



Integrated Water Governance Support System

Improved Governance by ICT

SPONSORED BY THE



IEEM gGmbH
Institute of Environmental Engineering
and Management at the
Witten/Herdecke University
mail@uni-wh-ieem.de
www.uni-wh-ieem.de



Federal Ministry
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and Research



Initial Situation

Water sector challenges

- Deterioration of water quality
- Stressed water resources
- Increasing water demand
- Impacts of climate change

Water Resources Management

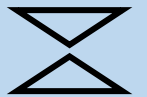


Institutional challenges

- Implementation gap between macro level (legislation/institutional framework) and micro level (local water management institutions and decision makers)
- Good laws and institutional frameworks are not necessarily sufficient to prevent corruption and mismanagement

Water Sector Governance

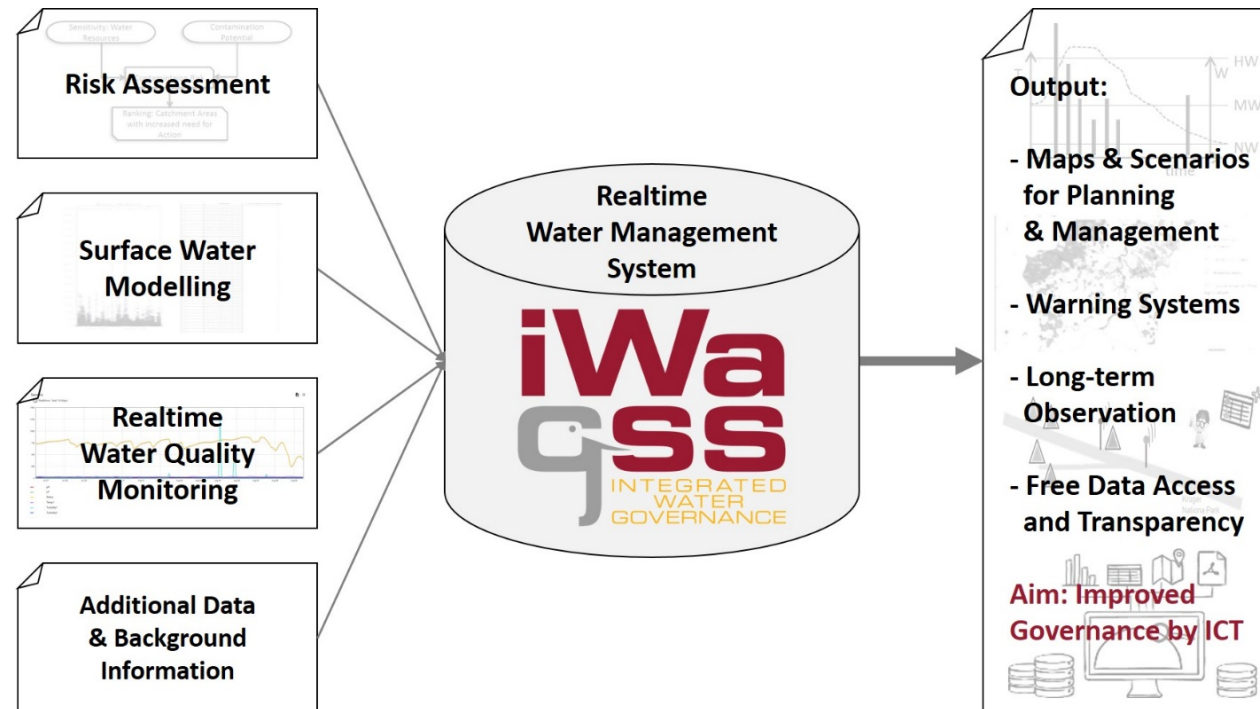
Rules-in-form



Rules-in-use

→ **Water crisis, deterioration of resources, collapsing infrastructure and substandard water services**

The objective of the research project iWaGSS is the development and practical pilot implementation of an **innovative water governance system based on information and communication technology tools (ICT)**.



The iWaGSS real-time water management system links different tools and methods, e.g. risk assessment, surface water modelling and real-time water quality monitoring in a single data management and decision support system providing reliable and transparent information for both water managers and stakeholders.

iWaGSS Realtime WMS - Contamination Risk Assessment

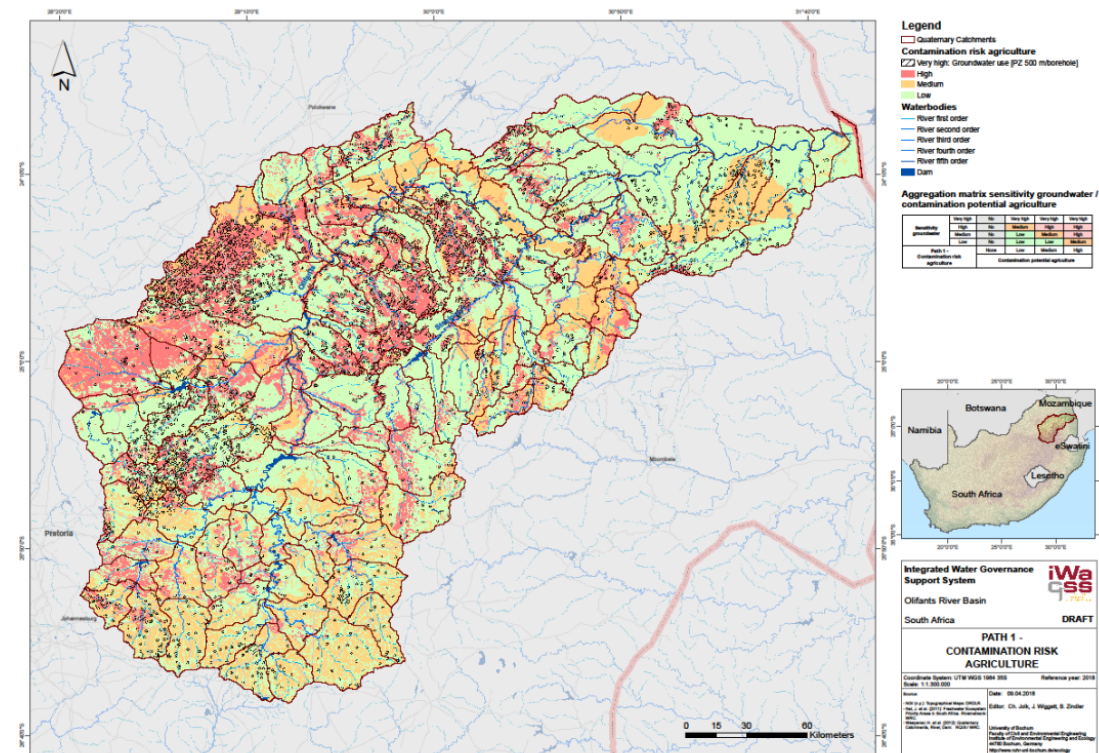
The **Planning and Decision Support Tools** identify contamination risks in river basins.

The contamination risks are results of a GIS-based assessment of the water resources sensitivity in regard to ecology and water supply and the contamination potential of pollutants.

The method distinguishes between three possible contamination paths:

- Infiltration of contaminants into groundwater
- Erosive runoff of contaminants into surface water bodies
- Direct discharge of contaminants into surface water bodies

The evaluation is generally an identification and prioritization of catchments with increased problem intensity and need for action.

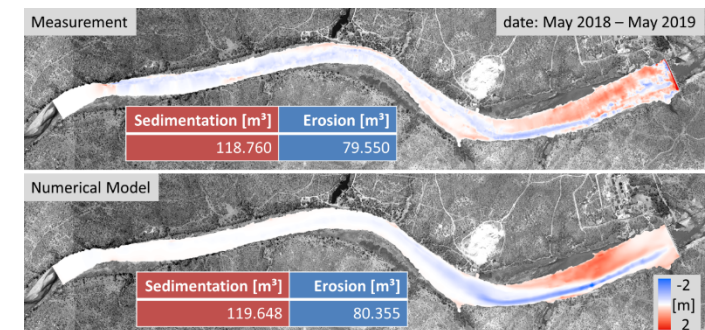
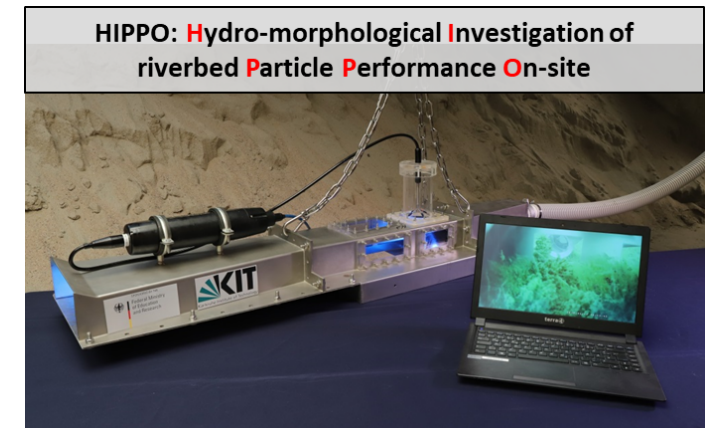
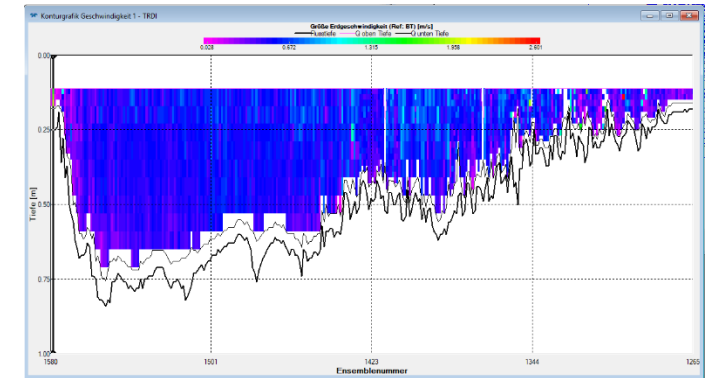


Hydrodynamic modelling

The aim of the 1D-hydrodynamic modelling, using the software MIKE Hydro from DHI is the modelling of the discharge as well as the water levels in the river network in order to be able to better assess statements on the distribution of pollutants from discharge points into the water bodies.

Reservoir modelling

- Development of the in situ measuring system "HIPPO" to analyze the process of remobilization regarding fine sediments.
- Innovative methods to determine the complex dynamic sediment characteristics (multi-frequency echo sounding combined with core probes, GraviProbe©, HIPPO)
- Validation of a predictive morphodynamic model for the heavily silted Phalaborwa Barrage.
- Development and testing of an adapted operating concept to guarantee a long-term functional water supply as well as the avoidance of ecological damage in the adjacent Kruger National Park.

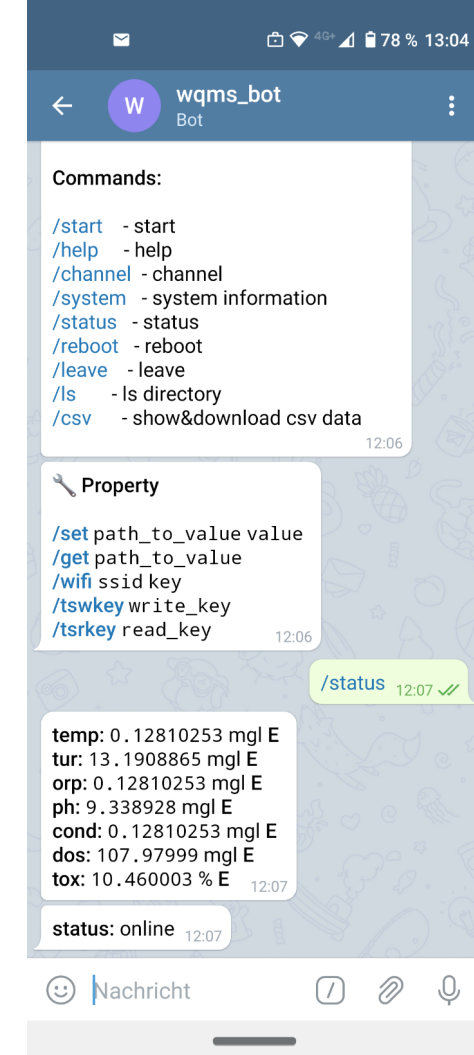


iWaGSS Realtime WMS – Realtime Water Quality Monitoring



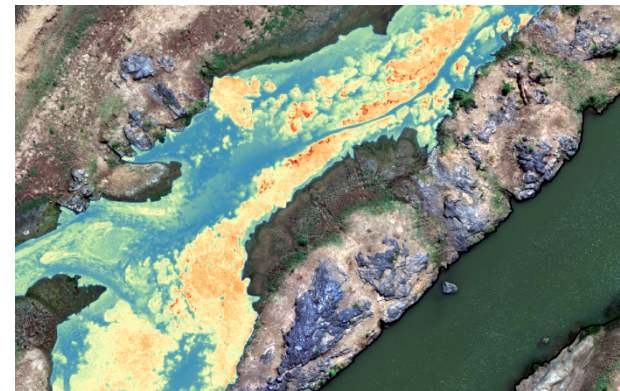
Installation and operation of a **network of online water quality monitoring stations** in the pilot region at the Olifants and Selati rivers

- Online measurement of toxicity, pH, conductivity, climate data and more
- Innovative real-time monitoring network for water quality monitoring
- Additional laboratory analysers for various parameters at SAEON offices
- Realtime data transfer through WQMS-bot for smartphones

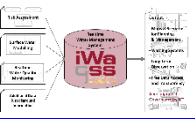


Remote Sensing – Use of Drones for River Monitoring

- Development and testing of a multiparameter drone with different sensors for a broad, efficient and safe collection of water-related remote sensing data
- Collection, generation and dissemination of basic scientific data to support the German and South African project partners (creation of over 30 data sets consisting of aerial mosaics, digital surface models or vegetation indices)
- Creation of procedures for data evaluation while continuously optimizing workflows and improving data quality
- Development and testing of further methods for the collection of water-related data by drone (depth measurement by sonar sensor, taking water samples and sample analysis in the field by direct measurement)



iWaGSS Realtime WMS – Features



GIS-Portal - displays geographical and attributive data, especially:

- 16 overview maps
- hydrological and meteorological time series
- cross sections of rivers for hydraulic modelling
- aerial photos and site topography of the drones

Real-time monitoring and early-warning system

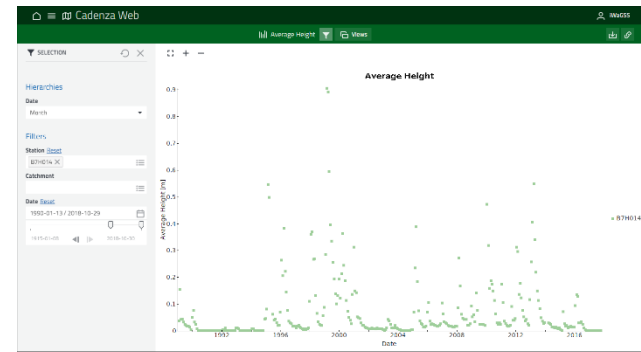
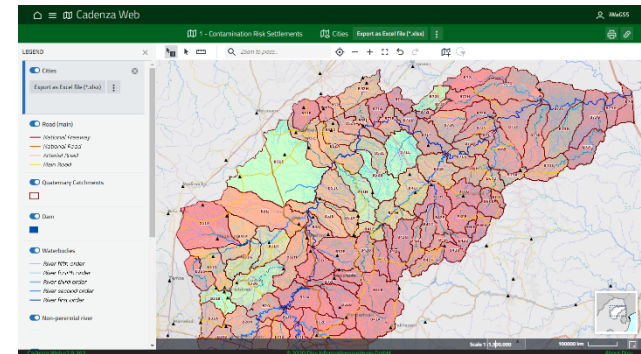
Displays the real-time data of the water quality monitoring stations

Risk-Assessment tool

Displays contamination potential and risk via infiltration, erosive runoff and direct discharge of the Olifants catchment, gives a ranking of contamination risk in 32 maps.

Public web-portal

Displays selected geographical and attributive data for the public



Incentive mechanisms in the context of governance

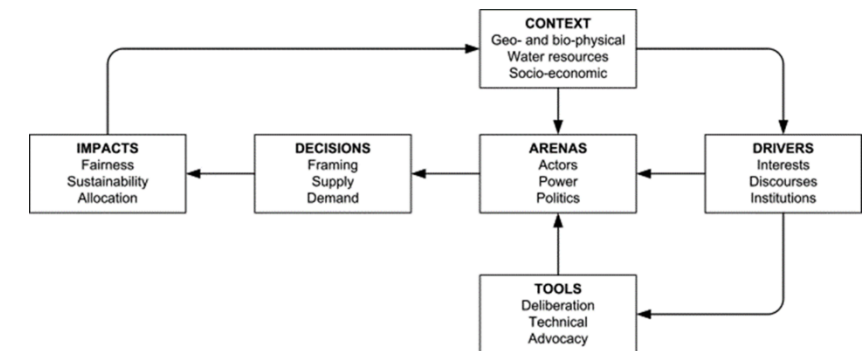
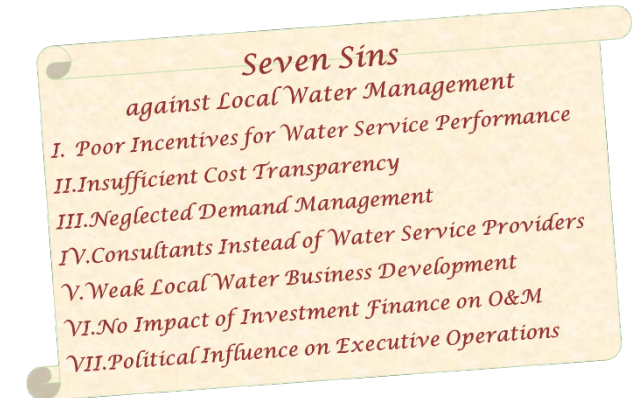
(→ 7 Sins against Local Water Management)

Includes socio-economic studies (e.g. on ecosystem goods and services, environmental economic accounting, cost-benefit analysis)

Finance concepts for water infrastructure investments (“sustainable water finance”) and O&M concepts for water infrastructure and services

Transboundary water governance mechanisms

- to overcome mistrust among stakeholders
- to counter-balance local power asymmetries
- to co-produce and share knowledge in collaboration with wide-ranging informal networks of scientists, policy makers, and civil society
- to build trust and cooperation and to facilitate water diplomacy



Improving water sector governance in the absence of established institutional structures (e.g. catchment management agencies) by

- Supporting decision makers and stakeholders and
- Providing “informal actors” with transparent and reliable information (“Governance by ICT”).

Easily accessible and reliable data and information are key for effective resources management.

- The iWaGSS WMS supports informal institutions taking over water management functions in the absence or failure of formal institutions by providing data and information.
- Participation and transparency are key factors to foster public accountability and to improve resources management and water governance.

Accompanying (financial) incentives & economic aspects have to be taken into account.

→ **Good water sector governance is key for efficient water resources management**

iWaGSS – Further Info

For further information please visit our booth at the **GRoW Virtual Marketplace**

<https://app.newroom-connect.com/fairs/bmbf-grow/areas/iwagss>,

the **iWaGSS website**

www.iwagss.com,

or see the **iWaGSS Special Issue of KW Korrespondenz Wasserwirtschaft**, 10/2020.



Thank you, Dankie, Ke a leboga!

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On behalf of the iWaGSS project: Jens Hilbig & Karl-Ulrich Rudolph

Contact: mail@uni-wh-ieem.de / www.iwagss.com

