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Water initiatives at TU Dresden, Commission on Water Research, UNU FLORES

Peter Krebs

GWSP SSC Meeting

Bonn, 9 December 2010

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DFG Senates commission on Water Research (KOWA)

UNU FLORES in Dresden

Water initiatives at TU Dresden

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Mission

Promote inter- and trans-disciplinary basic understanding and research

Identify core work areas in water research

Promotion of national and international collaboration on research and funding level

Support decision making in politics and authorities

Linking water research in Germany – and on an international level

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present KOWA members

S. Crewell
Meteorology

M. Exner
Environmental Medicine

H. Vereecken
Soil Physics

U. C. E. Zanke
Hydraulic Engineering

W. Aeschbach-Hertig
Hydrophysics

A. Bárdossy
Hydrology

R. Helmig (Spokesperson)
Hydromechanics

P. Grathwohl
Hydrogeology

I. Neuweiler
Hydromechanics

M. Jekel
Hydrochemistry

U. Gaedke
Limnology

E. Günther
Environmental Management

P. Krebs (Deputy Spokesperson)
Urban Water Management

K. Küsel
Aquatic Microbiology

M. Ahlheim
Environmental Economy

Guests:
- BMBF
- Young Scientists, Prof. B. Planer-Friedrich
- Office International Hydrological Program, Dr. J. Cullmann
- Review board Water Research
- Helmholtz Association, Prof. G. Teutsch
- Leibniz Association, Prof. K. Tockner

DFG:
Dr. Ute Weber
Programme Director

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Operational means

Working groups, open to external scientists

Round table discussions, workshops, summer (spring) schools on an international level

Interdisciplinary research proposals, often linking basic and applied research

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KOWA activities

Research topics

Water, viruses and health

Urban water resources and compounds management

Data and monitoring

Strategic & research topics

Integration of social and economic sciences into water research

Scenario building

Infrastructure for environmental research

Strategic activities

Structures in national and international water research

Promoting independent development of young scientists

→ Water Science Alliance

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Relation to Water Science Alliance

KOWA round table discussion, June 2008

“Meeting the new challenges in international water research – discussing strengths and weaknesses of existing centers and potential for developing new structures“

Vision

Carrying out

- interdisciplinary research
- on relevant topics
- on a high scientific level
- in a stimulating environment

→ **DFG / KOWA is part of the process and actively contributes to the development of WSA**

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Challenges in resources management

Non-renewable resources are depleted

Renewable resources are deteriorating in quality

Overuse and incomplete recycling

Diffuse distribution

Complex flux patterns

Coupling of agriculture, land use, water and waste on an international level

New compounds, priority substances

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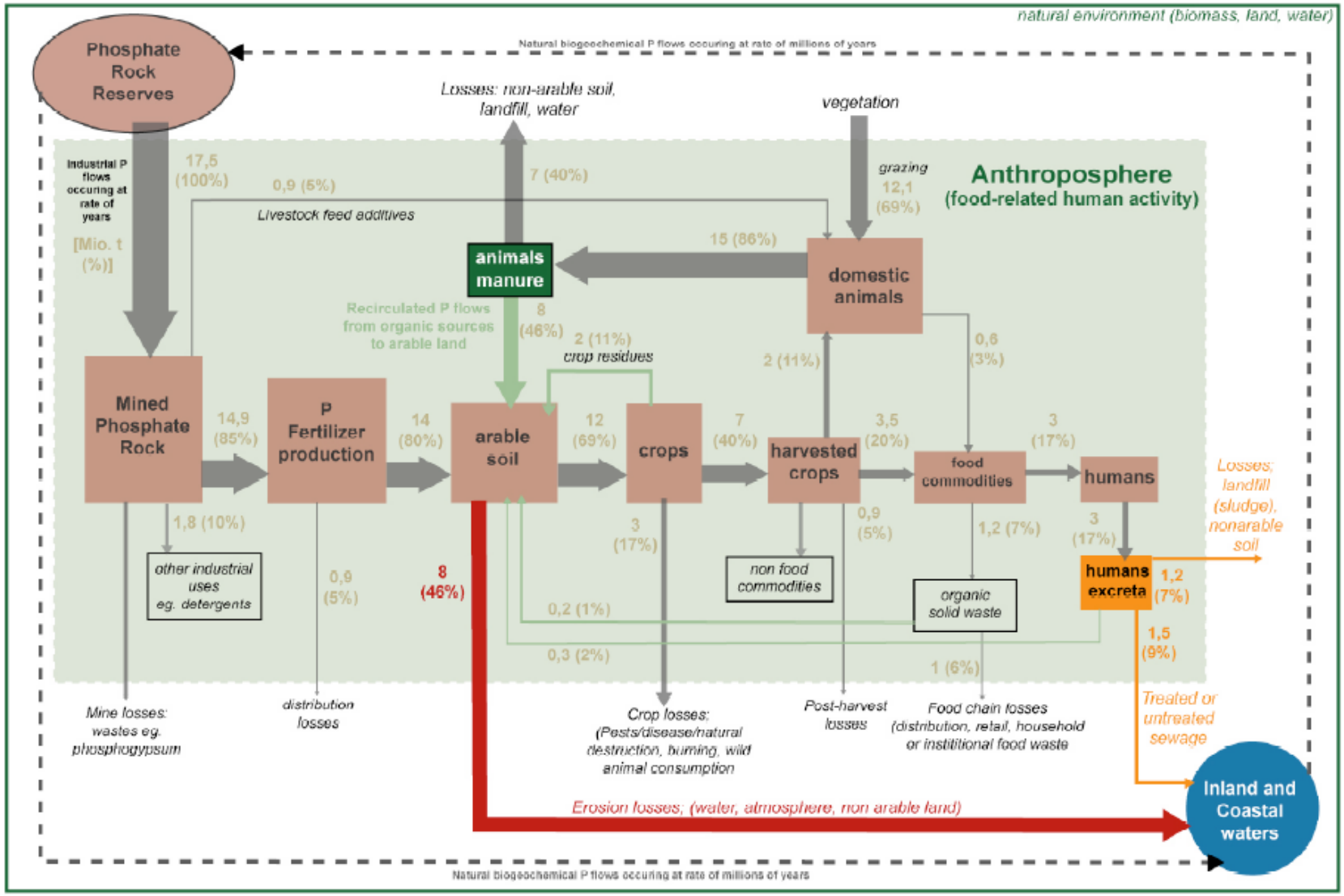
Loss of phosphorous



(Global P-flow, changed after Cordell, Drangert and White 2008, submitted, http://phosphorusfutures.net)

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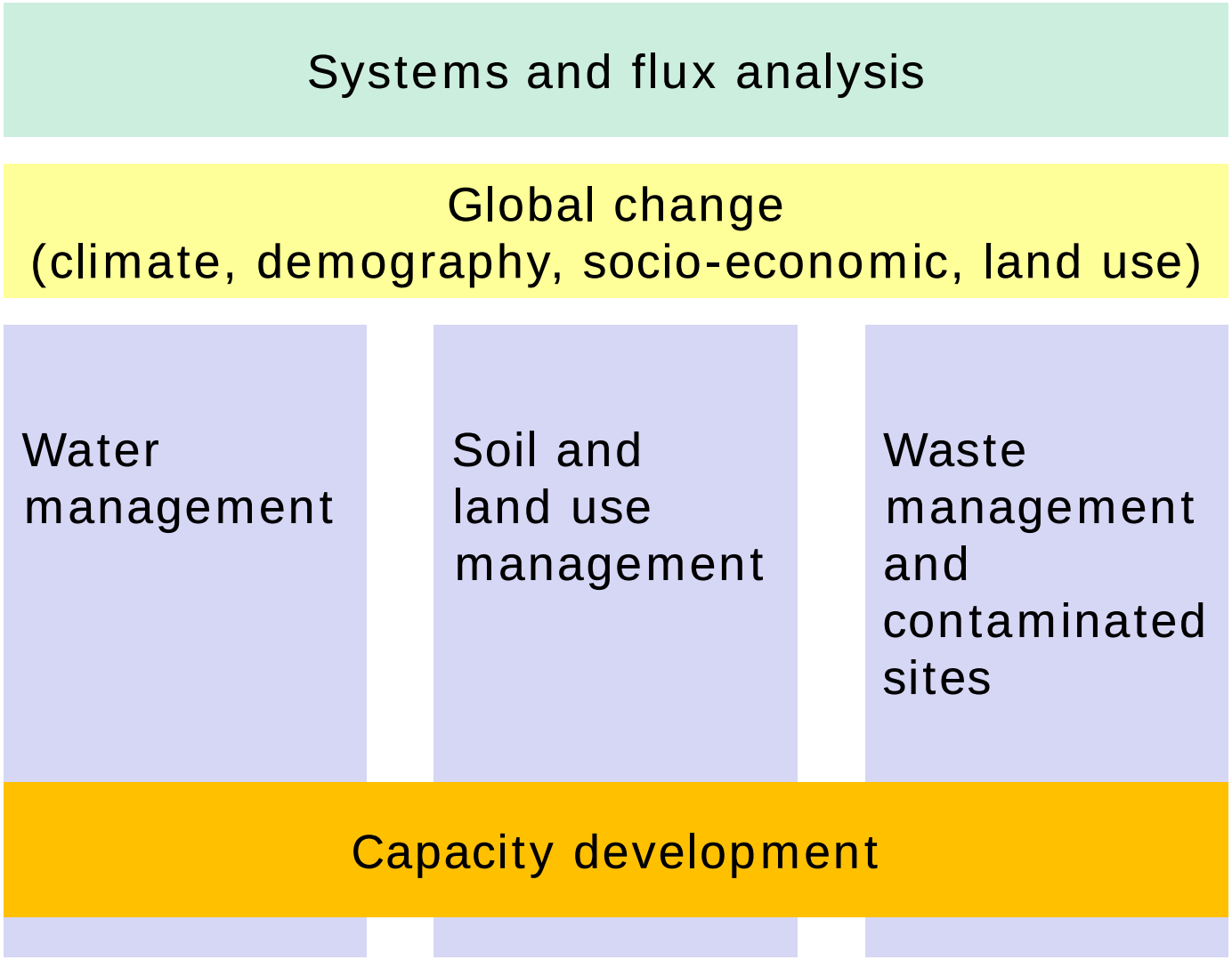
UNU FLORES

Integrated management of material fluxes and resources



Develop tools to evaluate options

Develop scenarios

Identify drawbacks

Analyse processes

Develop options

Implementation concepts

Education and capacity development

The UNU postgraduate programmes (Master and PhD) on "water"

Dresden based Graduate School

Master of Science programme

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UNU multi-campus twinning

Goal:

to strengthen UNU‘s presence in developing and transitional countries

to intensify research and teaching interaction with those countries

build sense of ownership of various research and capacity development activities in those regions

Twin institute Mozambique

Rationale: Mozambique facing serious water-related problems

- → government ready to address those challenges
- → Consolidated Plan for Action for Science & Technology in Africa (CPA) identified “water” as core subject of one of the regional centres of excellence
- → water management among crucial problems globally

Establishment of water-focused twin institute could have strong regional impact / capacity strengthening through UNU collaboration and presence in Africa

Goal: Twin institute to be operational by 2013

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DFG Senates commission on Water Research (KOWA)

UNU FLORES in Dresden

Water initiatives at TU Dresden

Interdisciplinary Research Platform: Soil – Water – Waste

Meteorology

Hydrochemistry

Hydrology

General Ecology

Hydromechanics

Hydrobiology & Limnology

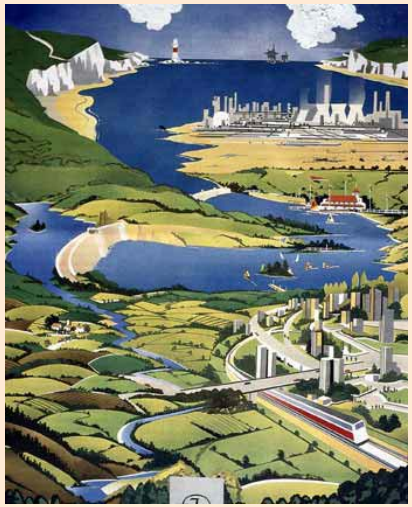
Hydro Engineering

Soil Science & Site Ecology

Groundwater Management

Urban Water Management

Contaminated Site Treatment



Waste Management

Environmental Development & Risk Management

Remote Sensing & Geodata Analysis

→ linked to UFZ, IÖR, IGB, UNEP/CIPSEM, **UNU FLORES**

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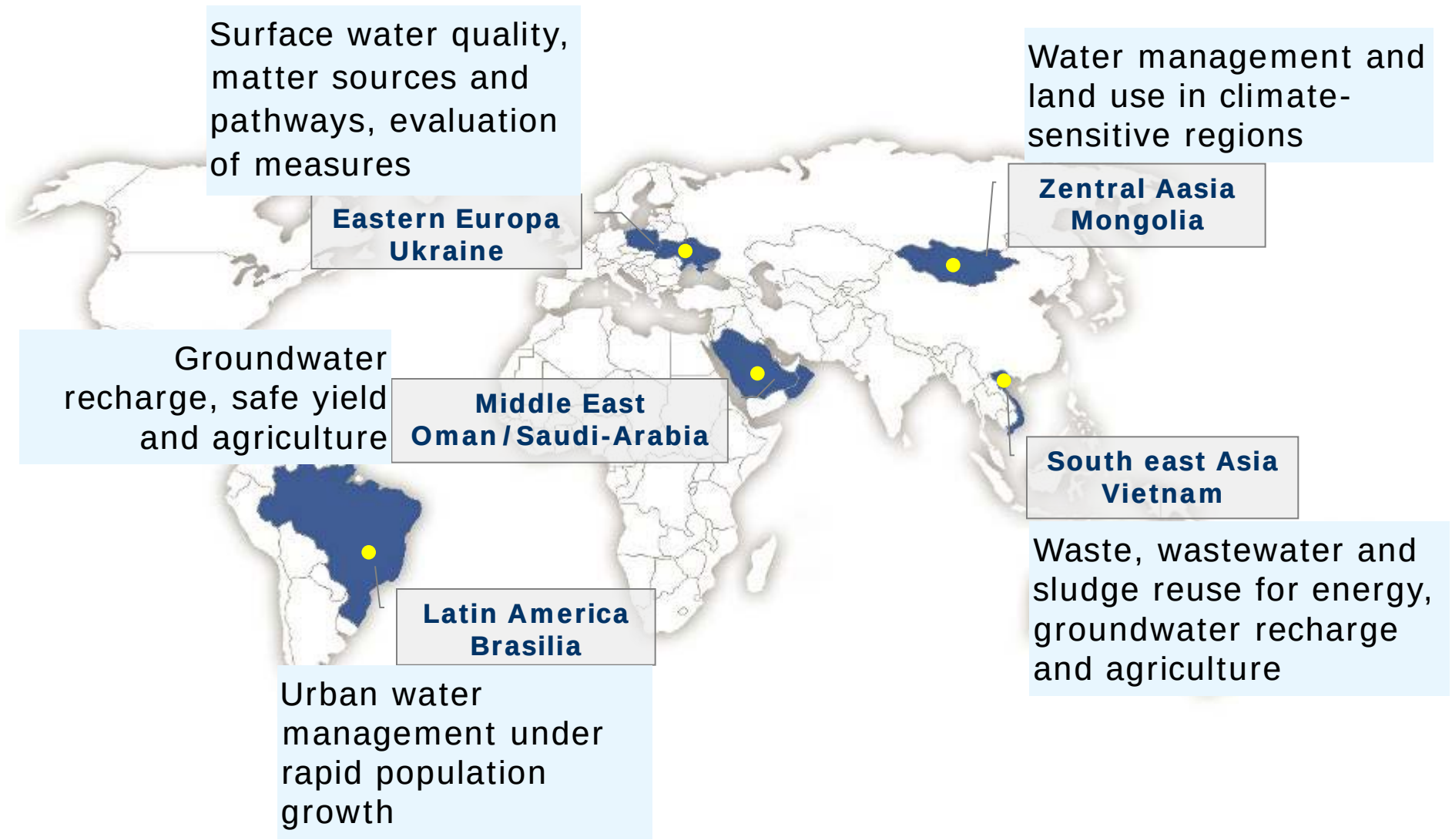
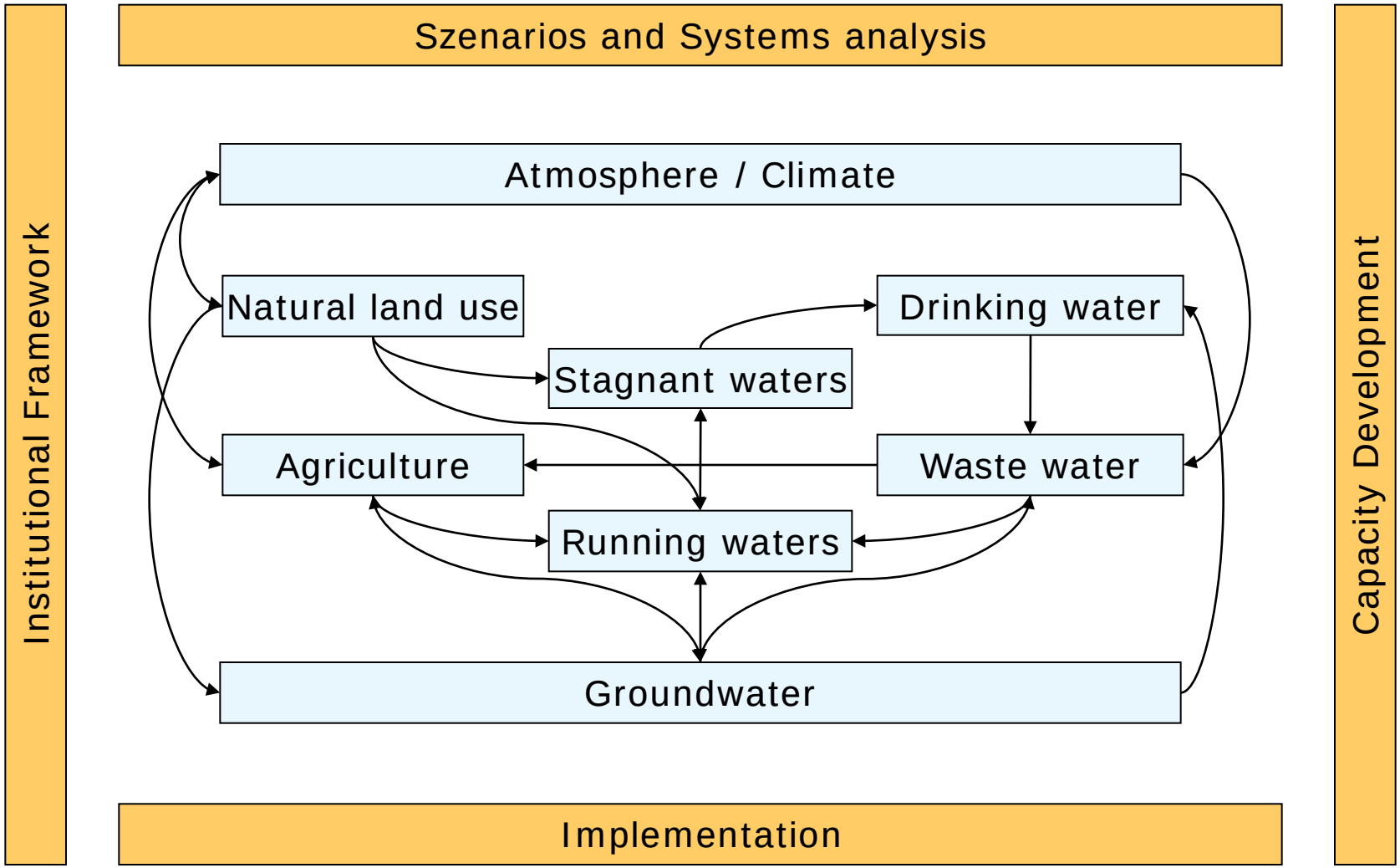
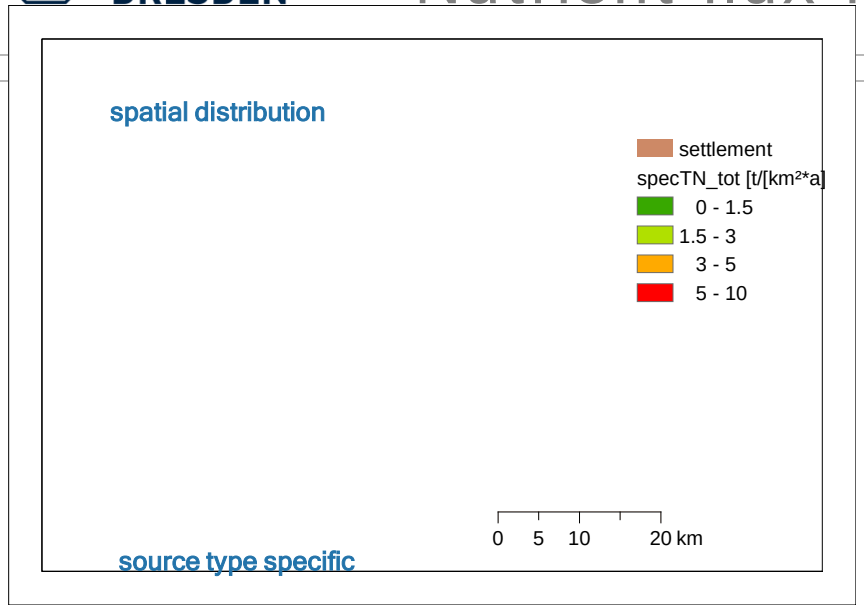
Project IWAS
International Water Research Alliance Saxony

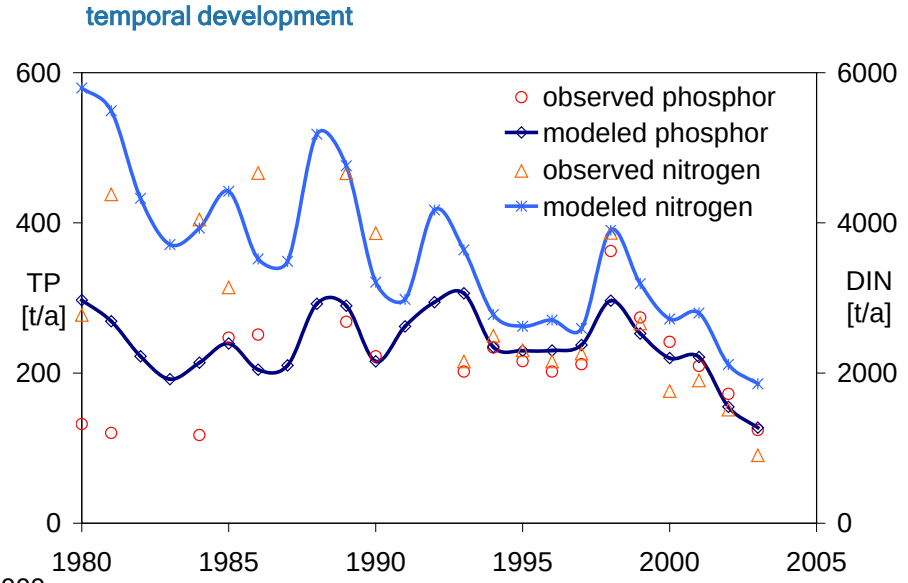


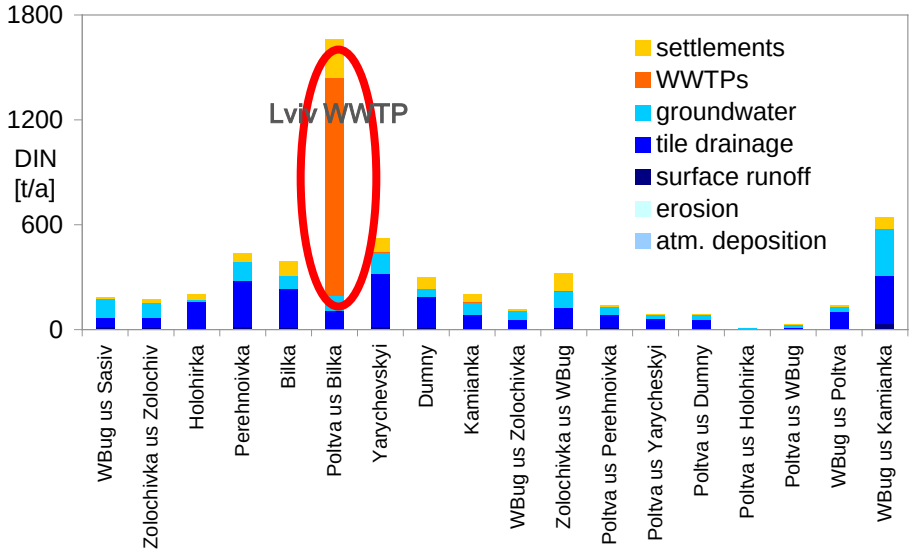
IWAS IWRM concept

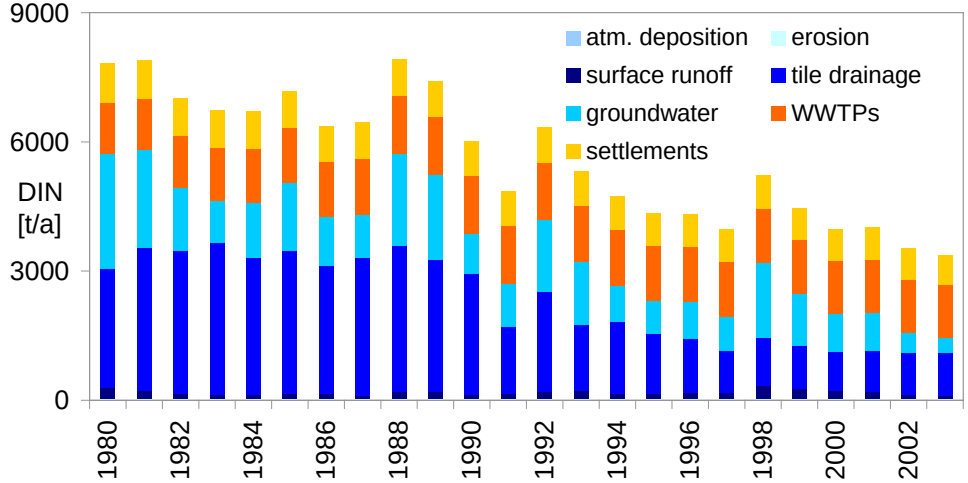


Nutrient flux modelling on catchment scale









Helm & Blumensaat (2010)

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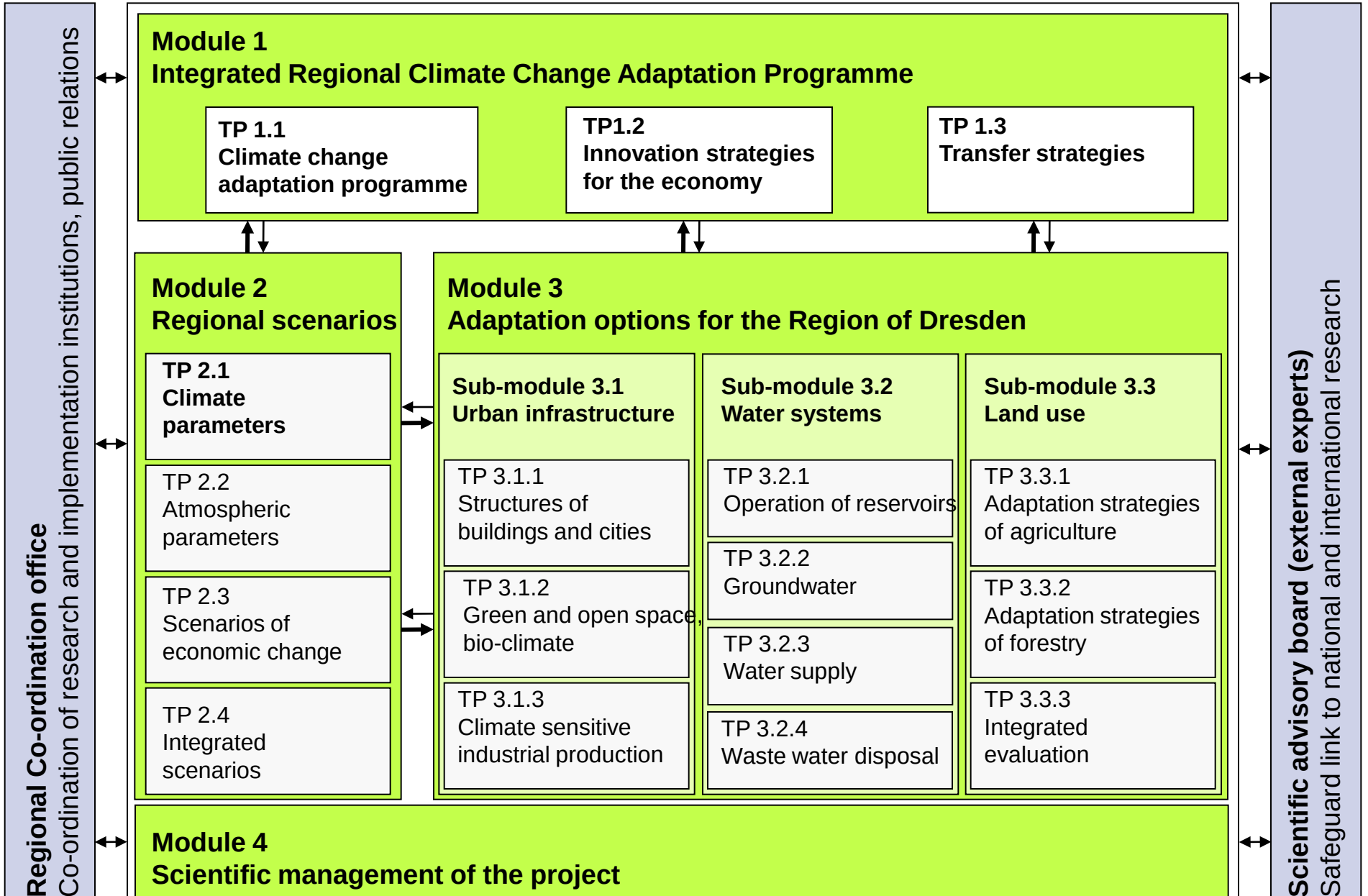
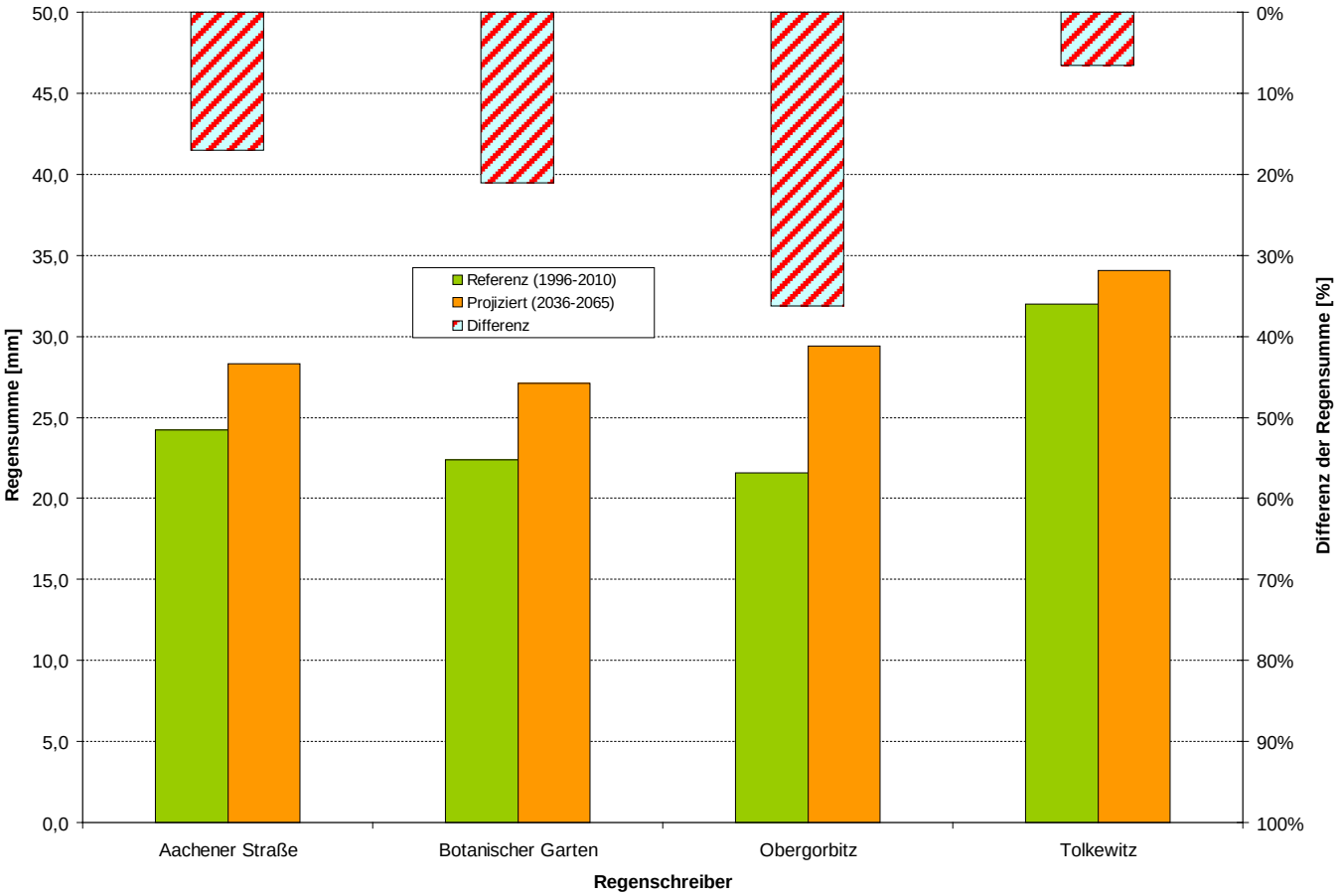
Project REGKLAM
Regional climate change adaptation program



Projected extreme rainfall

Example: rain heights for return period = 20 a, Duration = 15 min



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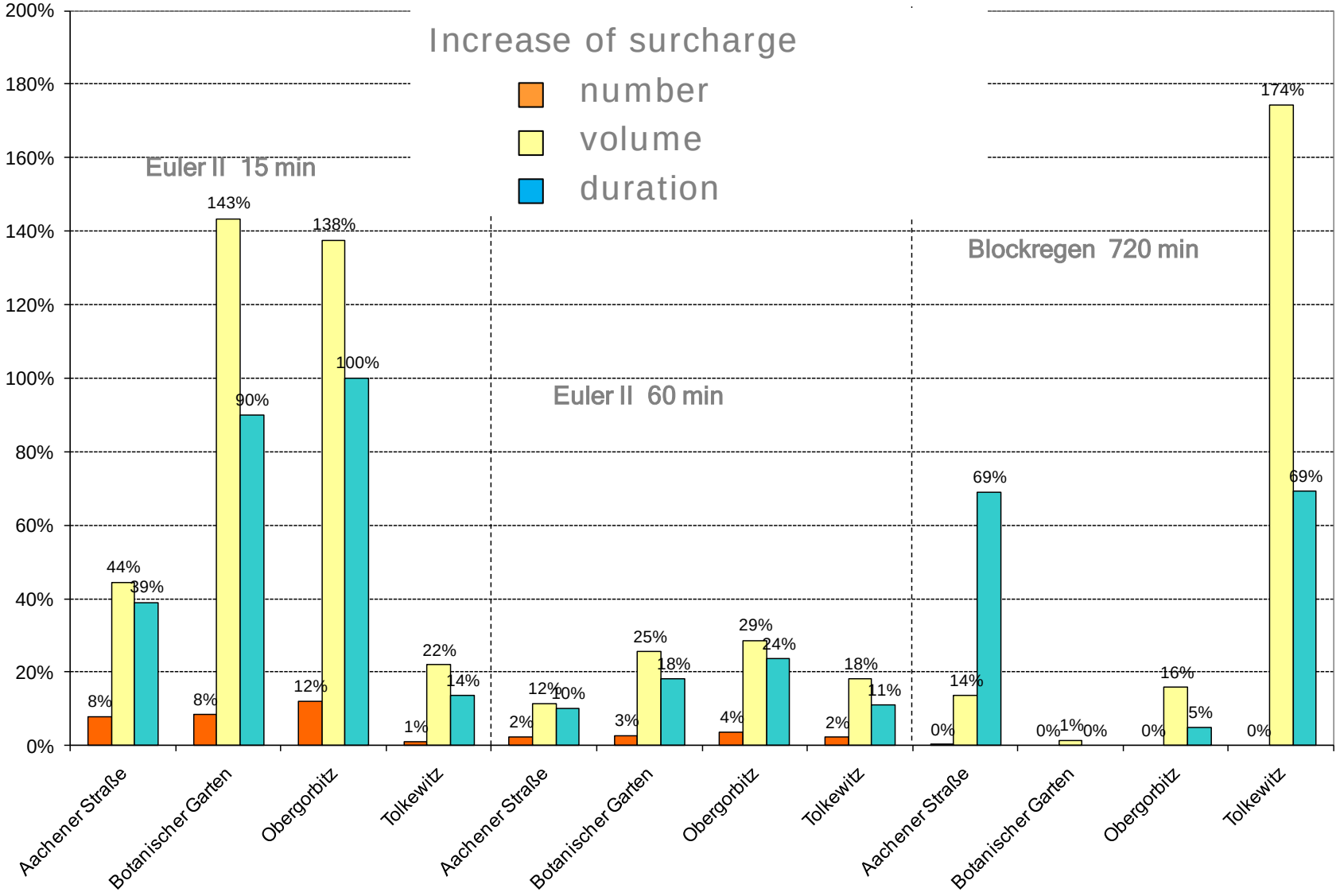
Simulated surcharge



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Extreme “event” analysis

Continuous integrated long-term simulation with detailed models

Part of sewer system of Dresden, adapted WWTP, self-purification of river is weak

10 years rain series, 14 rain gauges, 5-min temporal resolution

Extreme value analysis

Application on

- Extreme values of NH_3 and O_2 concentrations in river
- Scenario analysis
- Development of control strategies, extreme value analysis as major criteria

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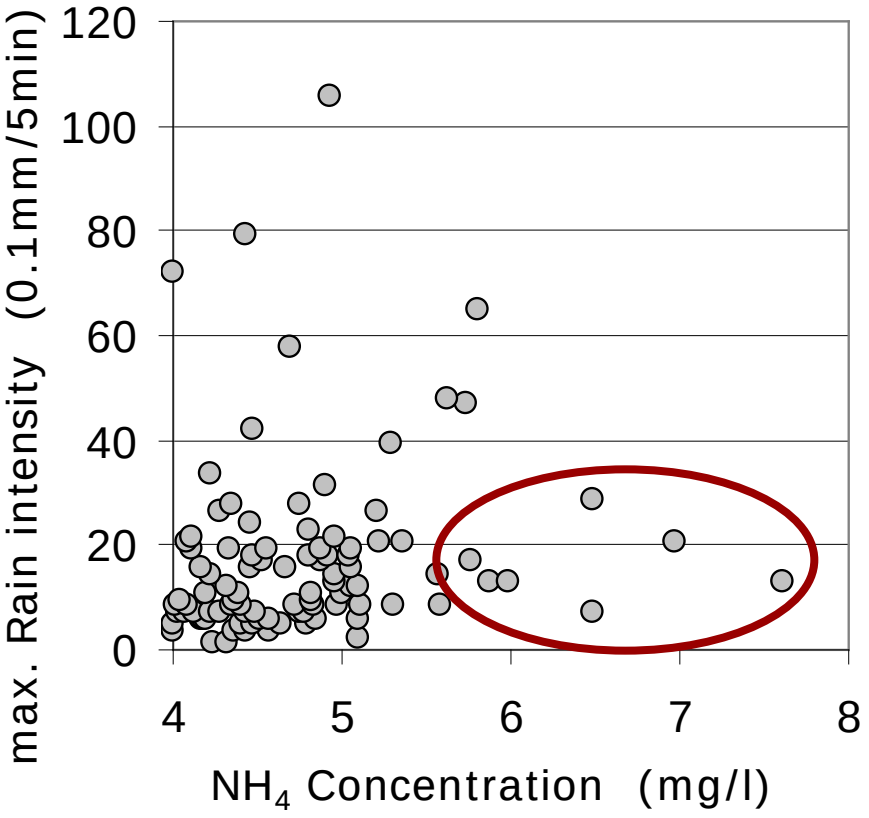
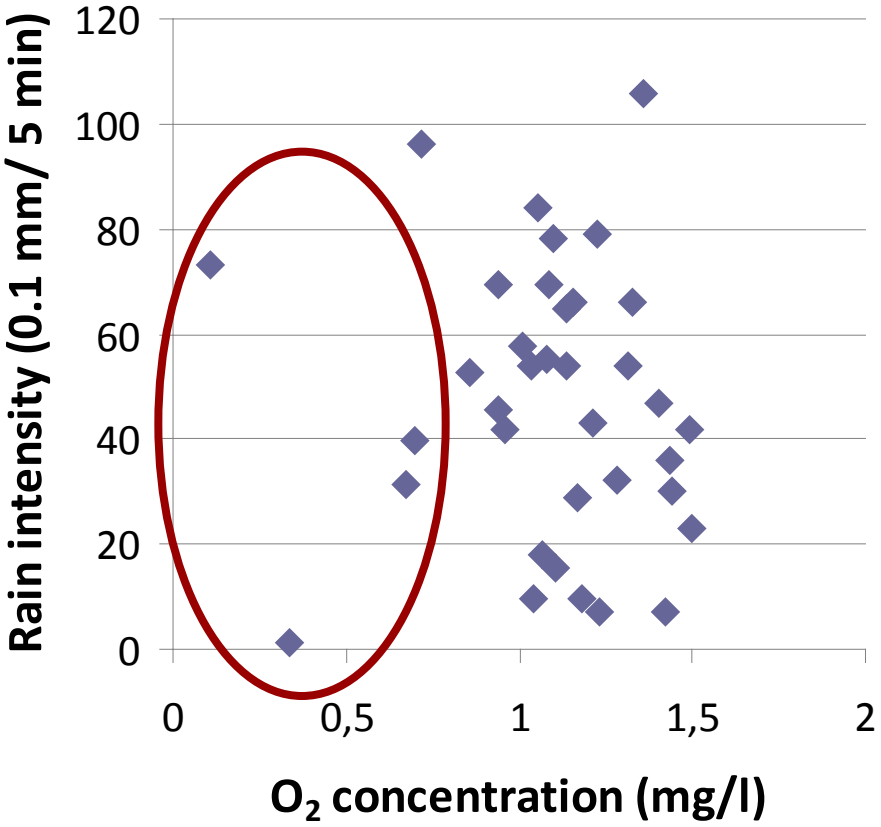
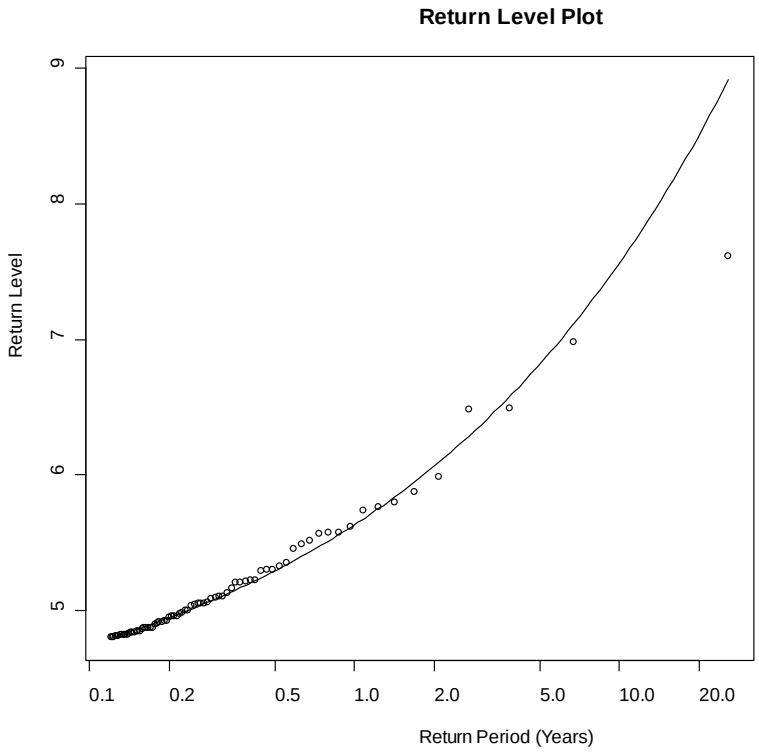
Maximum concentrations vs. maximum intensities





Schindler *et al*. (2008)

→ The most intense rain events are not critical for receiving water quality


Return Level Plot
Return Level
9
8
7
6
5
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0
Return Period (Years)

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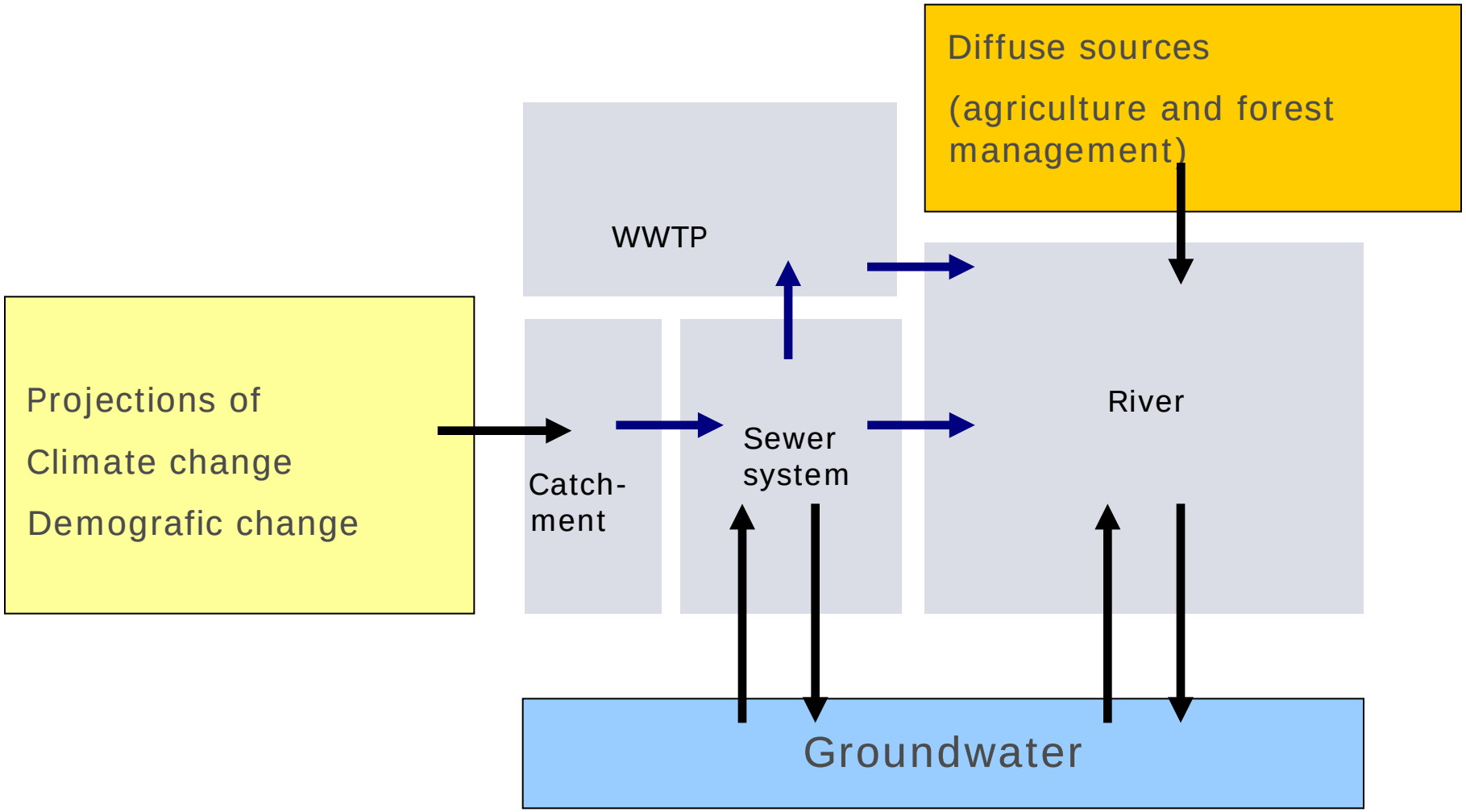
Under construction



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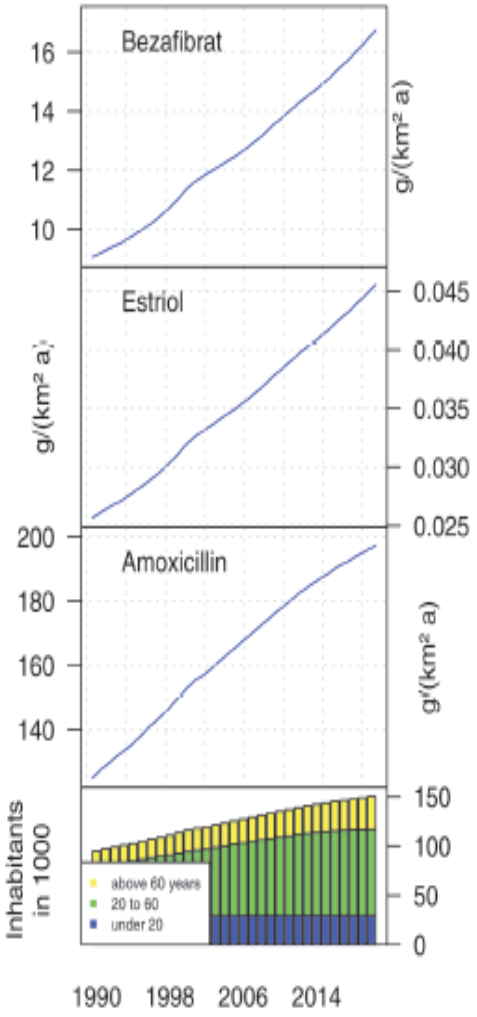
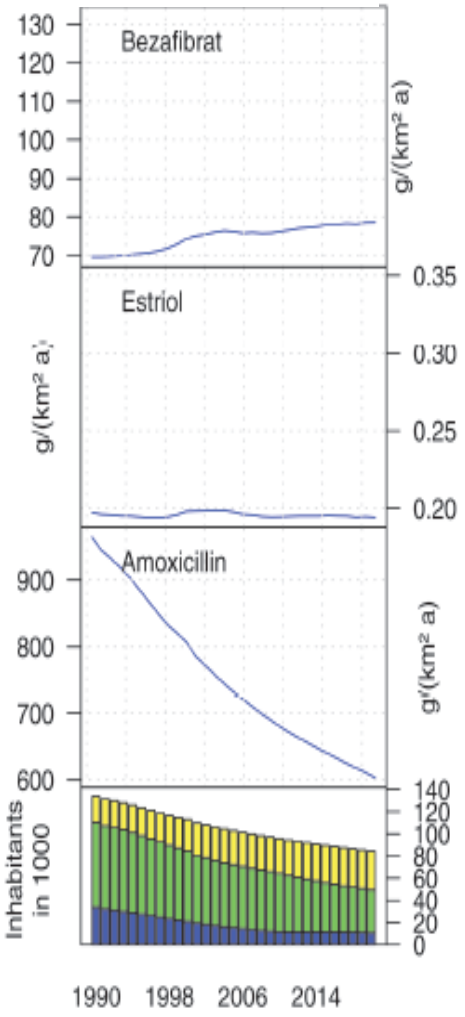
Micro pollutants = f(Demografy)

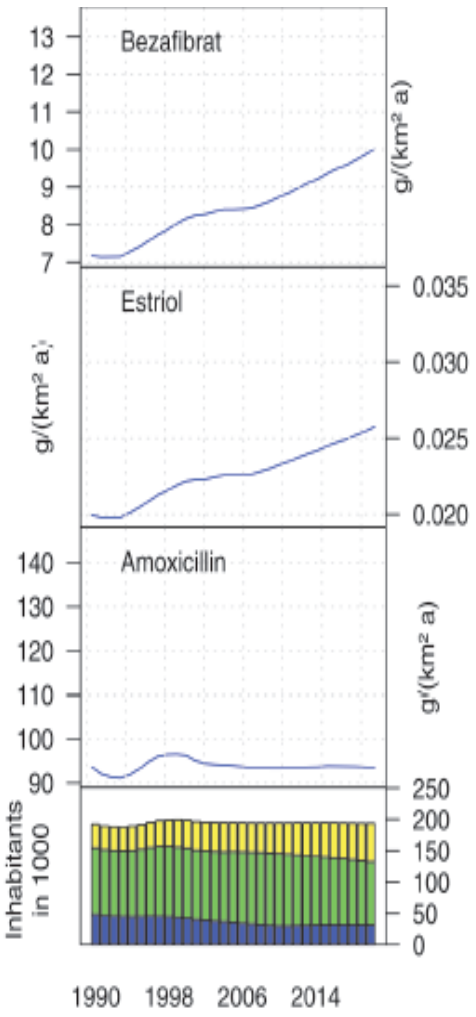
Population growth



Population decrease



Population const. Increasing age



Lipid regulator: Mainly older people

Sexual hormon and Gynaecologicum: young and mainly older perople, resp.

Antibiotcs, anti infectivum: Regular distribution over age classes

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Do not only model…