



Rijksinstituut voor Volksgezondheid
en Milieu
*Ministerie van Volksgezondheid,
Welzijn en Sport*

The 'water quality check' for urban water

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Water quality check urban water | 28 August 2018



Changing urban water management - sustainability

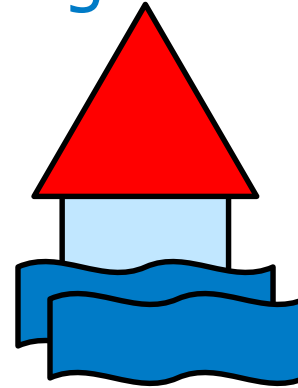
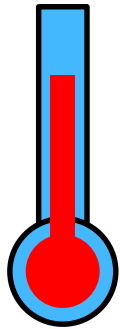
- Natural resources are final
- Circular economy

- Urban water management
 - New ways of collecting, transporting and treating wastewater
 - Recovering resources and energy from wastewater
 - Saving water and energy in households





Changing urban water management – climate



- Climate proofing public spaces
- Urban water management
 - Storing excess water
 - Cooling, more water integrated in urban areas





Changing urban water management - effects

- Sustainability and climate proofing have led to more and other types urban water
- More interaction with urban water

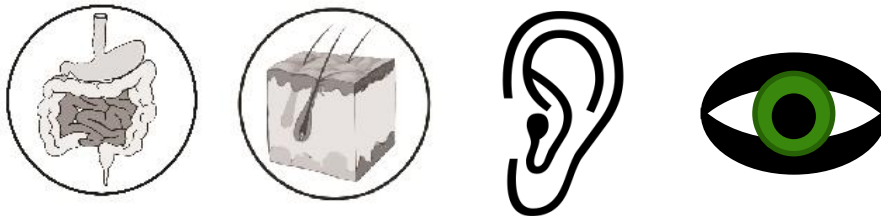


- Urban water has advantages, but... we should also take into account possible concerns



Exposure and water-related disease

- Usually mild symptoms



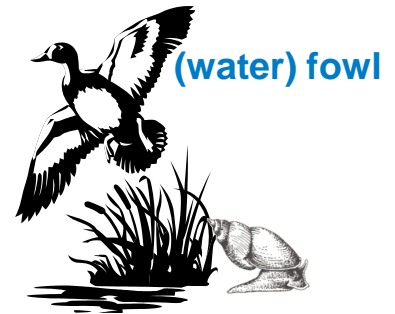
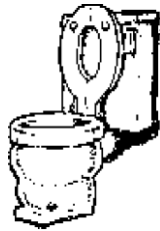
- Usually self-limiting
 - no GP visit
- Potentially severe to very severe
 - hepatitis, meningitis, poliomyelitis



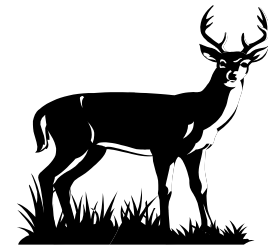


Pathogens in surface water

wastewater
- treated
- untreated



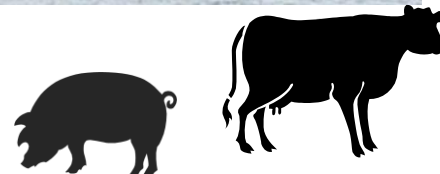
shipping



wildlife



recreation

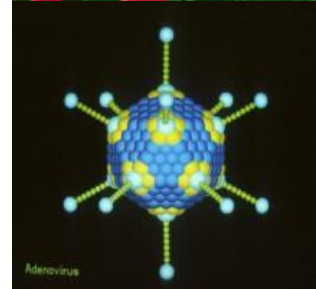
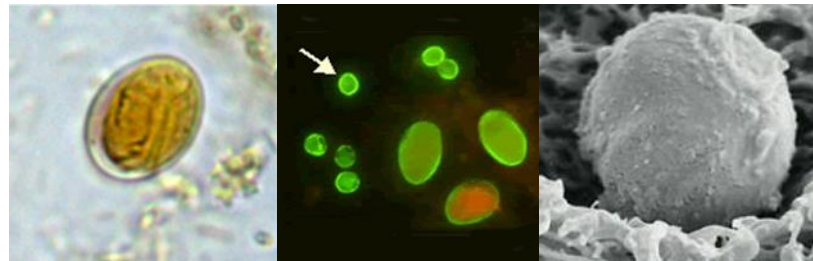


livestock



Pathogens of fecal origin

- Fecal bacteria
 - such as pathogenic *E. coli*, *Shigella*
- Enteric viruses
 - such as norovirus, enterovirus
- Parasitic protozoa
 - such as *Cryptosporidium*, *Giardia*
- Cause gastrointestinal complaints
 - vomiting, diarrhea
- Fecal-oral transmission





Naturally present pathogens

Can grow with water temperature $>$ ca. 18-20°C

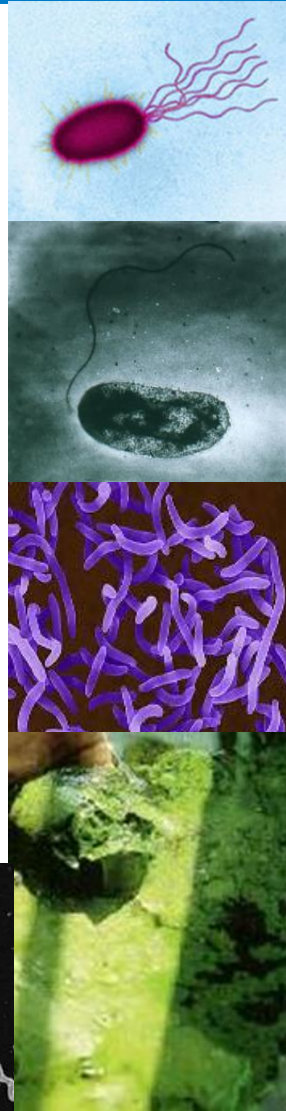
- *Pseudomonas aeruginosa*
- *Vibrio*-bacteria
- Cyanobacteria – blue-green algae

Leptospirosis

- *Leptospira*-bacteria
- mild (mud fever) to severe (Weil's disease)

Swimmer's itch

- larvae of water fowl parasite
- *Trichobilharzia*





Amsterdam City Swim 2016

- 2966 participants
- 2 days after heavy rainfall event → sewer overflow
- questionnaire: 31% of participants had gastrointestinal complaints in the week after the ACS, non-swimmers 5%
- norovirus in 5 fecal and 3 water samples
- norovirus infection can be severe in elderly and children due to dehydration





Inventory of urban water concepts and exposure

- What are new trends and developments?
- Are people exposed to surface water?



		development	exposure
Development related to sustainability	waste water	Energy recovery from wastewater	-
		Phosphate recovery from wastewater	-
		Closing the water cycle	+
		New sanitation	+
	households	Rainwater retention	+
		Water saving / heat exchanging shower	+
		Solar water heater	+
		Grey water collection	+
		Urban farming	+
		Thermal energy storage systems	-
	Rain barrel	+	
Developments related to climate change	water storage	Wadi	+
		Water on the street	+
		Water square	+
		Green roofs	-
		Underground infiltration system	-
		Water-permeable paving	-
		Blue roofs	-
	cooling	Fountains in surface water	+
		Water attraction in street	+
		Living next to water	+
		Water playground	+
		Urban water recreation (city swims)	+
		Public drinking water taps	+



Exposure → risk

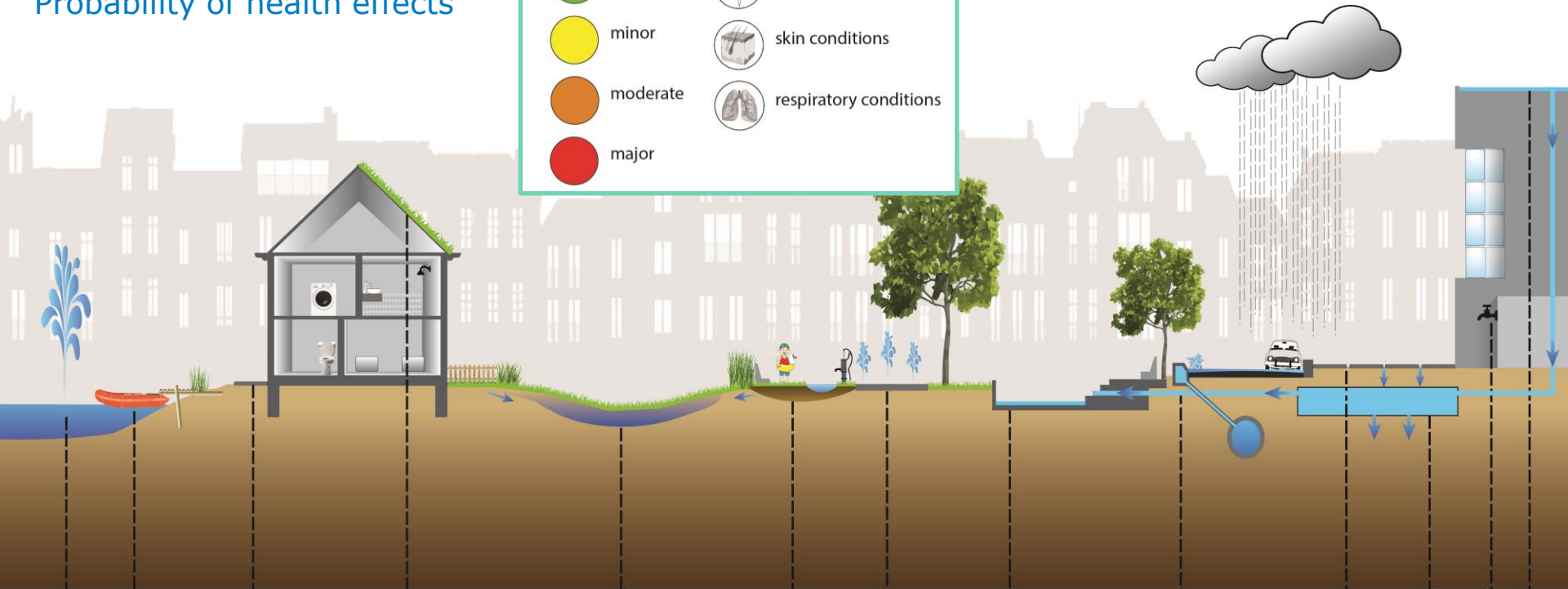
- Qualitative risk assessment
 - Type of source water
 - Water treatment
 - What could happen?
 - e.g. fecal contamination or growth
 - Which health effects?
 - gastrointestinal, pulmonary, dermal
 - What is the probability of health effects occurring?
 - Literature on outbreaks
 - Water quality information





Probability of health effects

	nihil		gastroenteritis
	minor		skin conditions
	moderate		respiratory conditions
	major		



Water Feature	Probability	Health Effects
fountain in surface water	Moderate (Orange)	Gastroenteritis, Respiratory conditions, Skin conditions
recreation in urban water	Major (Red)	Gastroenteritis, Respiratory conditions, Skin conditions
living near water	Moderate (Orange)	Gastroenteritis, Skin conditions, Respiratory conditions
green roofs	Nihil (Green)	None
wadi	Moderate (Orange)	Gastroenteritis, Skin conditions
water playground	Moderate (Orange)	Gastroenteritis, Skin conditions
water feature in the street	Major (Red)	Gastroenteritis, Respiratory conditions, Skin conditions
water square	Moderate (Orange)	Gastroenteritis, Skin conditions, Respiratory conditions
water on the street	Major (Red)	Gastroenteritis, Skin conditions, Respiratory conditions
water permeable pavement	Nihil (Green)	None
sub surface infiltration	Nihil (Green)	None
drinking water tap	Minor (Yellow)	Gastroenteritis, Respiratory conditions
blue roofs	Nihil (Green)	None



Water quality check

- Risk approach maps out the complete urban water concept
 - location, function, design, environment, use, exposure, potential pollution sources, etc

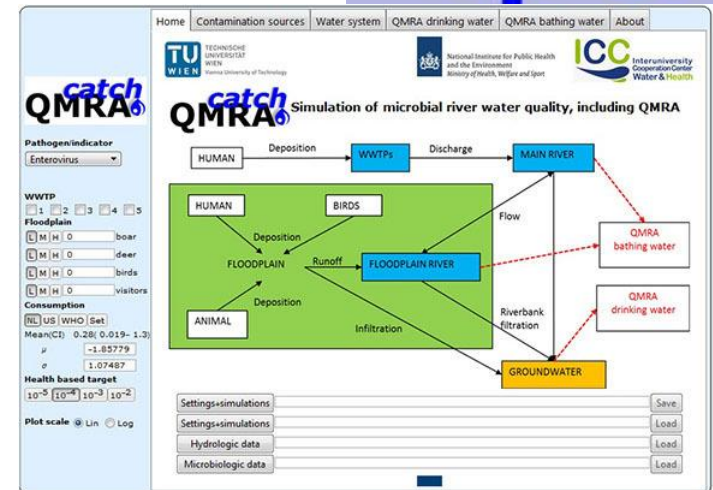
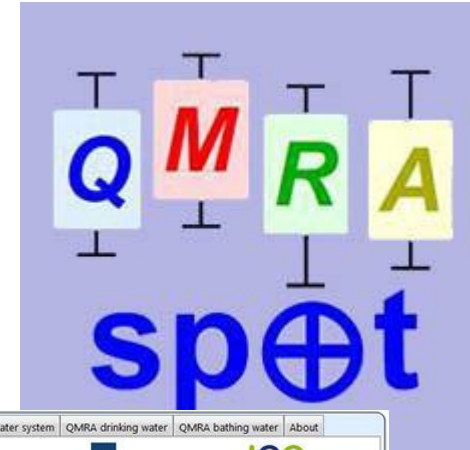
- Application
 - design & planning
 - existing concept
 - when health complaints or outbreak occurs





What's next

- Concept → Tool
- Qualitative and quantitative
- Develop together with stakeholders



to be continued!



Acknowledgements

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