

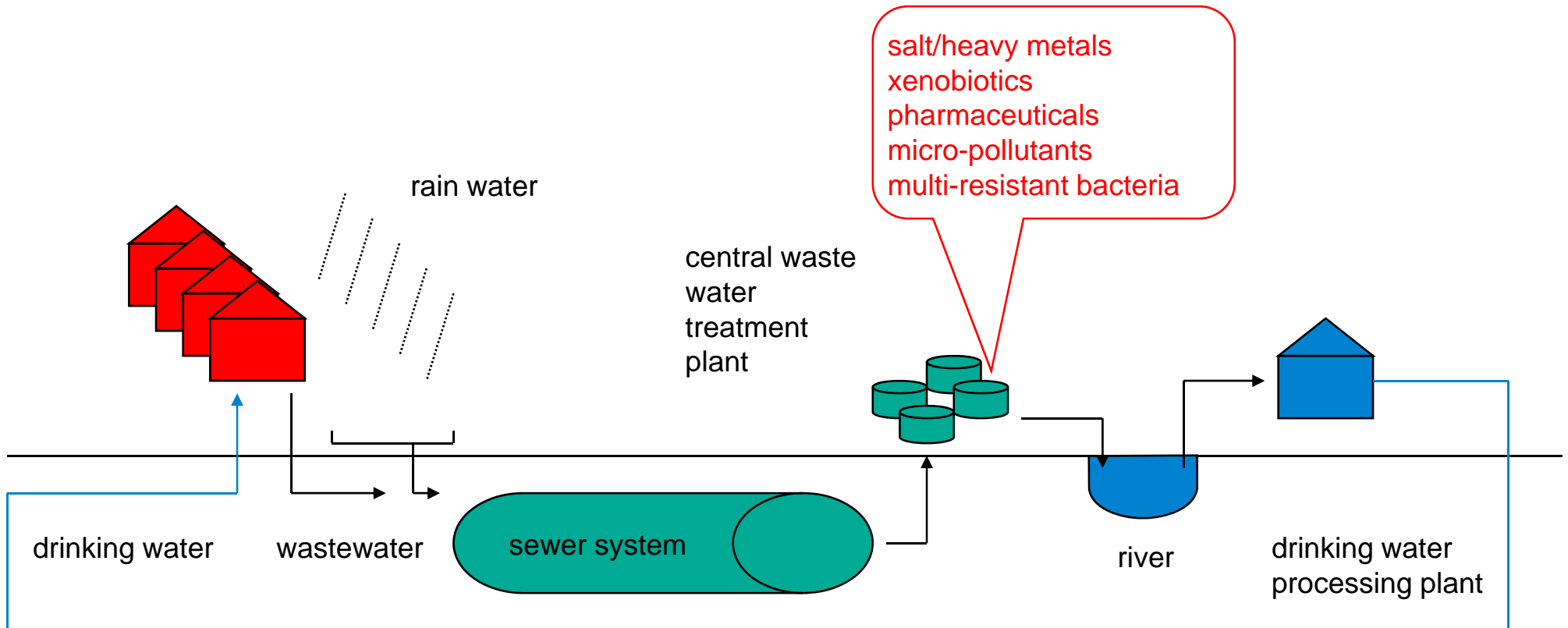
# Sustainable Water Infrastructure Systems in South-East Europe

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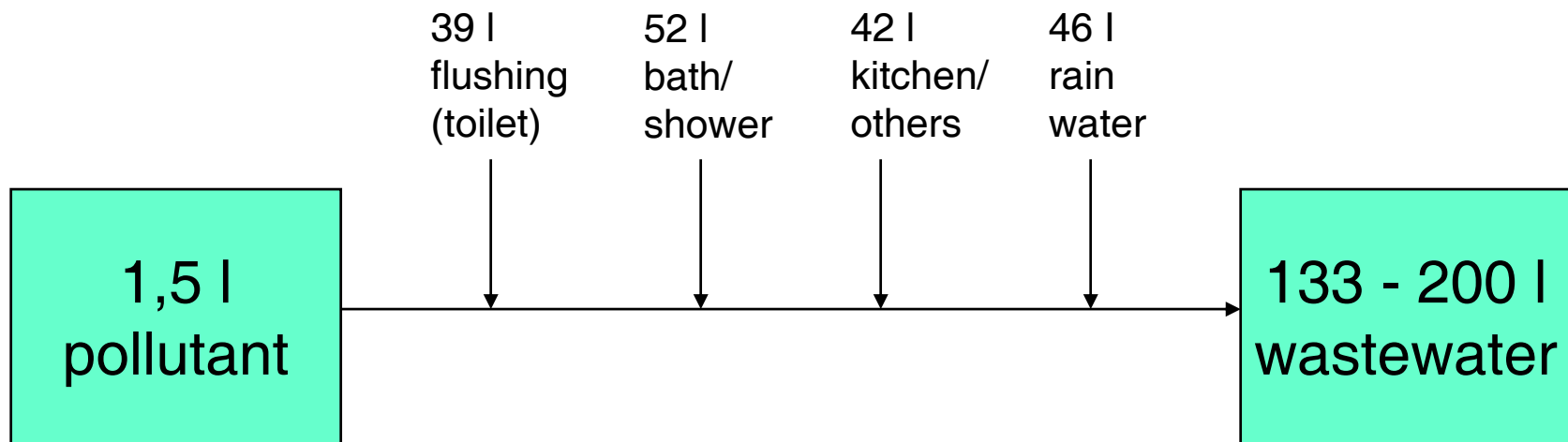
Water Workshop WATER QUALITY  
Novi Sad, Serbia, 4<sup>th</sup> September 2008



# Conventional Water management System



# Water Effluents in Households per Person and Day in Germany



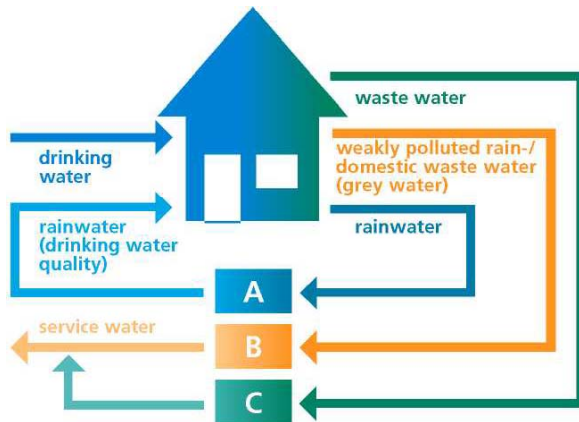
# Sewer System in Germany



Length:	400.000 km
Investment costs:	€ 150.000 - 250.000 / km
Duration of investment:	100 years
Total value:	€ 80.000 mill.

High demand of reconstruction (€ 55 bill. in Germany)!

# DEUS Concept: Cost Reduction in Water and Wastewater Management



- A** roof-rainwater treatment
- B** treatment of rainwater (public areas) and/or weakly polluted waste water (grey water)
- C** sustainable waste water treatment

## Reduction of investment costs:

- decentralization
- change from gravity sewers to vacuum sewers
- increase the volume-time yields of bioreactors

## Reduction of operating costs:

- increase the concentrations of pollutants
  - rain water separation
  - reduction of drinking water consume
  - addition of kitchen wastes

change from aerobic to anaerobic biology

# Planned Project



overall objectives:

adaptation of the **DEUS concept** to the local conditions in South-East Europe

**demonstration projects** for sustainable, de-centralized water and wastewater infrastructure systems

combined with **training and education** for engineers, scientists, technical staff, and public authorities

to build capacities for **innovative sustainable wastewater management** to prevent environmental pollution caused by uncontrolled discharge of untreated wastewater

# Specific Objectives



implementation of an **education and training center**

introduction of innovative methods for **de-centralized wastewater treatment**

demonstration of the applicability of a **small scale systems** for municipal wastewater treatment and **waster water reuse**

**knowledge and know-how transfer** and **capacity building** for design, operation, management, and post-project evaluation

contribution to the achievement of national strategies and goals in **sustainable wastewater management** in South-East Europe

# Planned Activities



- design and construction of demonstration plants for water management and anaerobic wastewater biotreatment
- continuous operation of the demonstration plants
- establishment of competence centers
- evaluation of technical, economical, ecological, and social aspects
- dissemination activities



# Demonstration Centers



- demonstration plants for innovative de-centralized wastewater treatment in selected municipalities
- anaerobic wastewater bio-treatment in modular high performance membrane bio-reactor
- construction and operation jointly by scientists and engineers from Germany and SOE countries
- cleaning of the wastewater to that grade, which is necessary for the specific utilization; reduction of COD to less than 100 mg/l
- accompanying experiments in the Laboratories of Fraunhofer IGB and local scientific partners

# Competence Centers

- associated to the demonstration plants
- education and training centers for students, scientists, civil engineers, chemical engineers, technical engineers, representatives of administrative bodies, technical staff for maintenance and repair
- information centers for local residents and other interested stakeholders
- different learning modules, which meet the requirements in wastewater management according to the demands of the different stakeholders
- learning modules comprise of seminar with lectures, exercises on the pilot plant area and case studies as well as a formulation of a practical implementation concept
- improve acceptance and safety of decentralized wastewater management

# Evaluation

- **technical evaluation**
  - technological performance of each demonstration plant
  - interfaces to other public utilities like energy supply and waste disposal
- **economical evaluation**
  - specific costs of wastewater treatment
  - potential income (fees, revenues from energy supply etc.); cost-benefit ratio
  - present and future economic situation of the project areas
- **ecological evaluation**
  - determination of the impact of the existing insufficient wastewater treatment on the local ecosystems and of positive ecological impacts of the innovative wastewater treatment solutions
- **social evaluation**
  - effects of the education and training activities on the competence of the participants
  - impacts on the socio-economic characteristics like human health
  - general acceptance and reactions of inhabitants

# Criteria for the Selection of an Appropriate Demonstration Site

- no or insufficient water and wastewater infrastructure
- readiness for investments into water / wastewater infrastructure
- readiness for providing an additional part of the project budget
- local conditions for technical realization
- local scientific partner for maintenance of the demonstration plants, education, and training
- appropriate infrastructure for a training and information centre
- economical development (tourism, agriculture etc.)
- traffic infrastructure

The project shall be supported by European or national public funds