

KURAS – Concepts for urban stormwater management and waste water systems

The KURAS joint research project was started in June 2013 with the aim of developing concepts for urban stormwater management and waste water systems based on sample projects in Berlin. The Technical University of Berlin (TU Berlin) and the Berlin Centre of Competence for Water (KWB) coordinated the various partners and the research work. The German Federal Ministry of Education and Research (BMBF) funded this project, which focuses both on infrastructure and on urban quality of life.

What was researched?

In the focal area of waste water systems, changes in demographics, behaviour or climate were defined for a representative area of the city of Berlin that cause significant underloading or overloading of waste water systems with negative impacts such as odour nuisances or corrosion.

In the focal area of stormwater, the effects of stormwater management measures were analysed and practically oriented recommendations for planners and cities were developed on this basis.

The results show that integrated consideration of measures for stormwater and waste water management takes into account effects that go beyond the primary goals of the individual measures, on the one hand, and facilitates improved adaptation of urban waste water systems to changes, on the other hand. The methods developed as part of KURAS allow for targeted selection of adaptation strategies for specific problems and can thus serve as an aid to integrated planning.

Research institutions:

- TU Berlin, Department of Fluid System Dynamics
- TU Berlin, Institute of Architecture, Department of Building Technology and Architectural Design
- TU Berlin, Institute of Ecology
- Berlin Centre of Competence for Water (KWB)
- IWW Water Centre
- FU Berlin, Department of Hydrogeology
- Neubrandenburg University of Applied Sciences, area of Landscape Architecture and Geodesy
- Leibniz University of Hanover, Institute of Meteorology and Climatology
- TU Kaiserslautern, Department of Water Management for Settlements
- Institute for Automation and Communication Magdeburg
- Senate Department for Urban Development and the Environment (since 12/2016 Senate Department for Urban Development and Housing and Senate Department for the Environment, Transport and Climate Protection)
- German Institute for Urbanism
- German Federal Environment Agency

Partners in practical applications:

- Ramboll Studio Dreiseitl GmbH
- Berliner Wasserbetriebe
- GEO-NET Umweltconsulting GmbH
- Ingenieurgesellschaft Prof. Dr. Sieker mbH

PROJECT GOALS
HIGHER-LEVEL GOAL

Development and model-scale demonstration of integrated concepts for sustainable management of waste water and stormwater for urban locations.

- SUB-GOALS
- Development of recommendations for the operation, expansion and adaptation of engineering infrastructure for waste water with regard to extreme cases of overloading and underloading that will be intensified by future demographic and climate change
 - Demonstration of a methodology for optimising combinations of centralised and decentralised measures for stormwater management with regard to their effects on residents, the environment and costs (and cost structure)
 - Preparation of higher-level planning and management instruments for the operation of waste water systems
 - Development of tools and recommendations for planners/architects

Effects	Measures			Application for 2 sample quarters				Recommendations
	M1	M2	M3	E	ΣM ₁	E	ΣM ₂	
RESIDENTS	1 Building physics and services	1	...	1	...	<ul style="list-style-type: none"> • Financing models • Incentives • City planning instruments • Tools for planners and architects
	2 Landscape quality	...	...	2	...	2	...
	3 Urban climate	...	...	3	...	3	...
ENVIRONMENT	4 Biodiversity	...	...	4	...	4	...
	5 Groundwater/soil passage	...	...	5	...	5	...
	6 Emission into surface waters	...	...	6	...	6	...
	7 Impacts in surface waters	...	...	7	...	7	...
ECONOMIC ASPECTS	8 Costs of measures	...	...	8	...	8	...
	9 Use of resources	...	...	9	...	9	...
	10 Economic analysis	...	...	10	...	10	...

INTERFACE
SURFACE-SEWER

- Exchange of results at the surface-sewer interface
- Comparison of methodological approaches (cost calculation, sewer simulation, ...)
- Intensive exchange through joint workshops among partners at the interface and delegates for specialist topics
- Concluding "synergy conference", joint recommendations

STRATEGY
WASTE WATER SYSTEMS

Options for action	Application for sample area			Recommendations
	M1	M2	M3	
STATUS QUO	- Properties of waste water	<ul style="list-style-type: none"> • Modelling: Overall system effect analysis • Risk and SWOT analysis • Innovative mechatronics elements
PRESSURE TO CHANGE	- Functioning of pump stations	...	...
	- Functioning of sewer network	...	...
EFFECTS (OVER/UNDERLOAD)	- Demographic change	<ul style="list-style-type: none"> • Planning tools • GIS-based management instruments • Refurbishment recommendations
	- Climate change	...	...
	- Water-sensitive behaviour	...	...
EFFECTS (OVER/UNDERLOAD)	- (Sewer) deposits	<ul style="list-style-type: none"> • Refurbishment recommendations
	- Corrosion	...	...
	- Odours	...	...
	- Reducing strain/first flush effects	...	...
EFFECTS (OVER/UNDERLOAD)	- Blockages	<ul style="list-style-type: none"> • Refurbishment recommendations
	- Backwater/overflow	
	- Backwater/overflow	

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All results available at:
www.kuras-projekt.de

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> Research for sustainable development