Project idea:

# Emerging microbial risks – Tisza river longitudinal analysis

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Background

- Climate change is expected to increase the proliferation and persistence of emerging pathogens in water environments

- Drinking and bathing water quality indicators do not predict the presence of emerging pathogens

- Presence in surface water is poses a risk for drinking water abstraction and recreational use
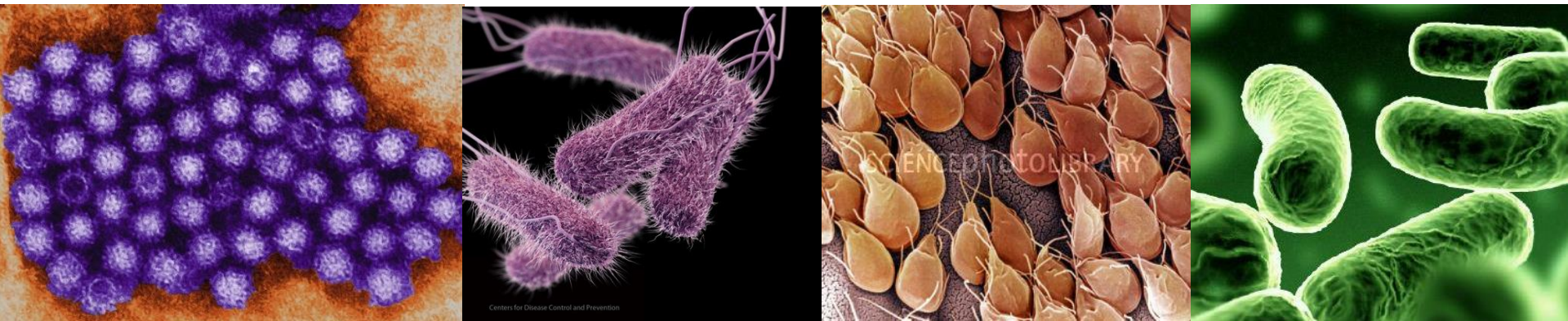
Emerging pathogens in water

- Enteric viruses (e.g. Adenovirus, Norovirus, Enterovirus, HAV)
- Bacteria (*Legionella,* NT *Mycobacterium,* antibiotic resistant bacteria)
- Protozoa: *Cryptosporidium, Giardia*, thermotolerant amoebae *(Acanthamoeba, Naegleria fowleri)*
- Available data on their environmental prevalence is scarce

Study objective

- Longitudinal study on Tisza River on the prevalence of emerging pathogens
    - Human enteric viruses
    - Protozoa (Cryptosporidium, Giardia)
    - Antibiotic resistant bacteria
- Additional sampling at tributaries and potential contaminant sources
- Combination of prevalence data with hydrodynamic modelling
- Pathogen transport model

Priorities and linkages

- PA 5.07 Anticipate regional and local impacts of climate change through research

- PA 4.01 To implement fully the Danube River Basin Management Plan

- Existing project linkage: Joint Tisza Survey

- Previous project linkage:

Viroclime

VIROLOGY WATER AND CLIMATE CHANGE

- „Impact of climate change on the transport, fate, and risk management of viral pathogens in water"
- FP7 No. 243923, 2010-2013
- Lead: Aberyswythe University (UK)
- Partners:
  - University of Barcelona (Spain)
  - University of Patras (Greece)
  - University of Umea (Sweden)
  - FIOCRUZ (Brazil)
  - Catalan Institute of Climate Science (Spain)
  - National Public Health Service Wales (UK)
- NIEH (Hungary): WP4 – Case study work package leader

Viroclime study site

- Human adenovirus
- Norovirus GI
- Norovirus GII
- JC Polyomavirus
- Bovine polyomavirus
- Porcine adenovirus

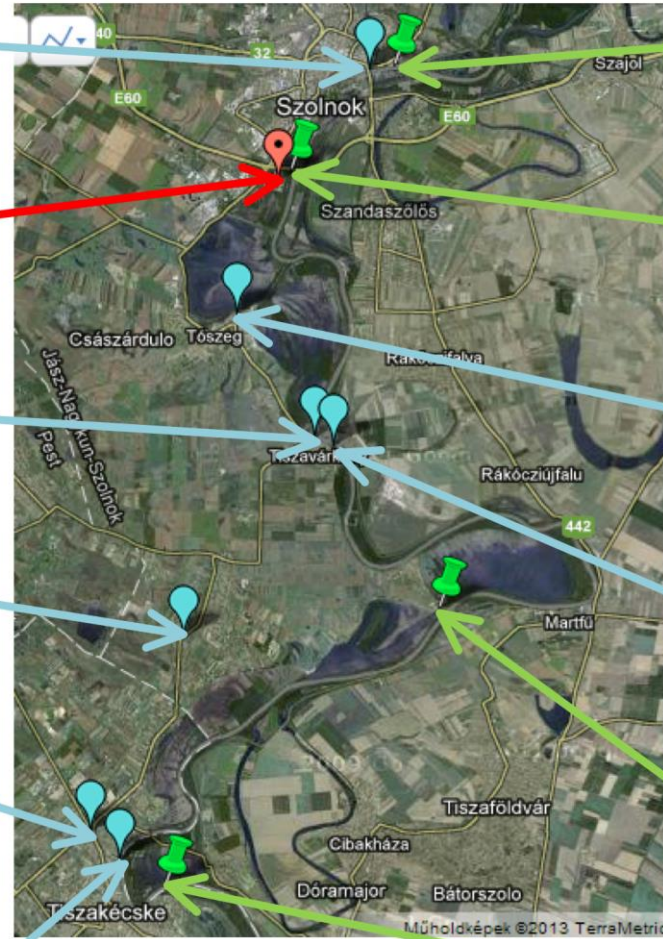Zagyva1

Szennyvíz1-2

Tisza9

Csatorna2

Csatorna

Tisza11

Tisza1

Tisza2

Csatorna1

Tisza10
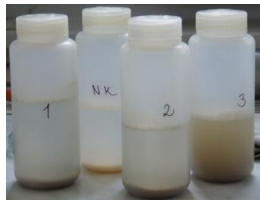
Tisza3

Tisza4

Virus concentration and detection

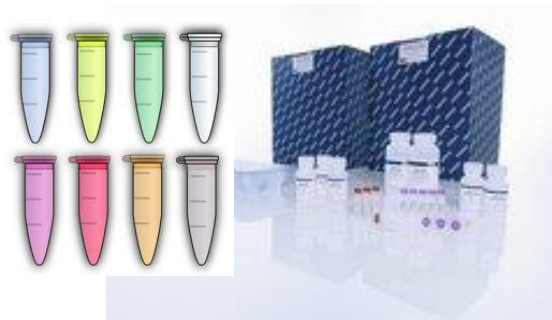Approx. 10 L surface water
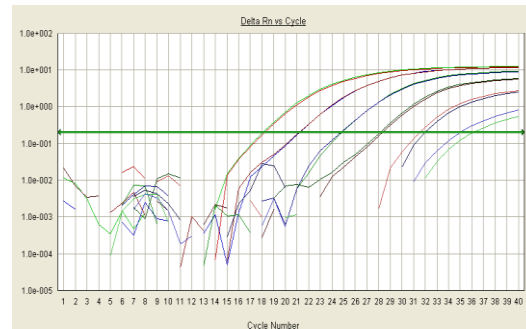50 ml sewage

Adjusting to pH 3.5
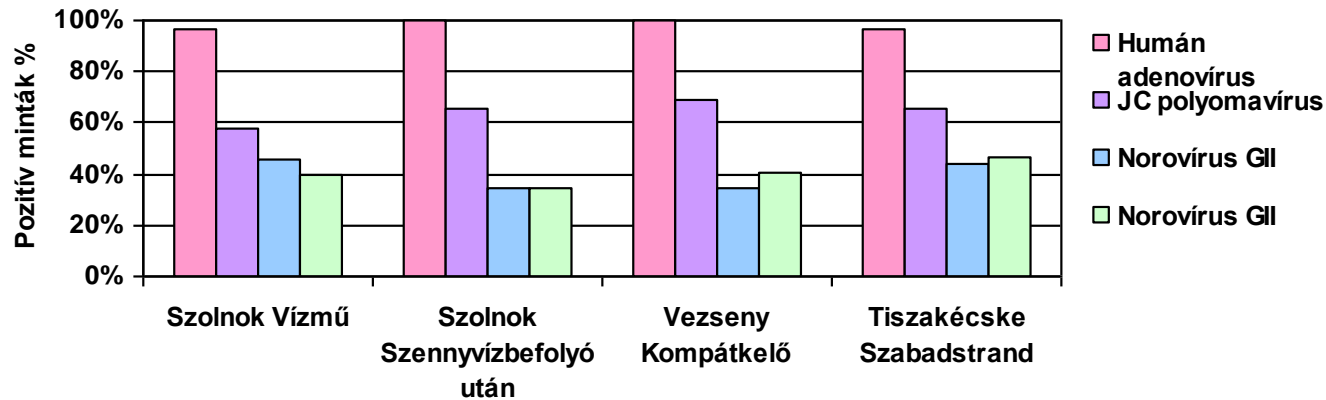
direct flocculation

centrifuging

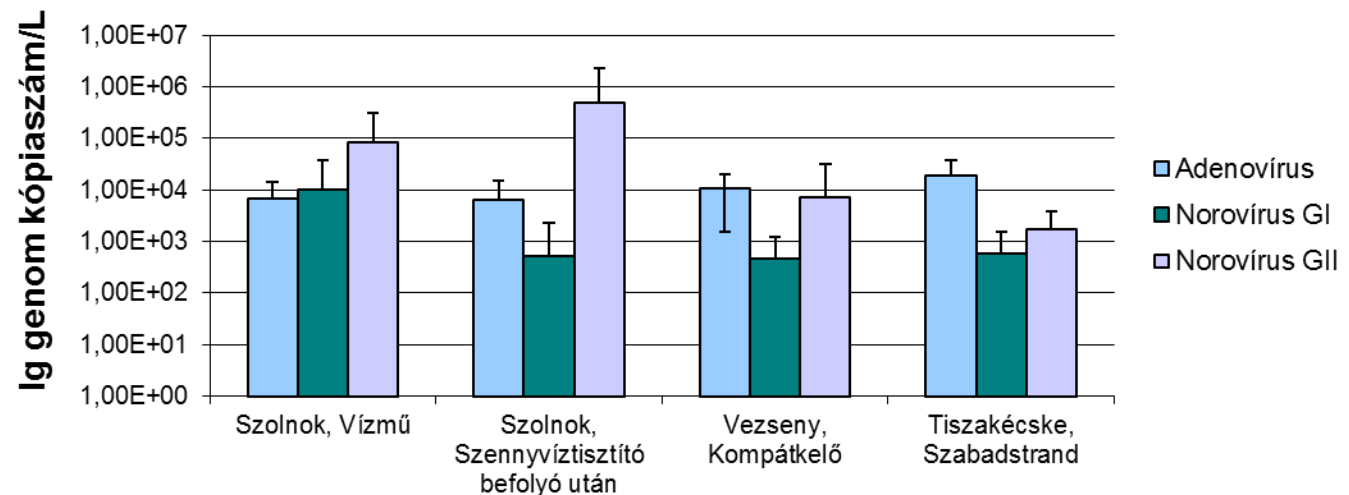Virus concentration and Purification of nucleic acid

Determination of amount of virus with virus-specific qPCR
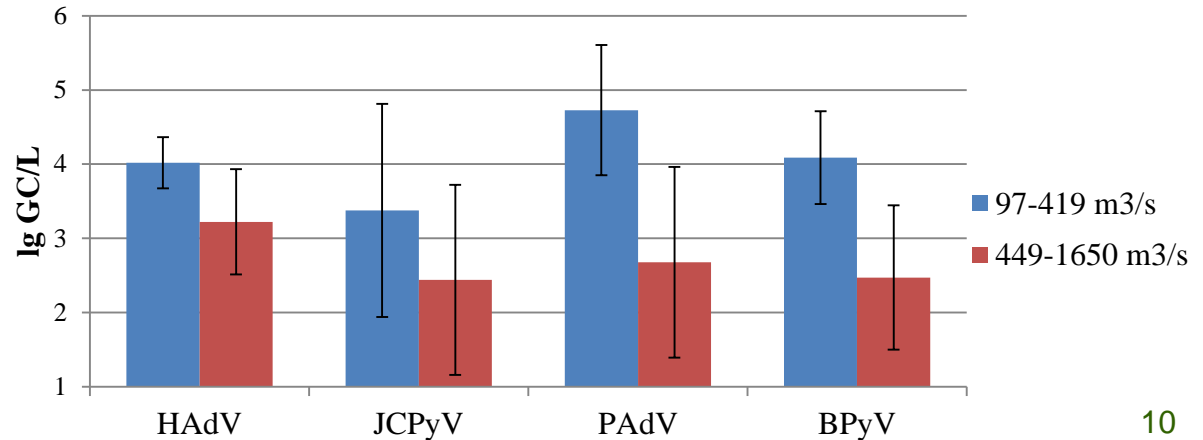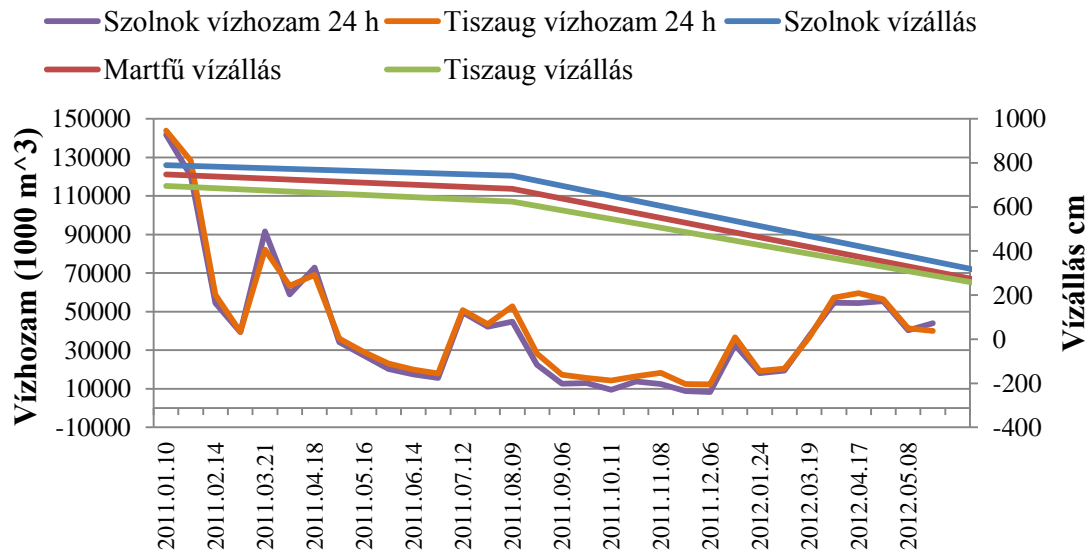
Prevalence of enteric viruses

% of positive samples

Virus titers (lg GC/L)

Flow conditions and virus conditions

Expected results

- 20 sampling points along Tisza River + potential contamination sources (wastewater discharge, tributaries)

- Prevalence data on the target organisms

- Analysis of spatial distribution

- Source investigation

- Trasport models

- Risk assessment based on human exposure scenarios

Partners and financing

- Potential partners
  - JRC (expressed interest)
  - Austria
  - Romania
  - Italy
- NIEH expertise:
  - Microbiology
  - Risk assessment
- Expected expertise:
  - Hydrological modeling
  - QMRA
- Estimated budget: 1 000 000 €

Thank you for your attention!