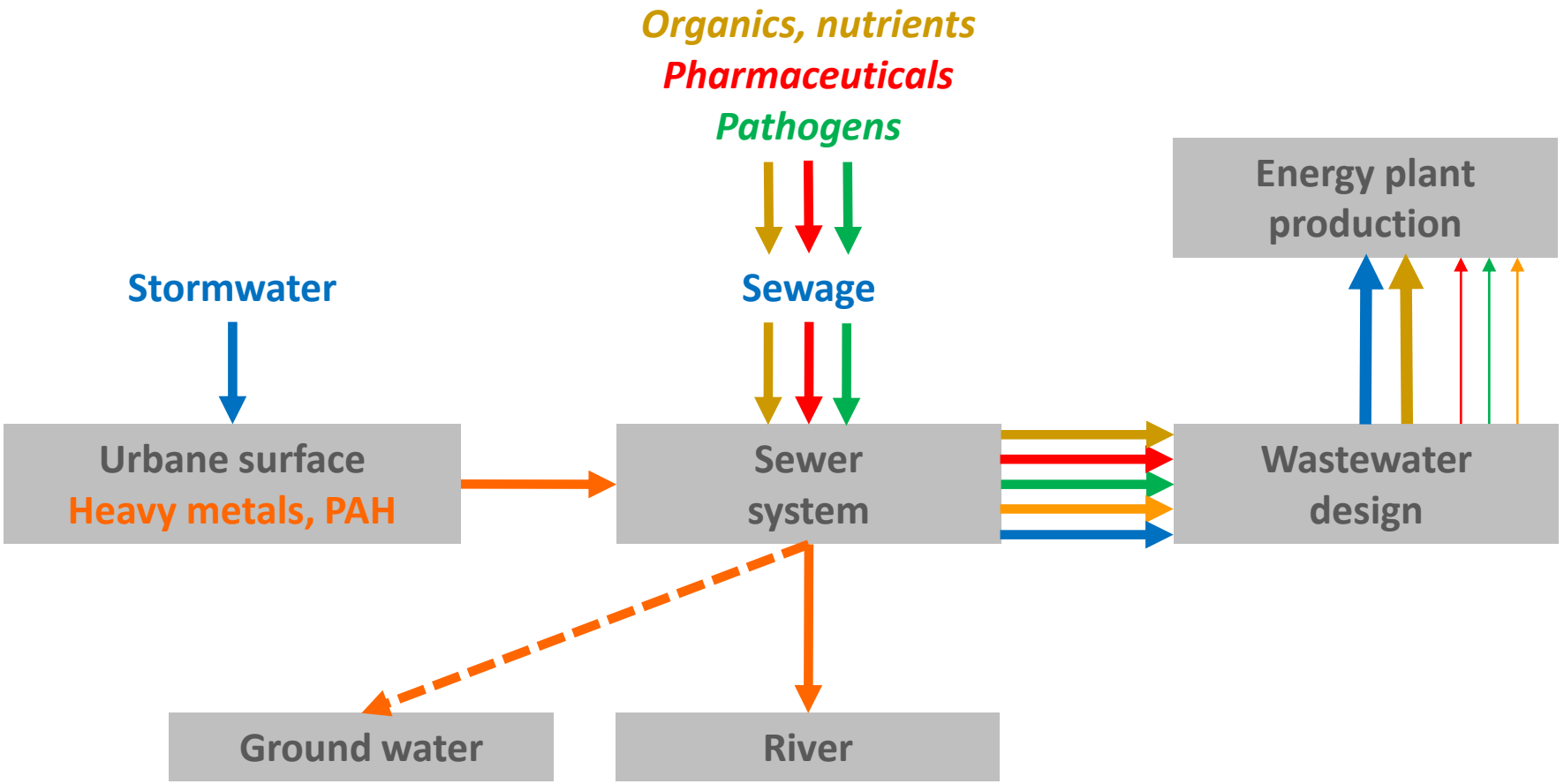
Irrigation – Use for energy plant production



BUT → Soil degradation?

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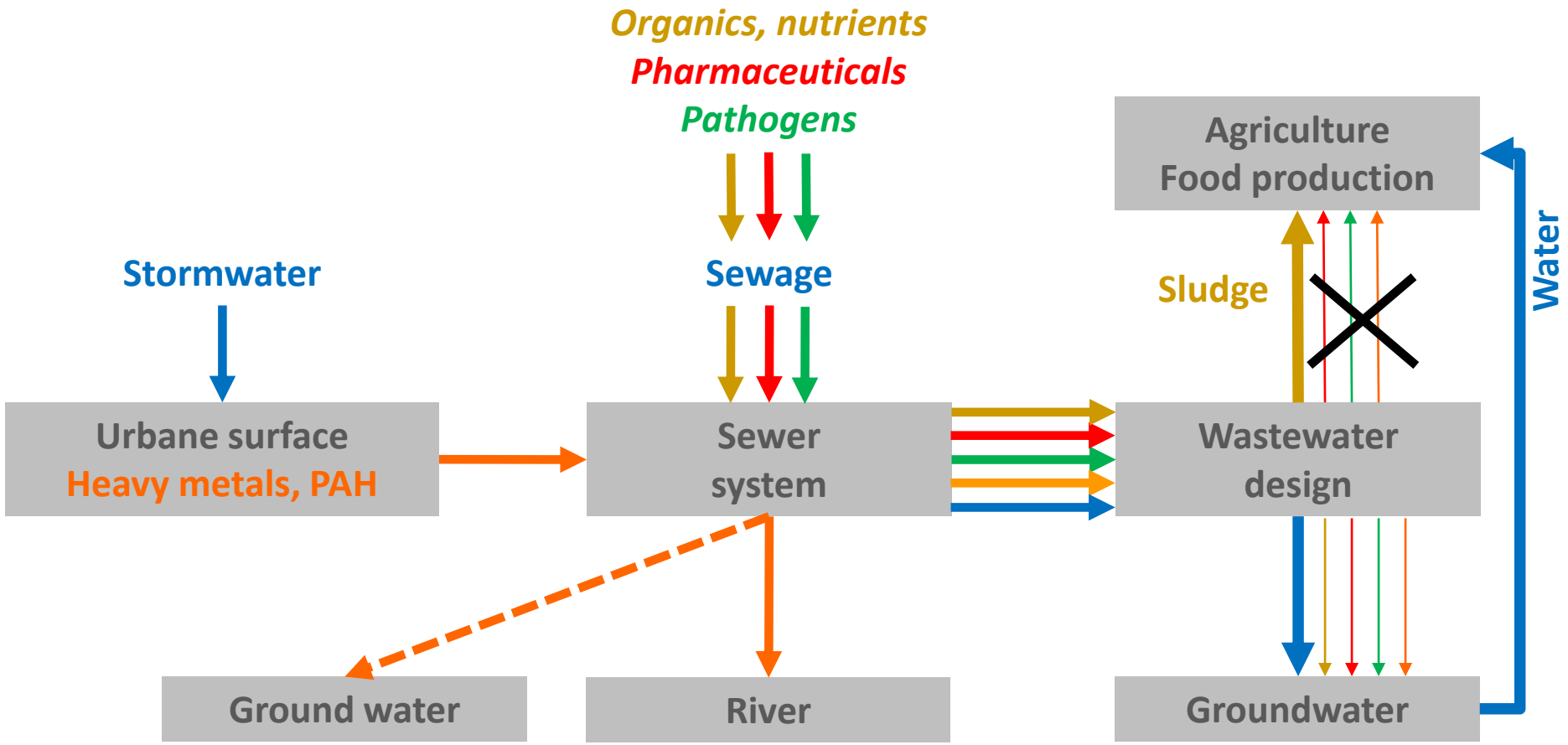
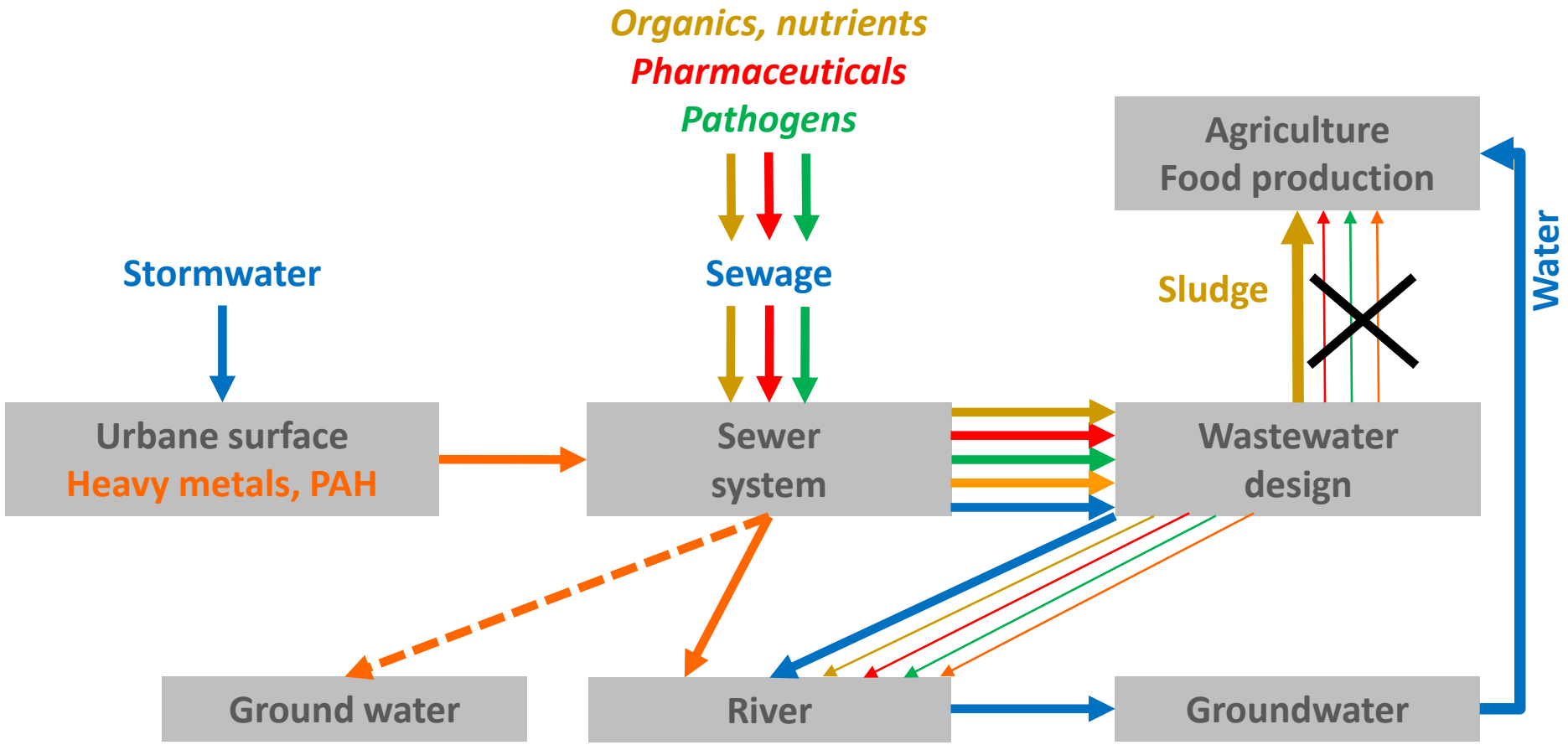
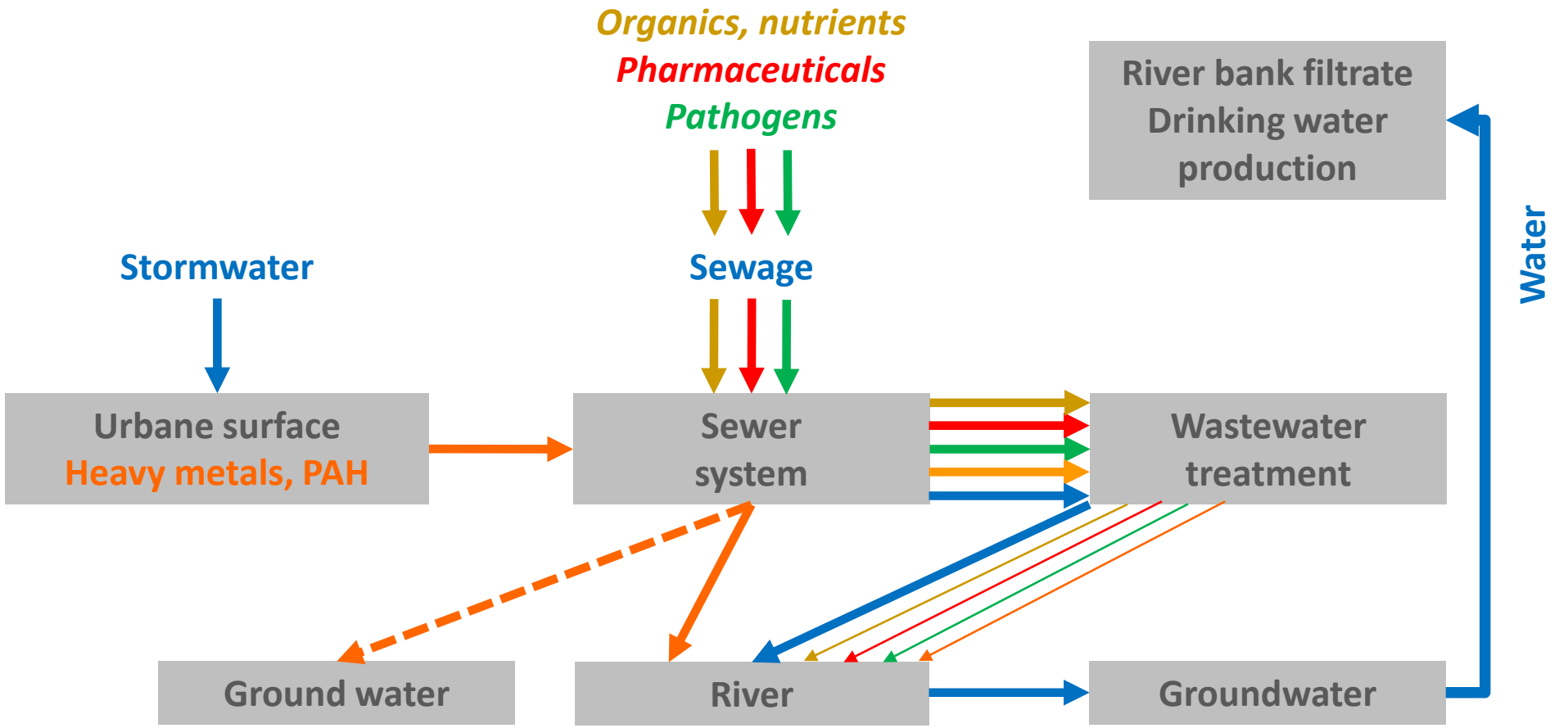
Indirect reuse of water – use of sludge as a fertiliser



Large scale indirect reuse of water – downstream



Large scale indirect reuse of water – river bank filtrate



Wastewater design

Approach

Water, nutrients and organic matter are resources

Tailor-made wastewater treatment

Modular process engineering – in order to serve various purposes

Wastewater design

Research

Appropriate processes/modules

Performance, safety

Consider various climates

Direct/indirect reuse

Effect of soil passage on pollutants removal

Effects on soil