WHAT IS THE PROJECT ABOUT?

- Taihu region: One of the most economically prospering regions of China
- Taihu region: One of the focus regions of the Chinese National Major Science and Technology Program for Water Pollution Control and Treatment
- Tai lake: A drastic example of water pollution with nutrients (nitrogen, phosphate), organic contaminants and heavy metals
- Problem: Insufficient raw water quality -> problems with the drinking water supply in recent years
- Aim: To assure the supply with good quality water by taking into account the whole water cycle

IMPACT

- Development and adoption of German water technologies and management concepts to Chinese boundary conditions
- Contribution to an improved water quality at the Taihu and in the megacities Wuxi and Suzhou
- Pilot project for other regions of China facing similar problems
- Strong linkage between science and practice in both countries ensures scientific progress as well as practical applicability
- Involvement of the leading research institutes, the relevant administrative entities as well as the water stakeholders warrants implementation in China
URBAN CATCHMENT
Urban Planning and Urban Water Management

Development paths for future-proof wastewater and rainwater management in the catchment area of Wuxi

The Challenges
- China: more than 731.11 million urban dwellers!
- Non-water-oriented urbanization mode
- Deteriorating and depleting water resources
- Increasing climate change vulnerability
- Tens of billions of RMB loss per year due to urban flash floods!

Our Approach WP O: Urban Catchment

WP O2: Improving O&M of the sewer network of Wuxi City
WP O3: Increasing climate change resilience
WP O1: Promoting sector policy and urban awareness
WP O4: Harmonizing urban planning and urban water management

GOVERNANCE
Integrated Urban Catchment Governance (IUCG)
Organizational, legal and fiscal foundations for sound management of waste- and rainwater

The Focus
- Due integration of spatial IUCG requirements into urban planning and development
- Sustainable funding and cost allocation
- Effective surveillance, information and participation

Our main aims
- Exchange of Chinese and German experiences on institutional IUCG drivers and obstacles
- Development of approaches and recommendations towards favorable regulatory, organizational and fiscal practices
- Contribution to global and regional development

Methods & Steps
- Expert assessments of the relevant settings
- Expert/ stakeholder interviews
- Stakeholder workshops
- Reports & recommendations

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Economics and Finance
Regulation
Organization
Monitoring Information

ORGANIZATION

INFORMATION
LAKE PROCESSES

Measuring
- Organic and inorganic chemical pollutants
- Biological pollutants: Antibiotic resistances
- Biological degradation and nitrogen turnover
- Algae
- Isotopic composition (H, C, N, O, S)
- Ecotoxicity, nutagenicity, endocrine effects

MONITORING

Advanced technologies will be developed and applied to analyse the spatial and temporal development of water quality within the Taihu.

- For spatial monitoring, the Biofish will be adapted to the specific shallow lake situation of Taihu.
- Development of a new profiling bouy for long term vertical in-situ monitoring, equipped with a multi-sensor system combined with the BBE Fluorometer for different algae classes.
- Historical lake development by sediment core analyses.
- Application of enhanced monitoring and analyses methods such as isotope analyses to identify nutrient sources and dynamics and to characterize the water cycle.
- Development of methods for early warning, enhanced monitoring strategies and for lake management concepts.

Process understanding
- Pollution situation and origin (urban areas, industry and agriculture)
- Turnover in functional water zones (nitrogen balance, biological degradation of organic pollutants)
- Ecotoxicity – environmental effects
- Algae growth and toxin release under dynamic environmental conditions
- Lake dynamics: Inflow / precipitation, evaporation, mixing processes, flow patterns
- Trophic sediment status (Lake history)
- Interaction of water and sediment phases

Ecological modelling
- Implemented food web interactions including the main nutrient fluxes
- Prediction tool for cyanobacteria blooms

CONTACT

SIGN: Sino-German water supply Network

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Handheld fluorometer

Daphnia magna

Desmodesmus subspicatus

Potamogeton antipodarum

Mass spectrometer

Desmodesmus subspicatus

Daphnia magna

Dario rerio

Potamogeton antipodarum

Lysed algal cell

Handheld fluorometer

Nitrogen sources and microbial turnover processes

StoLaM (Stoichiometric Lake Model)

Algae sensors

Isotope analytics

Ecotoxicity, Modeling

Chemical analytics

Monitoring techniques

Microbiology
SIGN: SIno-German water supply Network

**WATER TREATMENT**

**Ultrafiltration**
- Development and application of suitable membrane technologies
- Adjusting operation conditions
- Pre-treatment of lake water
- Online algae tests to manage ultrafiltration
- Laboratory tests and pilot study
- Assessment of energetic and material efficiency

**Taste and odour (T&O) elimination**
- Identification of T&O substances in lake and process water
- Evaluation and simulation of reaction pathways
- Assessment of T&O elimination strategies including evaluation of toxicity
- Optimizing water treatment (e.g. Advanced Oxidation)
- Recommendation of tailored water treatment strategies

**Biological treatment**
- Simultaneous elimination of nitrogen compounds and organic pollutants
- Assessment of the efficiency of biodegradation
- Isotope measurements of nitrogen compounds and organic pollutants to monitor biological transformation processes

**Water quality**
- Water quality analysis around the whole water cycle
- Laboratory identification of algae, organic, inorganic and microbial pollutants
- Toxicological tests of water samples
- Assessment of Taihu catchment to identify pollution and emission hot spots
- Recommendation of Taihu areas suitable for raw water abstraction

**WATER DISTRIBUTION**

**Optimized network flushing strategies**
- Avoiding drinking water deterioration in distribution networks
- Adaptation of an innovative optimized flushing strategy to the conditions of drinking water networks in China
- Measurement of the deposit accumulation velocity in pipes as a criteria for the definition of the flushing intervals
- The optimized flushing approach is based on the following steps:
  - Planning
  - Flushing with FlushInspect
  - Calculation of flushing intervals

**Server based leak control**
- Adaptation of an innovative server based active leak control system to Chinese standards and conditions
- Automated leak detection via noise logger
- Wireless transmission of leak control data to a server (cloud) via a radio-network
- Access to the data via internet
- Pinpointing of leaks through network correlation

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- Isotope measurements of nitrogen compounds and organic pollutants to monitor biological transformation processes
- Assessement of energetic and material efficiency

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