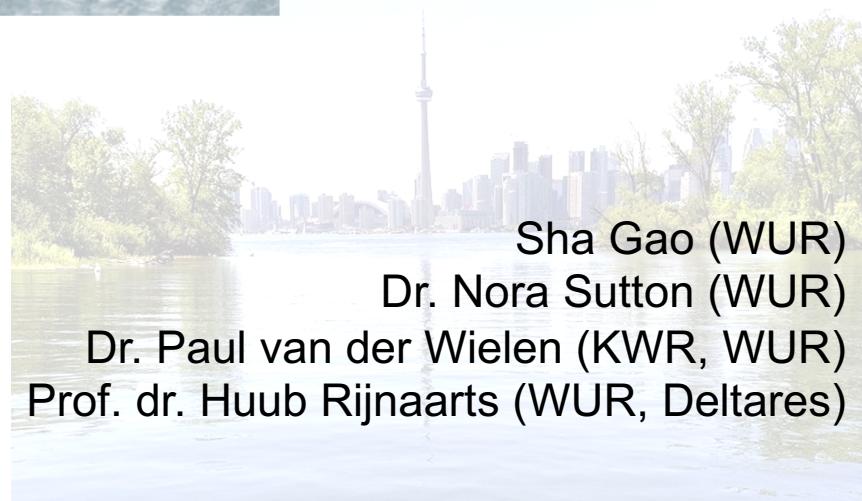




Microbiological urban surface water quality



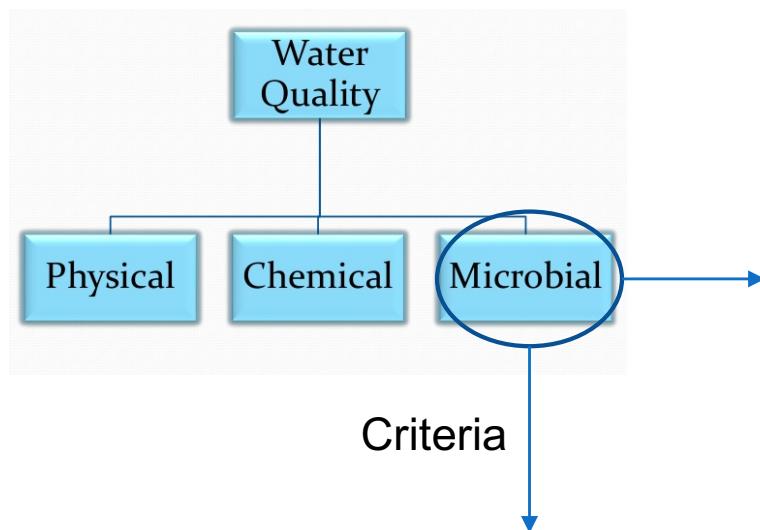
Sha Gao (WUR)

Dr. Nora Sutton (WUR)

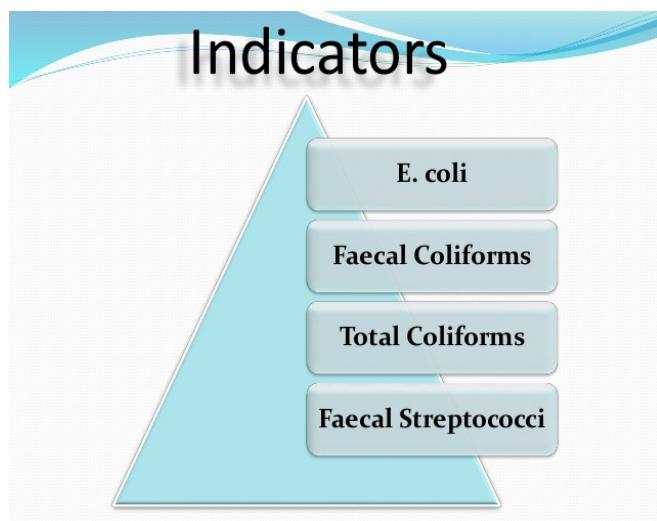
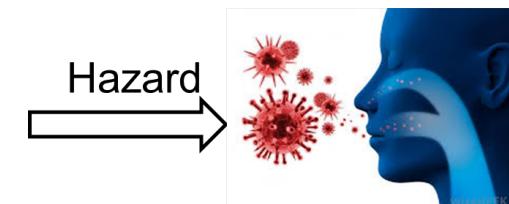
Dr. Paul van der Wielen (KWR, WUR)

Prof. dr. Huub Rijnaarts (WUR, Deltares)

Definition & criteria



- Microbial pollutants
Pathogens (bacteria, protozoa and viruses);
Antibiotic resistance genes;
Toxic cyanobacteria.
- Urban surface water
River, canal, lake.....

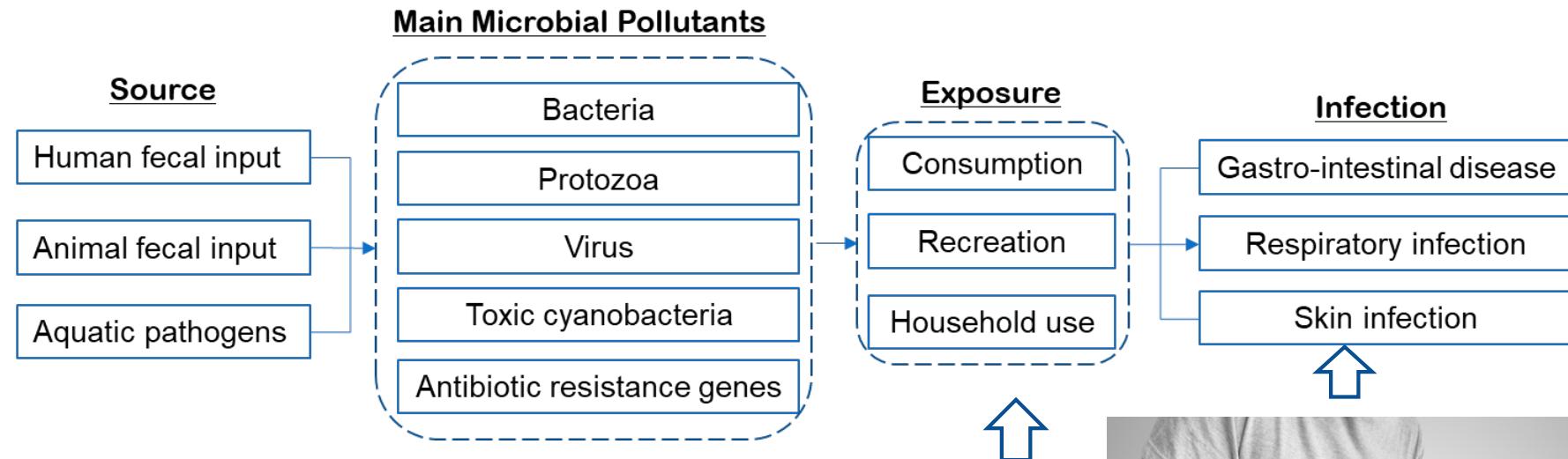


WHO 2003

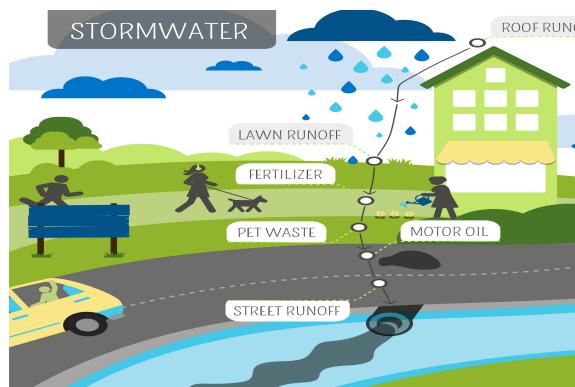
- Bathing water
- Fecal pollution



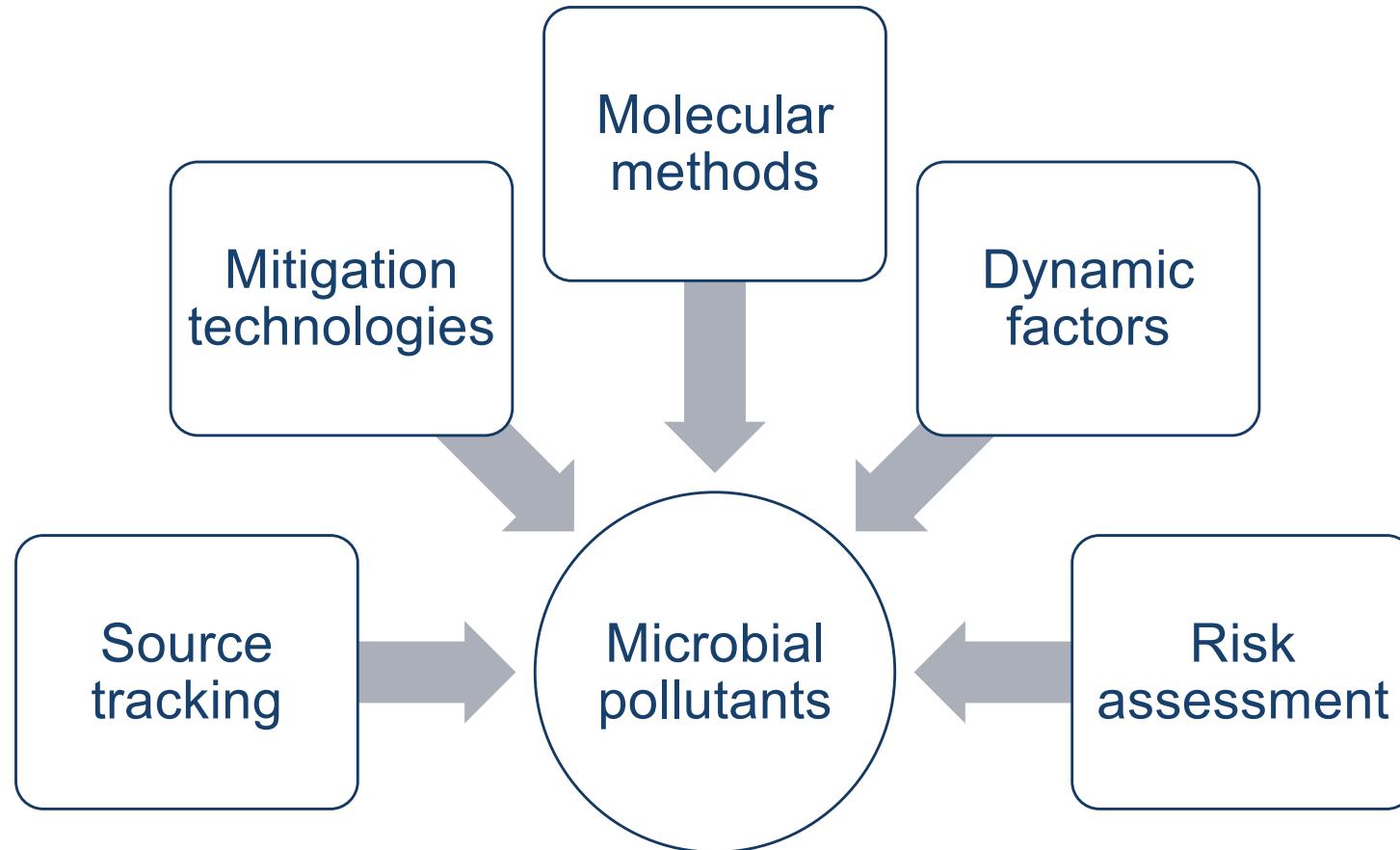
Microbiological urban surface water quality



Rainwater Runoff/overflow



Related current research



- Researchers have proved that indicators can not represent real microbiological water quality.
- Use this toolbox to new functions in Amsterdam and Toronto urban surface water.

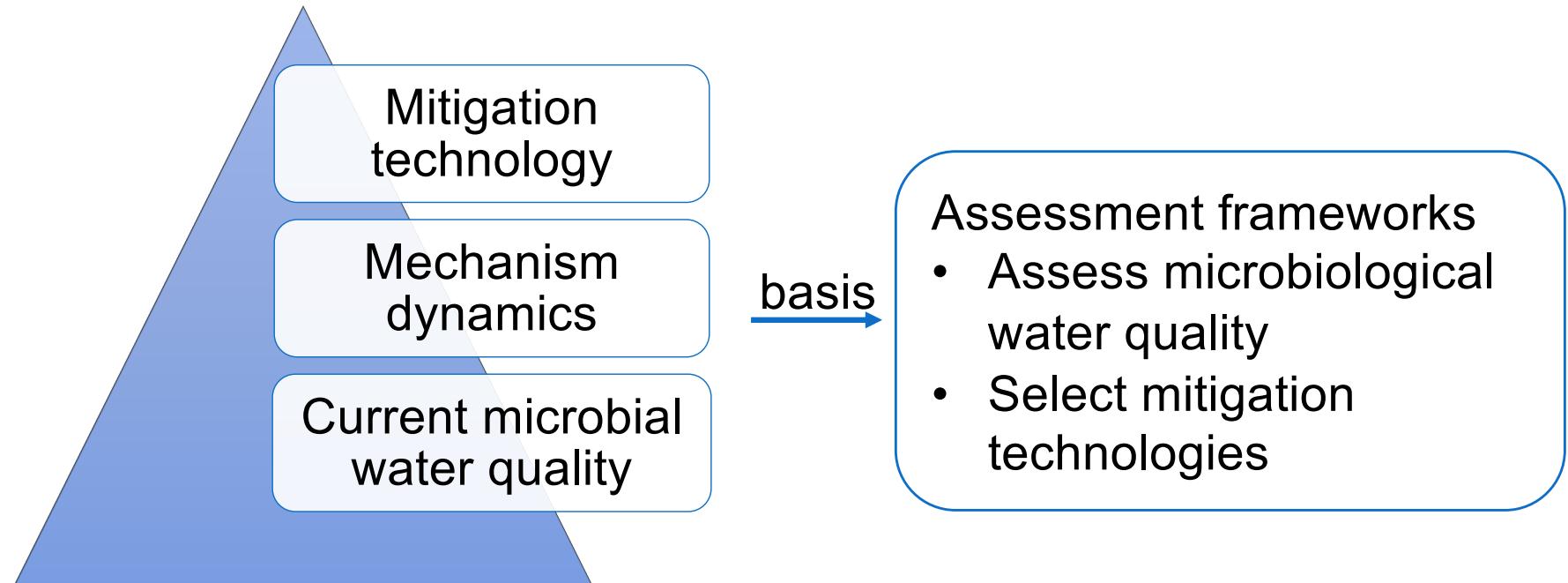
Urban surface water functions- Amsterdam



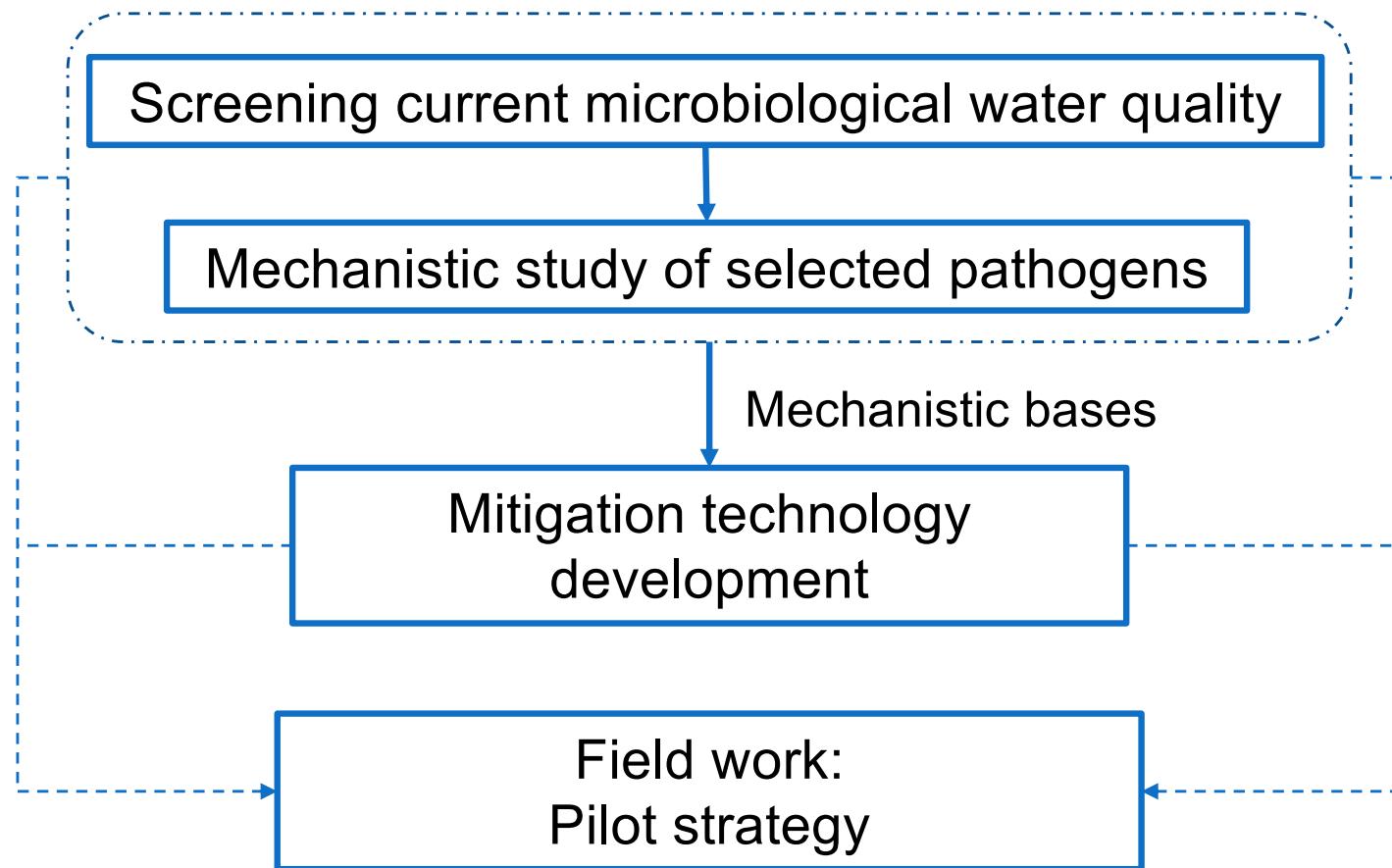
Outbreaks:

- Amsterdam City Swim of 2015, 31 percent of the swimmers got gastroenteritis health complaints (GGD Amsterdam, 2016);
- In 2015, a triathlon event in the inner city waters of Utrecht led to an outbreak of acute gastroenteritis with 73 cases (Parkkali S, et al., 2015).

Objectives

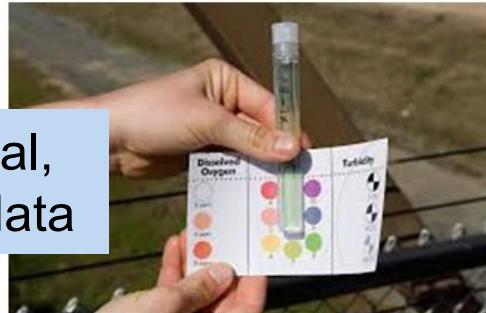


Research approach



Screening current microbiological water quality

Water chemical,
hydrological data



Campylobacter jejuni



Microbial
pollutants

Monitoring Water Quality

Sampling



Temporal
monitoring

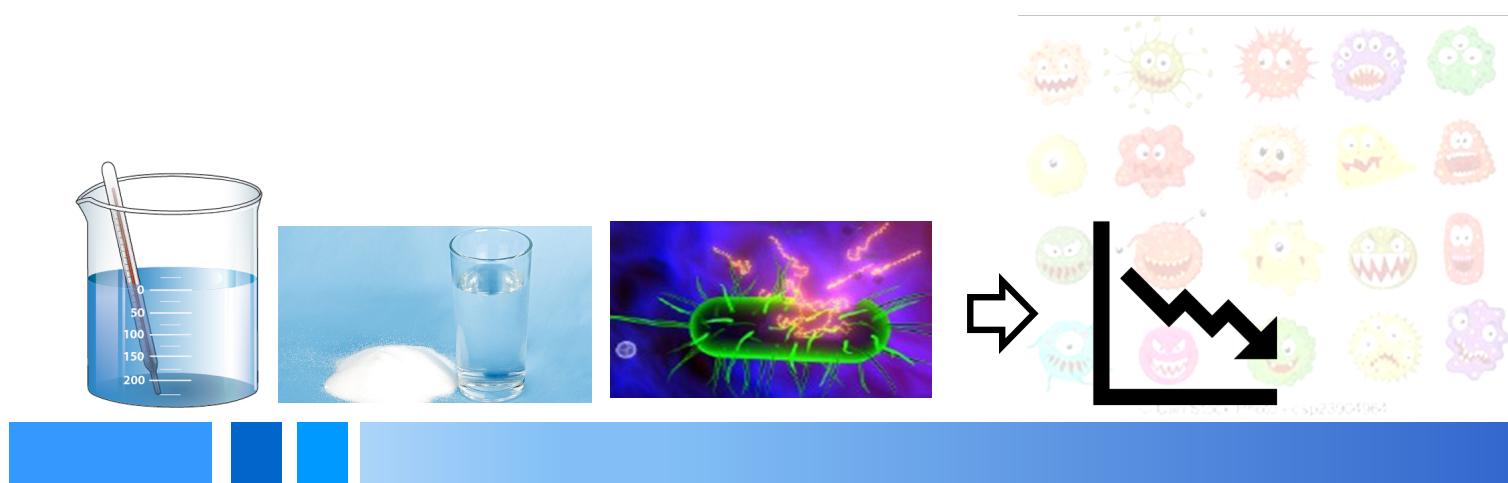


Mechanistic study of selected pathogens

- **Lab experiments under highly controlled indoor pools**
- Several typical pathogens
- Mechanism factors (Temperature, Salinity, UV exposure, etc.)
- Pathogen growth (biofilm growth, substrate availability, decay)



A mechanistic understanding of the fate of pathogens for predicting the behavior of pathogens in urban surface water and for developing technologies to improve water quality.



Mitigation technology development

- **Nature-based mitigation techniques**
- Optimize photodegradation (UV)
- Utilize retention systems to mitigate point-source releases (wetland)
- Aim at substrate and particle removal

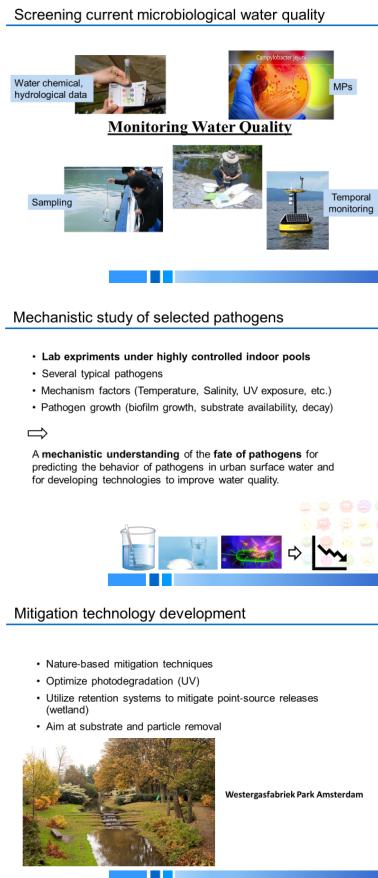


Westergasfabriek Park Amsterdam



Pilot strategy

- A monitoring scheme and mitigation technology focuses on assessment of the most vulnerable spatial and temporal points



→ Vulnerable points & important pathogens

→ Pathogens' mechanism behavior

→ Mitigation technology

Focused monitoring scheme

Piloting monitoring scheme & mitigation technology

Thank you!



Micropollutant & Pathogen Group

More information/collaboration: sha.gao@wur.nl