

# Nutrient-rich diets increase food security, only if proper water quality is guaranteed

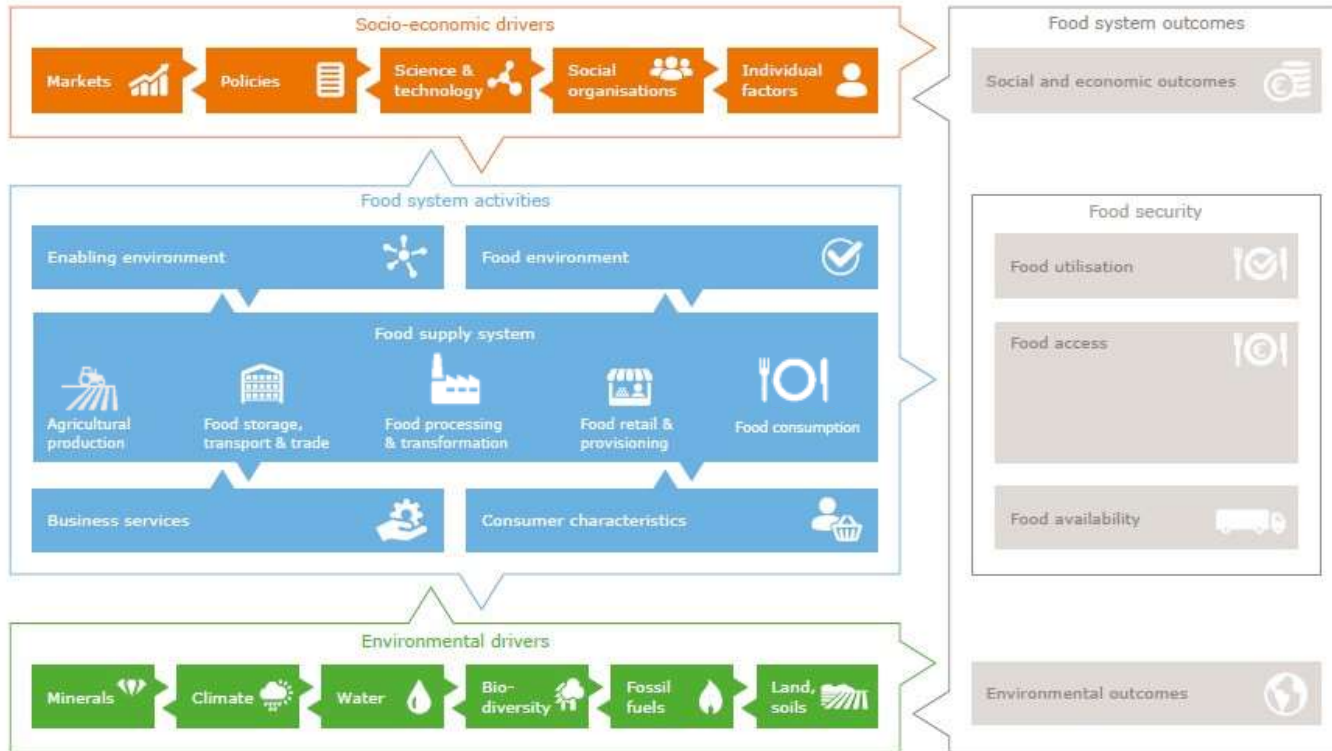
09-06-2021, Thijs de Lange, Vincent Linderhof and Stijn Reinhard



# Introduction

- In areas with poor water quality, the promotion of **nutrient-rich diets** with perishable food (like fruits, vegetables and fish), can deteriorate **food safety**
- **Growing pressure** on water resources leads to increase in use of (untreated) wastewater for crop production
- Food systems activities affect **water quality**; water quality influence **food security**
- To ensure nutrition-rich diets increase **consumers health**, an **integrated approach** which combines food system and water system thinking is need

# Food system approach



Source: Van Berkum et al. (2018)

# Impact food systems on water quality



Water pollution of **food production** was mainly described in the literature



Few cases were found for **food processing**, especially effect of waste from abattoir on water quality



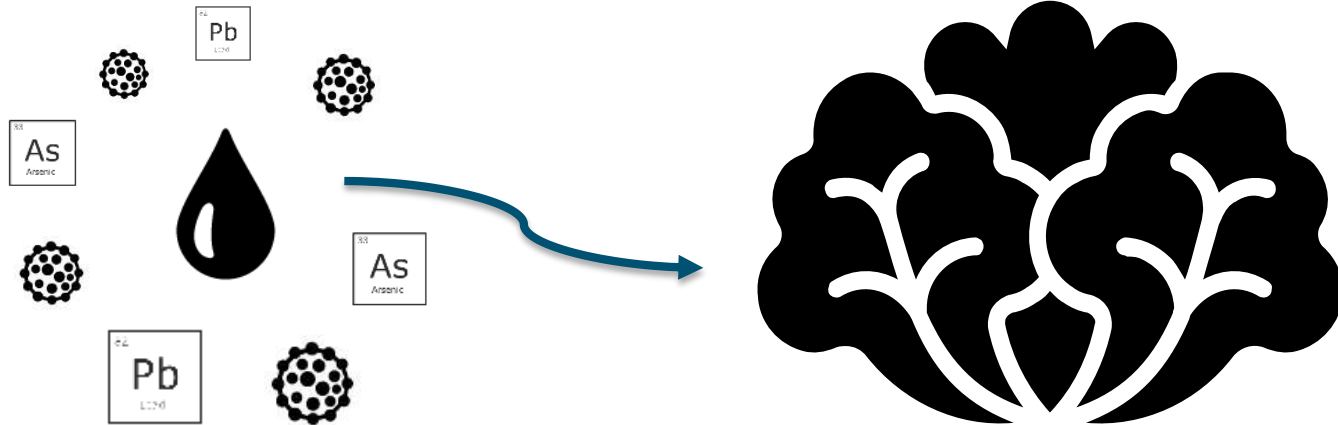
**Food consumption:** nitrogen and phosphate, and pathogens from human faeces (WASH)

- **Water pollution** directly from food systems indirectly induce other contaminations:
  - Nitrogen and phosphate induce algae blooming -> mycotoxins
  - Antibiotics in water resources -> antibiotic resistant pathogens

# Contamination of fruits and vegetables by water quality along the food system



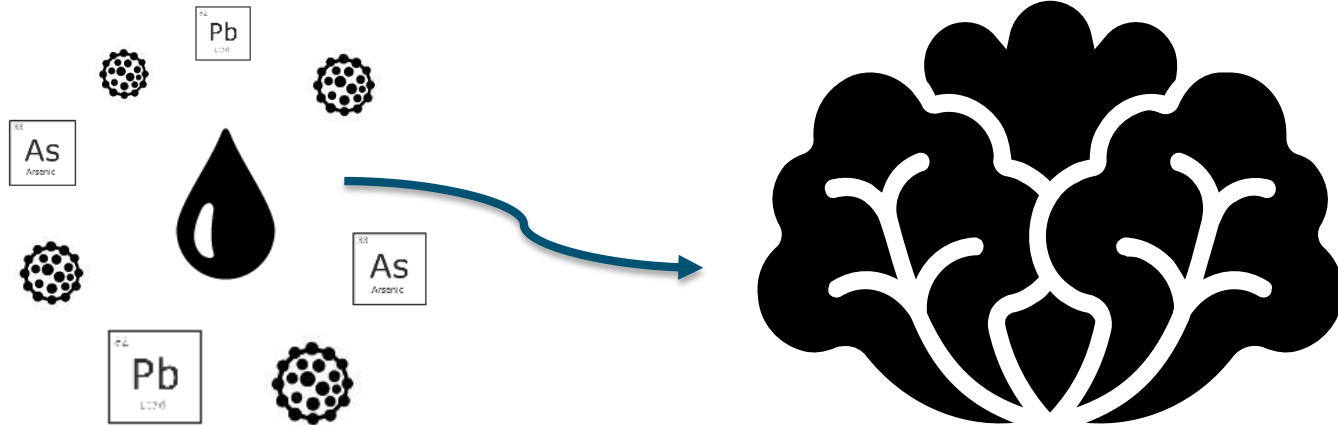
Agriculture: pollution from irrigation water (like heavy metals and pathogens) might contaminate produced crops



# Contamination of fruits and vegetables by water quality along the food system



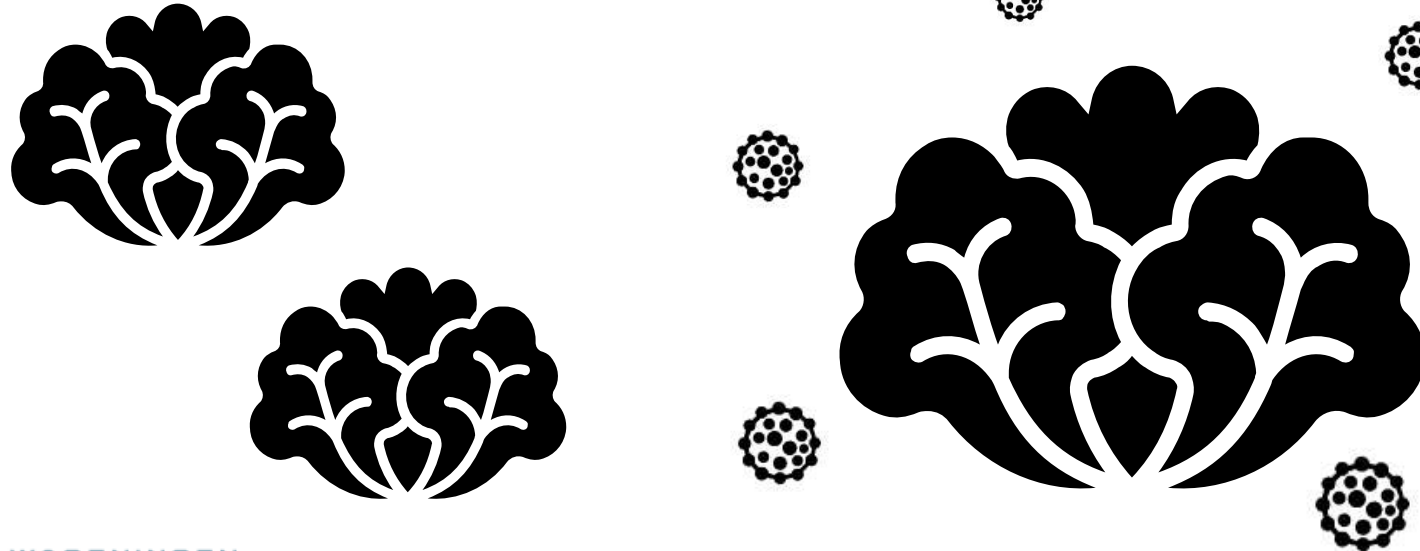
On markets: washing crops with polluted water on markets or at home might contaminate crops



# Contamination of fruits and vegetables by water quality along the food system



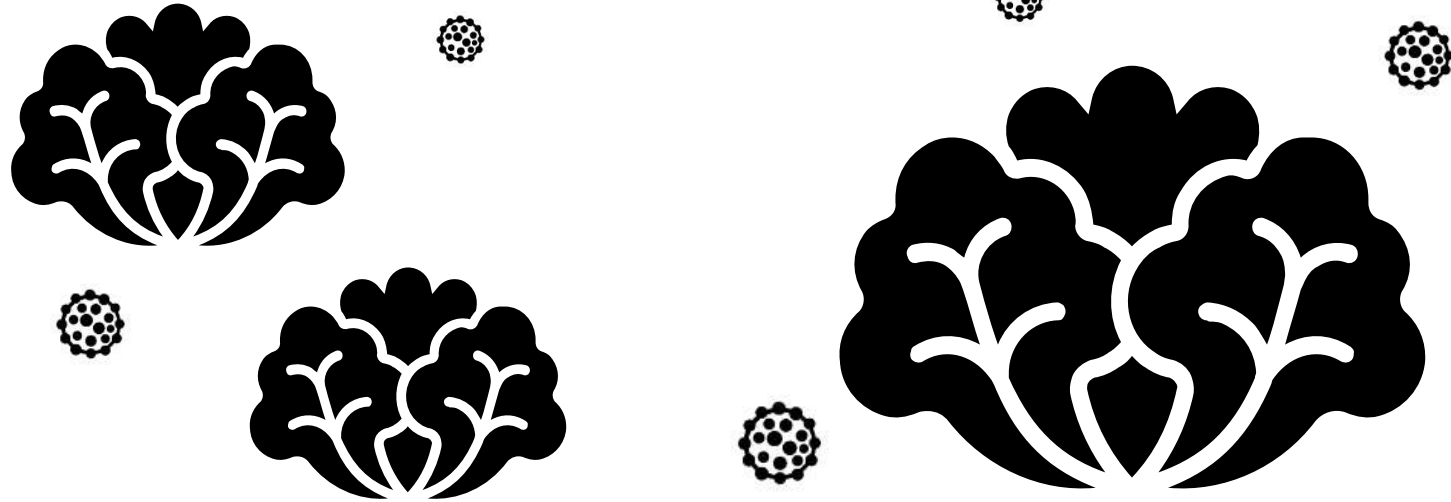
On markets and processing industry: cross-contamination if water is not refreshed sufficiently



# Contamination of fruits and vegetables by water quality along the food system



On markets and processing industry: cross-contamination if water is not refreshed sufficiently

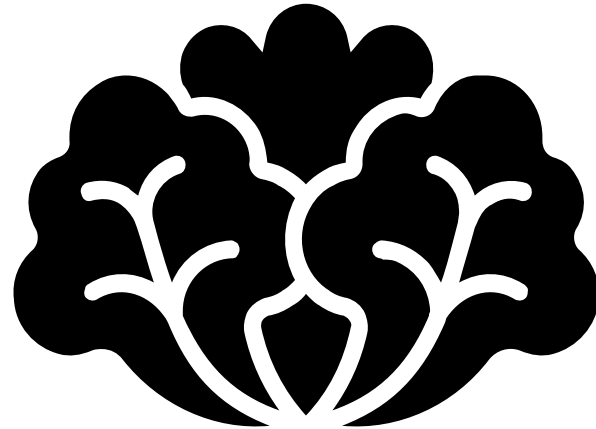




# Contamination of fruits and vegetables by water quality along the food system



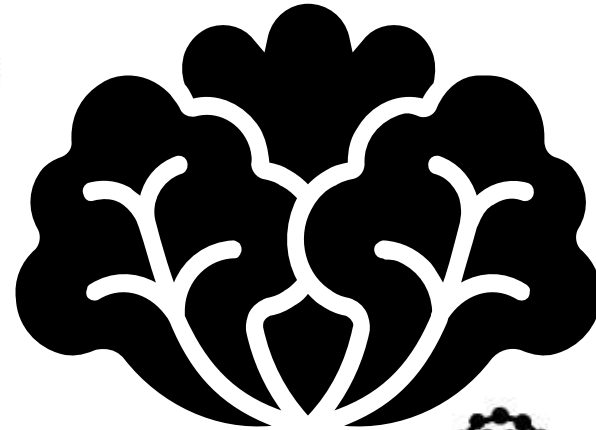
On market and at home: lack of access to safe tap water indirectly affects food safety



# Contamination of fruits and vegetables by water quality along the food system



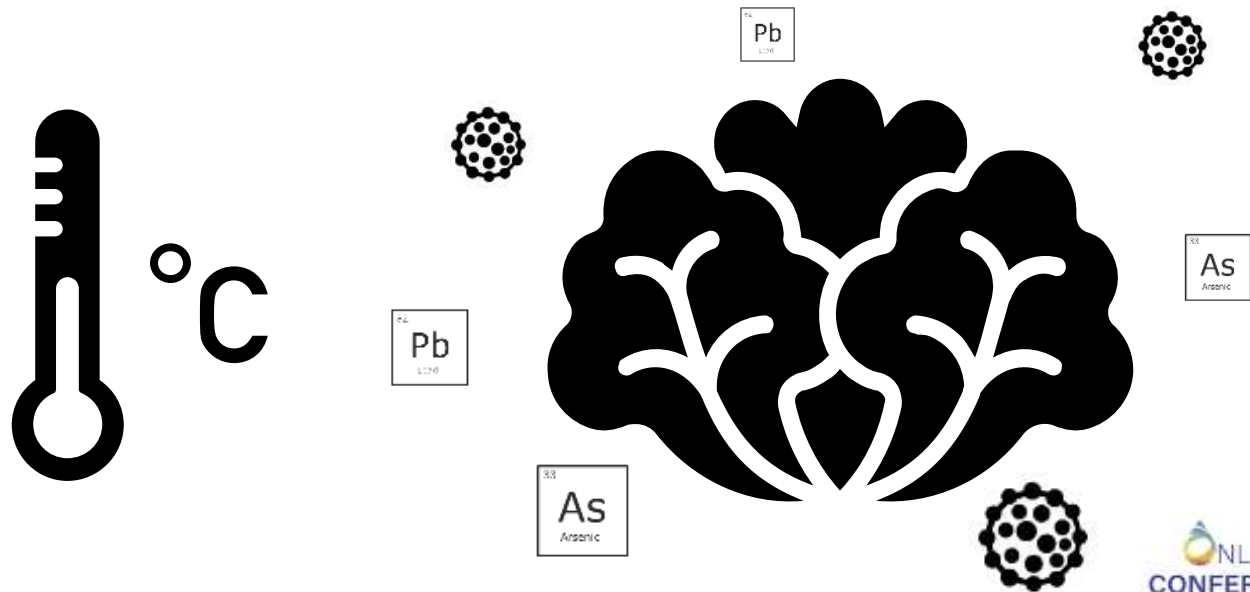
On market and at home: lack of access to safe tap water indirectly affects food safety → Faecal-oral contamination



# Contamination of fruits and vegetables by water quality along the food system



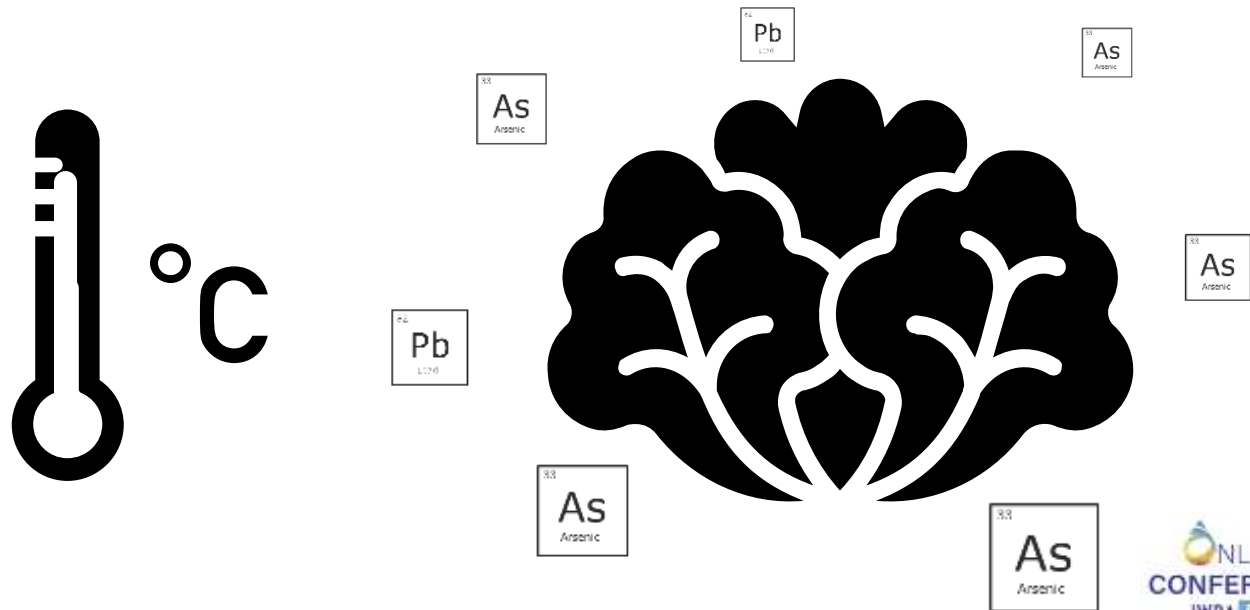
Food preparation influences food contamination depending on the type of contaminant



# Contamination of fruits and vegetables by water quality along the food system



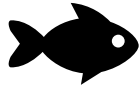
Food preparation influences food contamination depending on the type of contaminant



# Effect of water pollution on fish, seafood and seaweed



Production of **proteins** from fish and seaweed are encouraged towards **nutrition-rich diets**



**Fish** and **seaweed** are prone to heavy metal accumulation



**Shellfish** contaminated with pathogens from wastewater



Cyanotoxins from algae blooming (induced by high concentrations of nitrogen and phosphate) affect **fish production**

# Discussion

- **Wastewater use for irrigation** has a mixed effect on crop production
  - Phosphate and nitrogen **increase production**
  - Heavy metals and pathogens might **affect food safety**
- **Differences** in water quality between Africa and Asia explain how food is contaminated locally
- **WASH** is a crucial element in food systems:
  - **Human waste** is part of food system, how it is treated effects food security
  - From a food system perspective, **potable water** is often overlooked as an essential element of food security

# Conclusions

- Our analyses provide comprehensive insights on the effects of interactions between **water quality** and **food systems** on **food security**
- More **collaboration** between water managers, agronomists, food technologists and nutritionists is needed towards common goals **healthy diets** and **food safety**
- More research is needed between the link of **WASH** and **food security** including drinking water in the food system, and how WASH can be used to improve food safety

# Thank you for attention

Contact: [thijs.delange@wur.nl](mailto:thijs.delange@wur.nl)

