

The world's water quality: A pre-study for a worldwide assessment

Ilona Bärlund

Helmholtz-Centre for Environmental Research – UFZ

ilona.baerlund@ufz.de

GEO Group on Earth Observations - AquaWatch Meeting
June 8th 2016, Koblenz/Germany

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

CESR Center for Environmental Systems Research

UNEP

UN WATER

The water quality challenge

- Wastewater production at least doubling by 2050 → Sewerage connections increasing
- But not wastewater treatment → More untreated wastewater to rivers and lakes

Human health:

Health risk of contaminated rivers & lakes → contact with surface waters → washing, cleaning, drinking

Food security:

95% inland fishery production from developing world

200 million Africans consume fish regularly

Rapidly growing demand for irrigation water

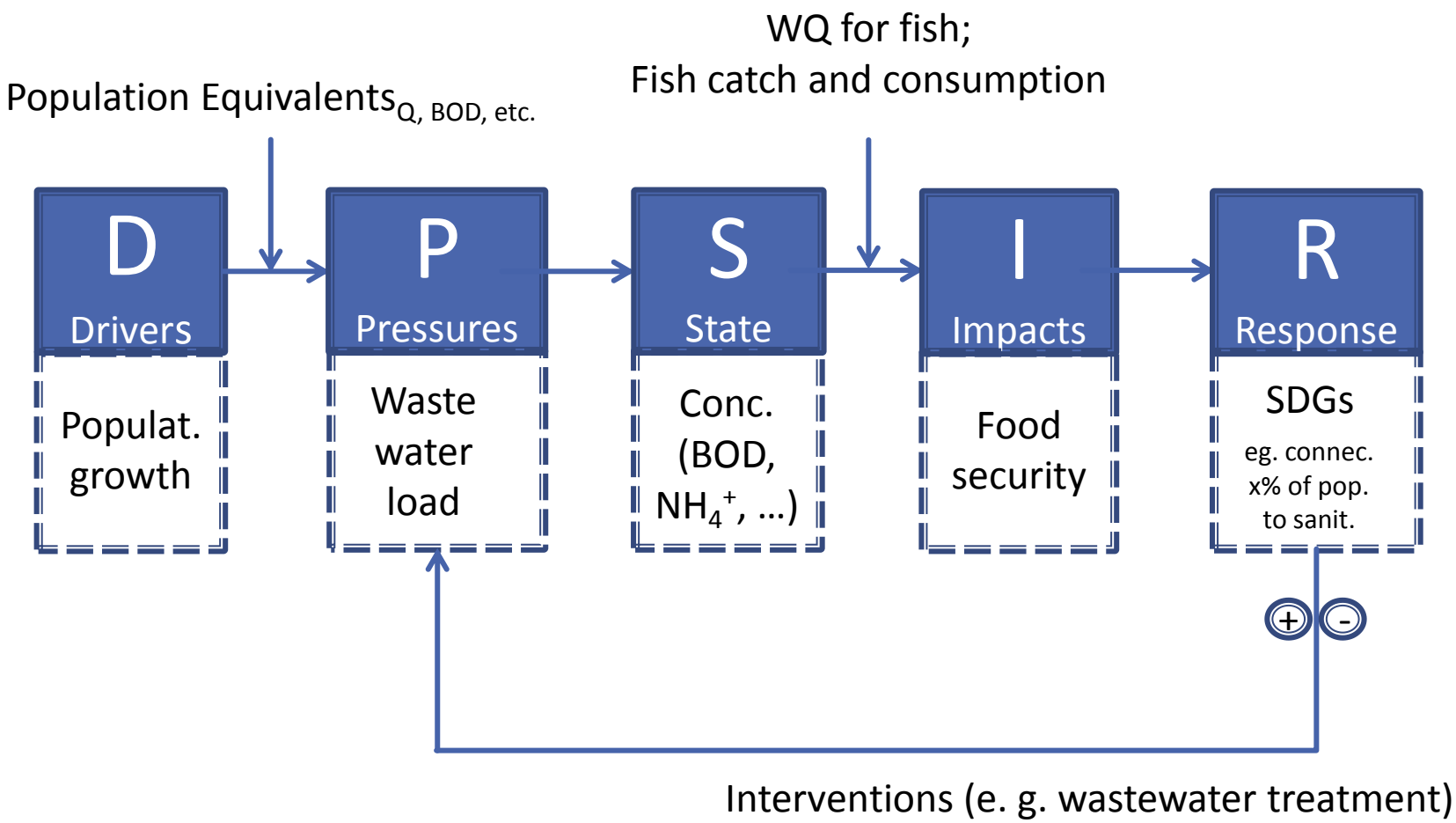
About the World Water Quality Assessment pre-study

- Two-stage activity (= pre-study 2013-2015 and full assessment)
- Model and data driven analysis in parallel
- Global coverage, with focus on developing countries
- Freshwaters (running waters and lakes)

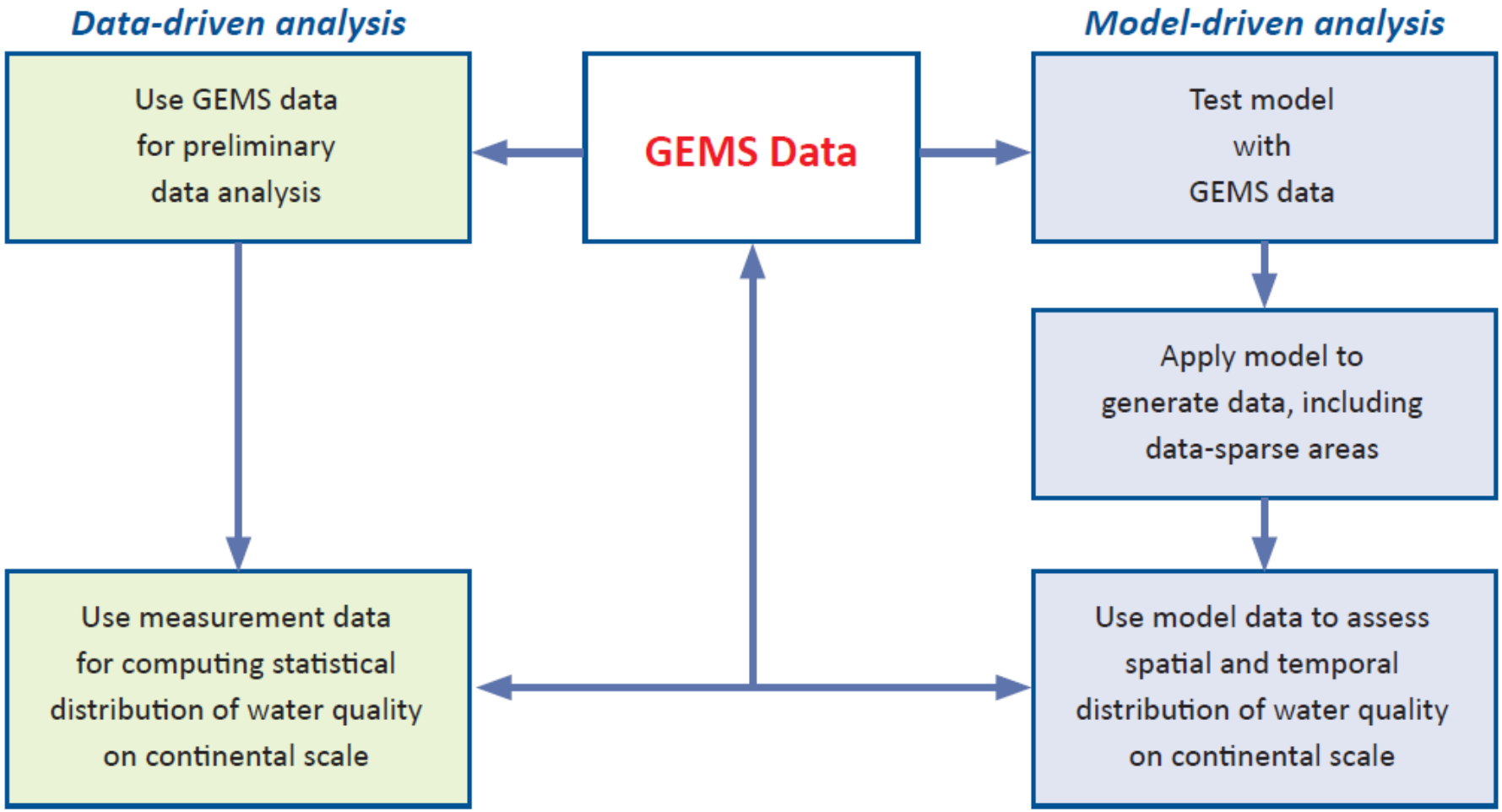
Objectives

- Identify **current "hotspots"**
  - of deteriorating water quality (focus on BOD, FC, TDS, totN/totP)
  - types, intensity and sources of water pollution
  - of potential impacts relating to human health and food security (freshwater fishery)
- Identify main water quality **data and information gaps**
- **Develop and test** assessment methodology

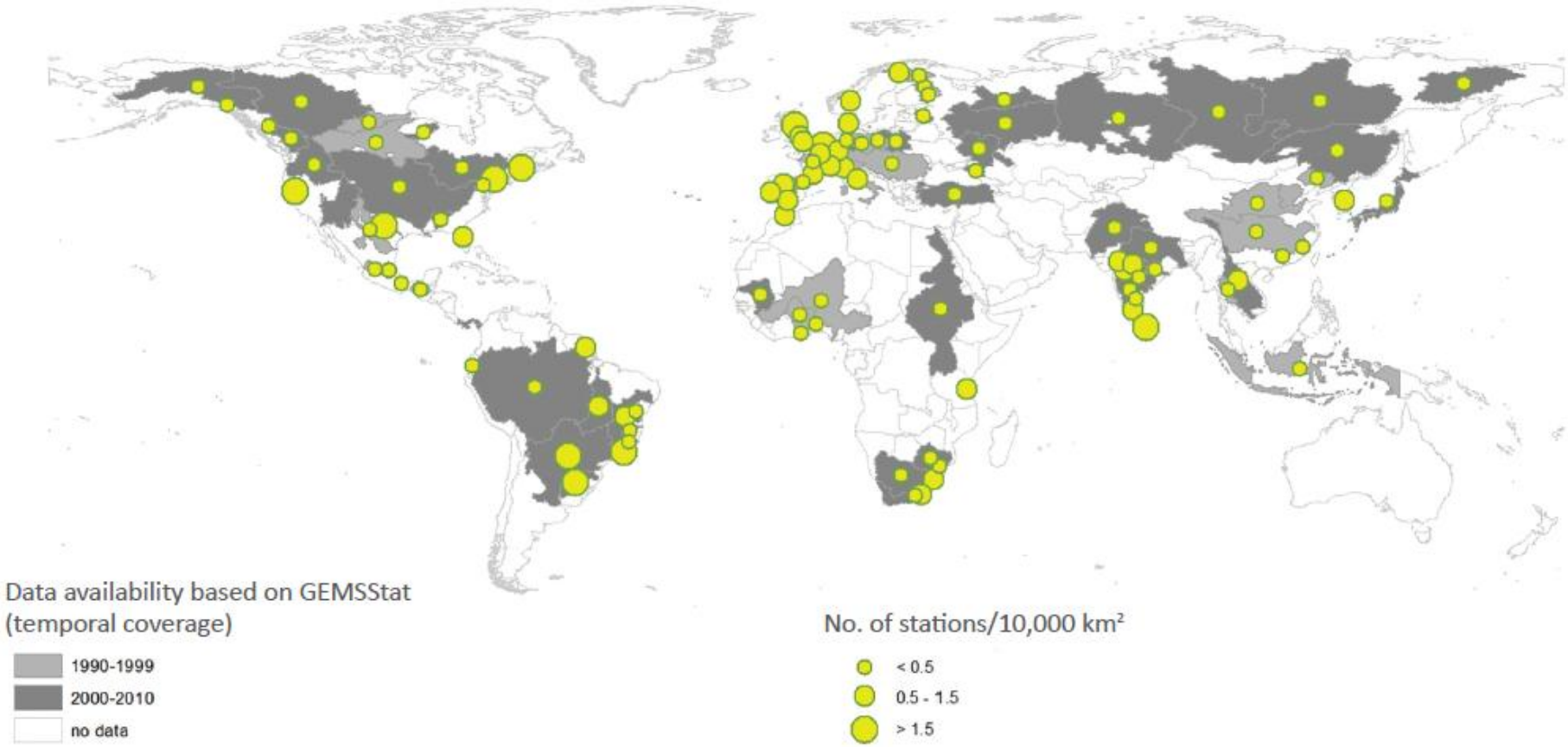
The generic concept behind the assessment



Approach


Data-driven analysis
Model-driven analysis
Use GEMS data for preliminary data analysis
GEMS Data
Test model with GEMS data
Apply model to generate data, including data-sparse areas
Use measurement data for computing statistical distribution of water quality on continental scale
Use model data to assess spatial and temporal distribution of water quality on continental scale

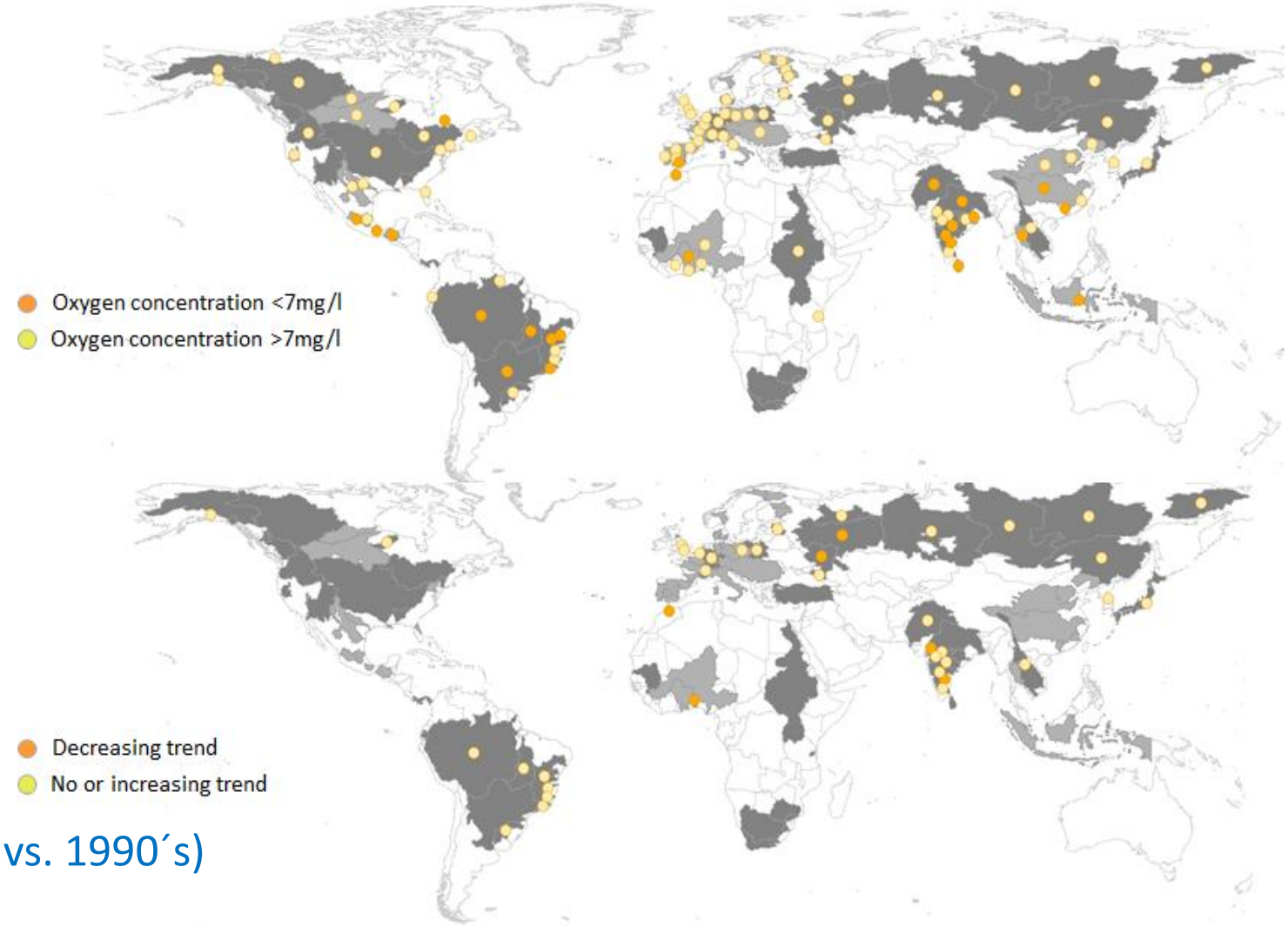
Basis for data-driven analysis



[Data source: GEMStat, 2014; GIS data source: GRDC, 2007]

Results: data-driven analysis (example for oxygen conc.)

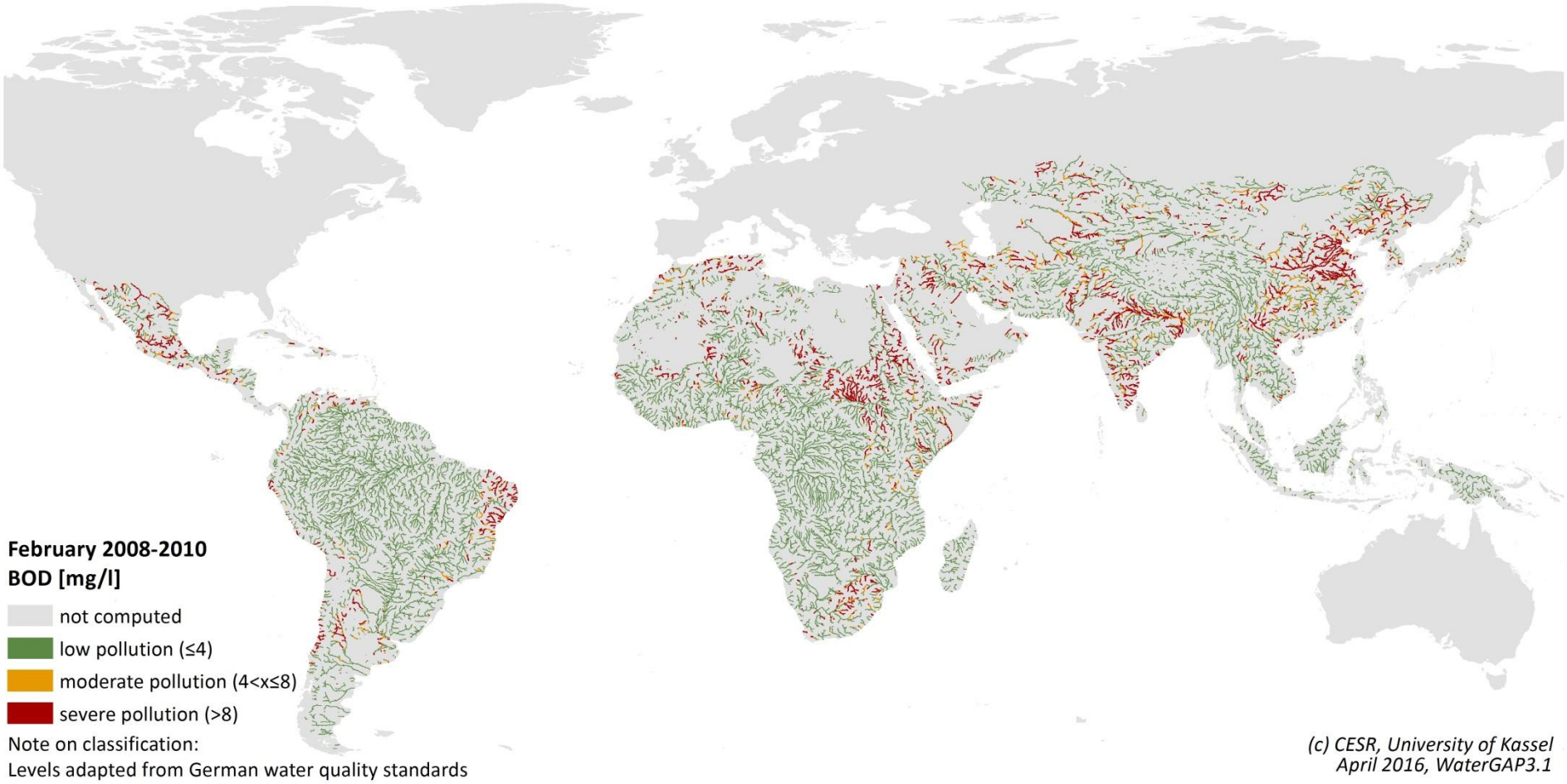
Actual status



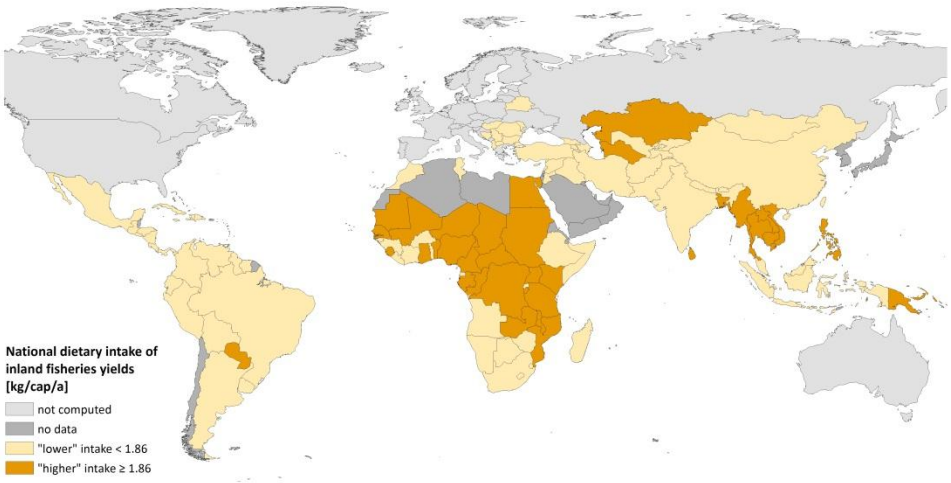
Trend (2000´s vs. 1990´s)

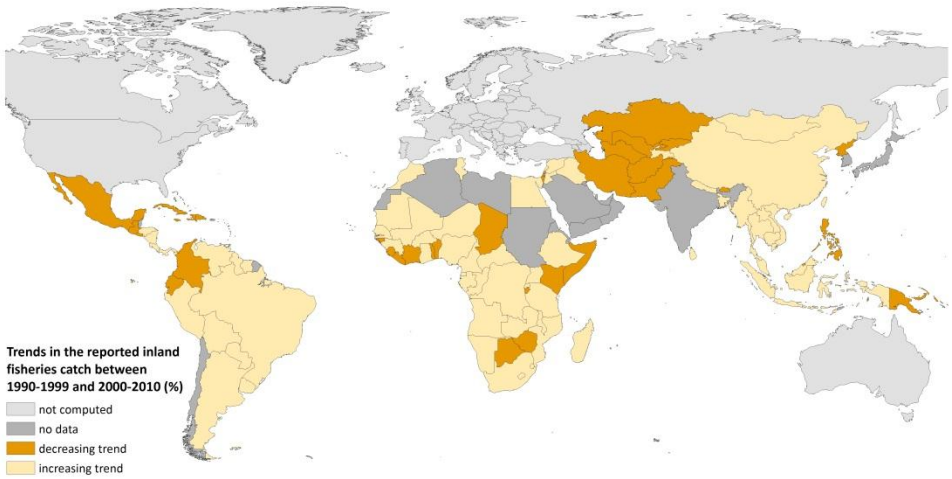
[Data source: GEMStat, 2014; GIS data source: GRDC, 2007]

Results: model-driven analysis (example for BOD)

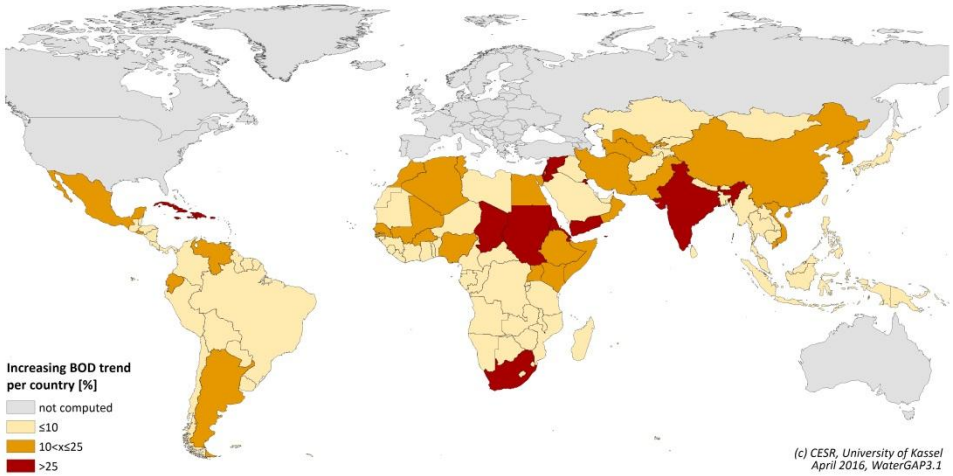


Results: combined data- and model-driven analysis

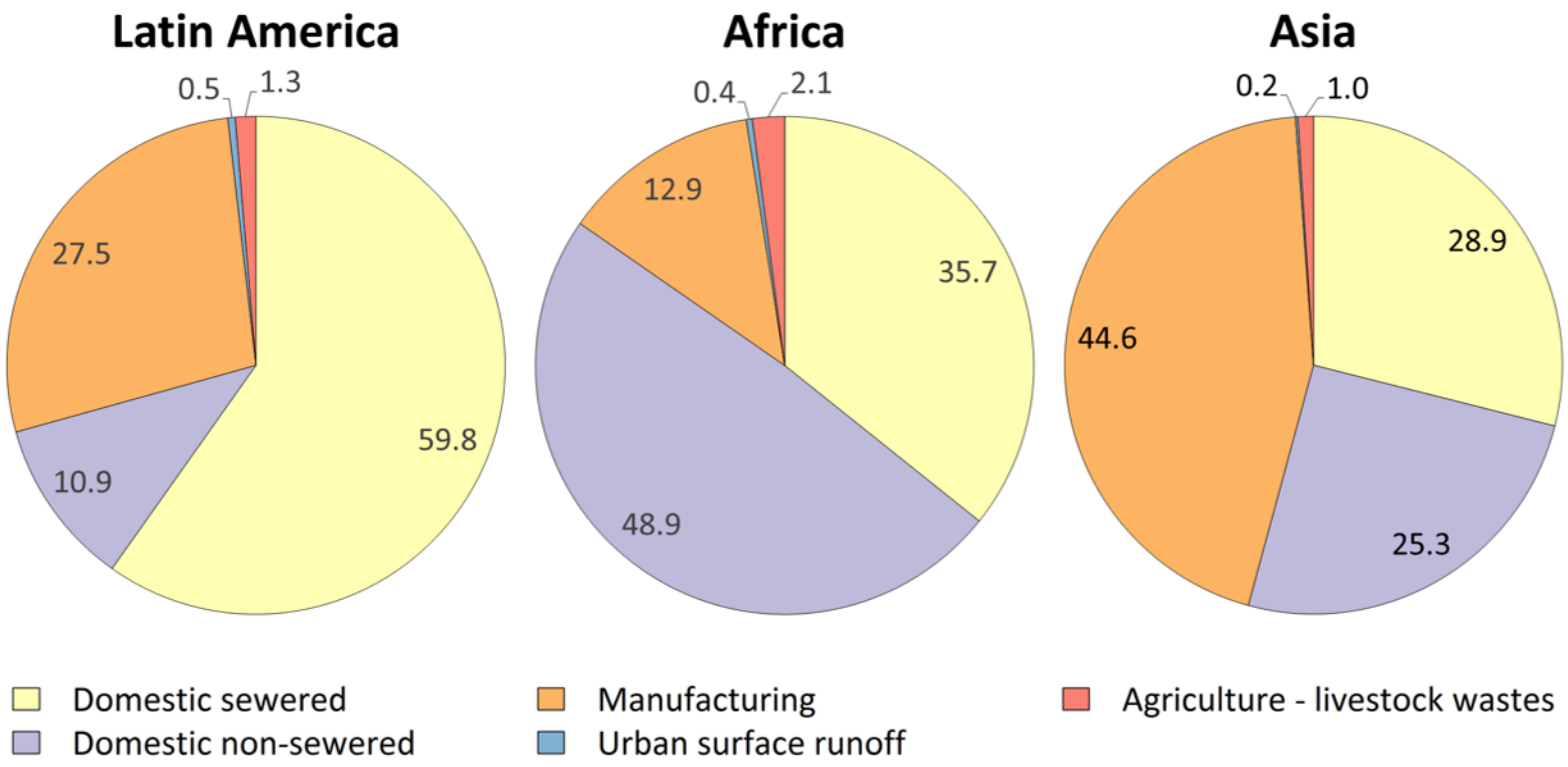




[Data: FAO FishstatJ 2014, World Bank Country population data]



Results: model-driven analysis, sources of pollution



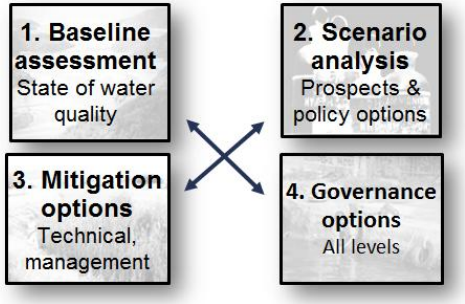
[CESR, University of Kassel, November 2015, WaterGAP3.1]

Products

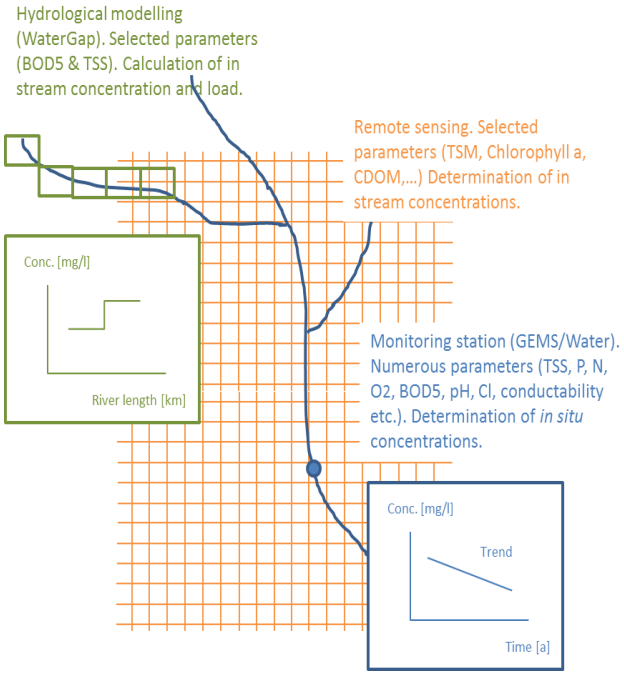
- UNEP report "**A Snapshot of the World's Water Quality: Towards a global assessment**" (launch May 2016)
- Combined analysis giving
  - the "big picture" of water quality,
  - indication of potential impacts and
  - perspectives for the solution of the water quality challenge
- Concrete estimates: e.g. "***Severe organic pollution already affects around one-seventh of all river stretches in Latin America, Africa and Asia***" but also "***More than three-quarters have a low level of organic pollution***"
- What can be done: Monitoring, Assessments, Management and technical options, Effective institutions

Perspectives

- First results subject to data gaps, assumptions and scale issues, to be further elaborated in
  - a **full assessment**



  - other projects: e.g. proposal „Effiziente, skalendifferenzierte Analyse und Prognose der globalen Wasser-Qualität – **Equal**“, BMBF call “Globale Ressource Wasser (GROW)”





Thank you

http://www.wwqa-documentation.info

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

CESR Center for Environmental Systems Research

UNEP

UN WATER