SIGN

SINO GERMAN NETWORK

Assuring water quality
from the source to the tap

The joint project

SIno-German water supply Network

中德合作安全供水系统

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Federal Ministry
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part of the
Innovation Cluster
Major Water

SIGN at a glance

Water is essential for every kind of life, but its quality is threatened by a variety of contaminants. The Taihu (Tai lake) in China represents a drastic example of such water pollution. A powerful consortium of German and Chinese research facilities, companies, and concerned stakeholders is working on different aspects of the water cycle. The overall aim is to ensure good water quality from the source to the tap.

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SIGN
项目概况

水对各类生命体至关重要，
但其质量却受到多重污染的威胁。
中国太湖污染是极端棘手的水污染案。
因此，中德两国的研究机构、公司及利益相关方携手组建了强大的产学研团队，
试图从不同方面解决棘手问题，努力
实现以下的整体目标：确保从源头到水龙头的优良水质

Federal Ministry
of Education
and Research

China and Germany share a long history of more than 35 years cooperation in the water sector. This success has motivated MoST (Chinese Ministry of Science and Technology) and BMBF (German Federal Ministry of Education and Research) not only to fund cutting-edge research projects as done before but increasingly promote innovations. In 2011, the „Clean Water Research and Innovation Programme“ was adopted at the first Sino-German intergovernmental consultations in 2011. Its aim is to bring science to the people.

Additionally in 2012, MoST has offered a collaboration within China's Major Water Programme, which lead to bilateral projects at lake Tai, lake Chao, lake Dian, and Liao river. The kick-off was held in Beijing, May 2015, in the presence of Vice-Minister Cao (MoST) and State Secretary Dr. Schütte (BMBF). By signing the Joint Declaration on the cooperation in the frame of the Chinese Major Water Programme, MoST and BMBF have provided a sound basis for accelerating the development and dissemination of innovative environmental technologies and for a successful water management.

The SIGN project (Sino German water supply Network – Clean water from the source to the tap) focuses on lake Tai region's main challenges, which are urban water management, pollutant monitoring, assessment of lake processes, water treatment, and water distribution.

SIGN represents a successful example of multi-disciplinary technological and scientific bilateral cooperation. I am delighted to see the progress of the cooperation and the many contacts that already have been established, and would like to express my best wishes for the successful strengthening of this collaboration.

中国与德国在水领域的合作源远流长，已步入第三十六个年头。这些成功激励了中国科技部 (MoST) 与德国联邦教研部 (BMBF)，不仅仅如先前那样为前沿研究项目提供资助，还不断地加大对创新的推动力度。2011 年，“中德清洁水创新研究项目”被纳入首轮中德政府磋商的议程。该项目旨在将科技送到大众身边。

此外，2012 年中国科技部提议在中国 “重大水专项” 的框架内进行合作，由此诞生太湖、巢湖、滇池与辽河四大中德合作治理项目。项目启动仪式于 2015 年5月在北京举行，并由中国科技部副部长曹健林博士与德国联邦教研部国务秘书许特博士出席见证。通过签署“中德两国关于就中国水体污染控制与治理科技重大专项开展科技合作的联合意向声明”，中国科技部与德国联邦教研部为加速创新环保科技的发展与推广以及为成功的水资源管理打下了扎实的基础。

SIGN 项目（中德供水网络——从源头到龙头的清洁水）重点应对太湖流域所面对的主要挑战，即城市水管理、污染物监控、湖泊保护进程评估、水处理以及水配给。

SIGN 项目是中德双边跨学科科技合作的成功范例之一。目睹该合作向前发展，至此许多联络得以建立，我表示非常高兴，并在此衷心祝愿合作得到进一步深化。

Dr. Ulrich Katenkamp
German Federal Ministry of Education and Research
Head of Division Resources and Sustainability

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SIGN
SINO GERMAN NETWORK

Assuring water quality
from the source to the tap

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The Innovation Cluster Major Water

The SIGN project is one of the three projects of the Innovation Cluster Major Water funded by the BMBF (German Federal Ministry of Education and Research) in the frame of the CLIENT program (www.sino-german-major-water.net). As stated in the joint declaration signed in May 2015 the German projects SIGN (www.water-sign.de), Sinowater (www.client-sinowater.net), and Urban Catchment (www.ufz.de/urban-catchments) cooperate closely with corresponding Chinese projects within the Chinese Major Program of Science and Technology for Water Pollution Control and Governance.

CLUSTER 创新集群重大水专项

SIGN项目作为由BMBF (德国联邦教育与科研部) 资助的三个创新集群重大水专项之一，隶属CLIENT项目 (www.sino-german-major-water.net) 的框架之下。正如2015年5月签署的中德合作联合声明所述，德方项目 SIGN (www.water-sign.de), Sinowater (www.client-sinowater.net) 和 Urban Catchments (www.ufz.de/urbancatchments) 与中国水污染防治科技重大项目框架下的相应中方项目紧密合作。

Scope of the SIGN project

Assuring good water quality from the source to the tap

Water is essential for every kind of life. However, in many parts of the world, water quality is threatened by multiple pollution sources. Access to clean and safe drinking water is crucial for human wellbeing and for the prevention of drinking-water-borne diseases.

In the last few decades, China has undergone rapid industrial and economic growth. Especially in densely populated areas, the need for clean water is constantly increasing. At the same time the quality of raw water is often impaired due to significant anthropogenic pollution. Furthermore, the available water resources in China are naturally low (only one quarter of the world average) and unevenly distributed with high water scarcity in the dry northern parts of the country.

The Sino-German research project SIGN will contribute towards improving the water quality in the Taihu region close to Shanghai, one of Chinas most economically prospering areas. Furthermore, it belongs to the focus regions of the currently running Chinese Major Program of Science and Technology for Water Pollution Control and Governance demonstrating its high political importance.

A powerful consortium of research facilities, companies, and concerned stakeholders was built in order to successfully manage the challenging tasks of the SIGN project. The project consortium is working on the quality of the lake, which serves as a water resource, and on the quality of the drinking water for the adjacent megacities. Assuring the supply with good quality water requires that the whole water cycle is taken into consideration:

- powerful sewer systems,
- competent management of water resources,
- adapted monitoring strategies,
- capable water treatment processes,
- efficient distribution of drinking water.

Within the SIGN project, German water technologies and management concepts are specifically developed and adapted to Chinese boundary conditions. Scientific progress as well as practical applicability is ensured by the strong linkage between science and practice in Germany as well as in China.

SIGN 项目的产科研领域

确保从源头到水龙头的优良水质

水对所有生命至关重要，但是在世界很多地方其质量却受到多重污染源的威胁。获取纯净的饮用水对人类福祉以及防止由饮用水滋生的疾病尤为关键。

中国的可用水源水平非常低（仅为世界平均水平的1/4），且水资源分布严重不均。在过去数十年间，中国经历了迅猛的工业和经济增长，其人口密集地区对水资源的需求也不断增加。同时，水源水质经常因人为污染而受到损害。

中德研究项目SIGN将致力于改善太湖流域的水质。临近上海的太湖地区是中国经济最繁荣地区之一，同时也是中国水污染防治科技重大项目的集中地区，具有高度的政治和社会影响。

为圆满完成挑战性任务，SIGN集聚了相关研究机构、工业企业和利益相关方而组成了强大的团队。SIGN项目团队的工作范围包括作为饮用水源的湖水本身以及邻近的大城市的饮用水这两方面。为保证优质水的供应，SIGN将整个水循环体系作为考虑范畴：

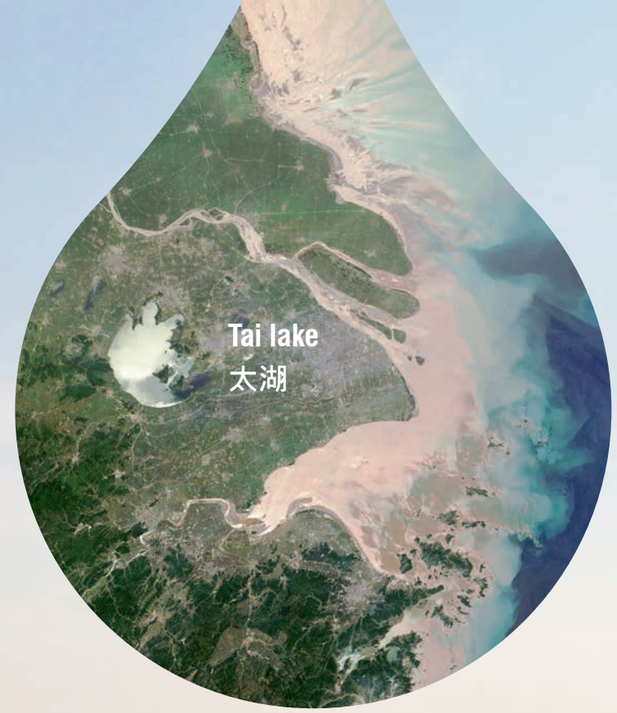
- 强大的排水系统
- 高效的水资源管理
- 因地制宜的监控战略
- 得力的水处理工艺
- 高效的饮用水输配

德国合作伙伴量身定制的水处理工艺以及管理概念将能够适应中国的边界条件。而中德之间在科技和实践方面的紧密联系又确保了科学的进步及其实际可操作性。

Some facts about Taihu

The Taihu (Tai lake)

- is located in the Yangtze Delta (Jiangsu province) close to Shanghai,
- is the third-largest fresh-water lake of China (2,200 km², 2 m average depth),
- represents a drastic example of water pollution with nutrients (nitrogen, phosphate), organic contaminants and heavy metals,
- has been suffering from eutrophication and algal blooms since the late 1980s,
- has insufficient raw water quality which threatens drinking water supply



太湖简介

太湖

- 位于长江三角洲，靠近上海
- 中国第三大淡水湖（2,200平方公里，平均深度2米）
- 是水体富营养化（氮、磷），有机污染和重金属污染的极端案例
- 自20世纪80年代以来频繁遭受富养化和水华
- 原水质量差，威胁饮用水供应

Urban Catchment

Main aim: Future-proof waste-water and rainwater management for urban catchment

Due to combined sewer and stormwater tank overflows as well as stormwater runoff pollution hundreds of Chinese cities are highly vulnerable to urban pluvial floods and subsequent surface water deterioration. Tailor-made strategies, techniques and policies for stormwater management and treatment support better flood prevention and control. Nationwide research about customized development paths, guidelines and tools for harmonized local urban planning and water management is conducted, contributing to comprehensive exploration of the sponge city development.

A case study in Wuxi city aims at improving the operation and maintenance of the sewer network by tailor-made sewer cleaning and flushing plans, flood simulation and concepts for urban runoff pollution control (runoff screening, separating units). Hereby, the practical use of innovative technical sewer devices is demonstrated and their effectiveness analyzed. Another case study in Jiaxing city enhances resilience to urban climate change and floods via scientific assistance for a river restoration project, customized urban storm-water management, and urban flood control strategies (discharge regulators, weir gates, flood barriers).

Partners:

DBI, RWTH, Steinhardt, ISAH

BUCEA, CRAES, Jiaxing Office, Tsinghua, Wuxi Drainage

城市流域

主要目标：面向未来的城市流域废水及雨水管理

数百个中国城市频繁遭受着严重的城市内涝以及径流污染。强降雨天气下，合流制管网溢流以及雨水池溢流的现象依然普遍存在。而量身定制的雨水管理与雨水处理的策略、技术和政策将能够改善城市流域的雨洪防控能力。为了助力中国的城水和谐、海绵城市发展，我们正基于全国范围的雨洪研究为中国城市量身定制相关的发展路径、指南与辅助工具。

无锡市案例研究旨在通过量身定制排水管网的清洗、冲洗方案来有效地改善排水管网的运行和维护。为此我们将示范应用创新的排水管网技术设备，并对其进行效果分析。此外，嘉兴市案例研究还致力于为河道修复项目提供科研支持、量身定制雨水管理与城市防洪策略，从而助力嘉兴市提高其应对气候变化的韧性能力。

合作伙伴：

汉诺威大学，亚琛工大，德国水泰和水科技，DAHLEM 工程咨询

清华，北建大，无锡排水，嘉兴五水共治

Monitoring and Early Warning

Main aim: Assessment of the physical, chemical and biological water quality by innovative and automated monitoring technologies

Water quality monitoring focuses on the relevant water constituents in terms of drinking water production and ecosystem effects. Cyanobacteria also known as blue-green algae, microbiological, inorganic (e.g. nitrogen, phosphorous, heavy metals) and organic parameters (e.g. industrial chemicals, pharmaceuticals, pesticides) as well as the H-/O-isotope composition of lake and sediment water are measured. Biological tools are used to assess ecotoxicity on different trophic levels as well as mutagenic and endocrine effects. Key pollutants are selected for more effective water quality monitoring.

Spatially resolved monitoring of water quality in Taihu is performed by an innovative mobile multi-sensor and sampling system (BIOFISH). Furthermore, a new profiling buoy with a vertically moving multi-sensor and sampling platform is developed to support the establishment of an early warning system for water quality. Recommendations for measures to mitigate the lake pollution are deduced from the obtained data.

Algae are measured in the lake as well as during drinking water treatment, using portable instruments and sensors integrated into the BIOFISH and the profiling buoy as well as laboratory-based devices for single and online measurements. Furthermore, new tools are developed in order to assess the integrity status of algae cells and thus the risk of toxin release.

Lake water quality is dynamic and influenced not only by anthropogenic activities, but also by weather conditions (wind mixing). Assessment of the dynamic lake water balance and circulation in the Taihu includes evaluation of H-/O-isotope measurements together with climate and hydrological data.

Partners:

BBE, GAIAC, Hydroisotop, IWW, KIT

CRAES, Jiangnan

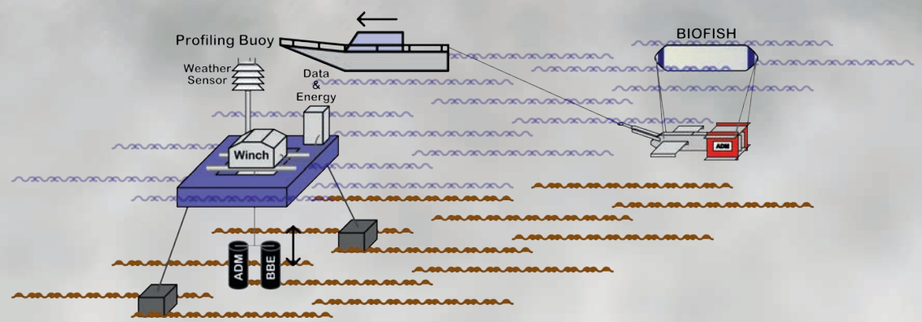
监测和早期预警

主要目标：以创新型的自动化监测技术评估太湖水的物理、化学、生物水质

水质监测主要针对与饮用水生产及生态效应相关的水中成分。我们对湖水以及沉积物的监测参数包括：蓝藻细菌亦称蓝绿藻、微生物指标、无机物指标（如氮、磷、重金属）、有机物指标（如工业化学品、药品、杀虫剂）以及H-/O-同位素成分。我们应用生物学工具来评估不同营养水平下湖水的生态毒性、诱变效应以及内分泌干扰效应。SIGN还通过遴选核心的污染物指标以达到更高效的水质监测。

太湖水质的空间分辨监测则是由一套创新可移动式多传感采样系统 (BIOFISH 生物鱼) 来执行。为了辅助建立水质早期预警系统，SIGN还开发了新型的分析浮漂，它配备有可竖向移动的多传感采样平台。这些监测数据使得制定缓解湖水污染的措施更加得有据可循。

SIGN不仅监测湖泊也监测在饮用水处理过程中的藻类参数。在单项分析与在线分析过程中应用到的工具包括：可携带式仪器、嵌入BIOFISH生物鱼的多种感应器、分析浮漂、各种实验室仪器。值得一提的是，SIGN还开发各种新工具来评估微藻细胞的完整状态及其释放毒素的风险。湖水水质呈动态变化，不仅受人为输入的影响也受到天气条件 (风混合) 的影响。因此对太湖的动态湖水平衡与循环的评估也就包括了对H-/O-同位素的测量及对气候和水文数据的评估。

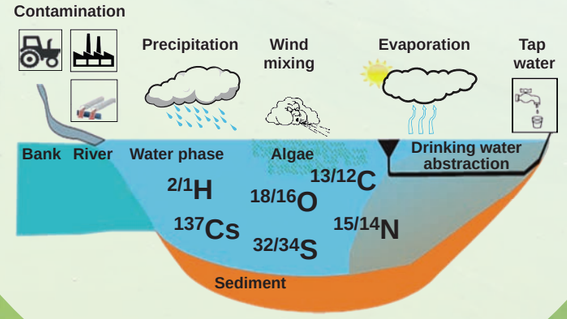


合作伙伴：

BBE，GAIAC，Hydroisotop，IWW，KIT

环科院，江南大学

Lake Processes



Main aim: Securing the quality of the raw water resource by considering beneficial as well as detrimental ecosystem effects

Beneficial biological effects are ecosystem services contributing to the elimination of anthropogenic pollutants from the water. Biodegradation of organic pollutants and nitrogen-containing nutrients (nitrate, nitrite, ammonia) is investigated in laboratory degradation studies with original material (water, sediment) from the Taihu basin. The use of modern PCR-techniques and the measurement of the C-/N-isotope composition of the anthropogenic pollutants and biomass allow evaluation of the bioactivity within the lake.

Some microorganisms can be detrimental to water quality and human health. Again, powerful PCR methods are used to detect bacteria with antibiotic resistance genes as well as pathogenic viruses and bacteria.

Another large and often clearly visible problem of Taihu is excessive algae growth along with the production of toxins, compromising drinking water quality. Onset and duration of algal blooms are impacted by the nutrient content of the water as well as by mixing processes. Investigation and characterization of the decisive effects on algal growth as well as ecological modelling contribute to more precise forecasts of algal blooms, which are crucial to optimize abstraction and treatment of drinking water.

Partners:

GAIAC, Hydroisotop, IGB, KIT, TZW-KA

CRAES, NIGLAS

湖泊过程

合作伙伴：

GAIAC， Hydroisotop， IGB， KIT， TZW-KA

环科院，南京地湖所

主要目标：考虑有益及有害的生态效应， 以保证原水资源

有益的生物效应是指有助于去除水中的人为污染物的生态系统服务功能。在实验室生物降解研究中，我们针对从太湖流域采集的原始样品 (水、沉积物) 调查了其有机污染物和含氮营养物 (硝酸盐、亚硝酸盐和氨) 的生物降解。而对湖泊的生物活性评估则通过以下技术得以实现：现代PCR技术，以及对人为污染物和生物质的C-/N-同位素成分分析。

另一方面，微生物可能对水质从而对人类产生有害效应。于是强大的PCR方法再次被用来检测带有抗生素抗性基因的细菌以及病原性病毒和细菌。

在水资源以及饮用水水质方面，太湖最严峻且明显的问题是藻类的过度繁殖及其毒素释放。水华的暴发和持续，受到水中的营养物质以及混合过程所控制。对藻类生长的决定因素的调查和特性鉴定以及生态模拟将有助于更为精确地预报水华，而这也正是优化饮用水提取和处理所需要的。

Water Treatment

Main aim: Fostering treatment efficiency by effective elimination of algae cells and taste & odor substances

Algal blooms are a large challenge for drinking water treatment. Thus, practicable, ecological, as well as economical solutions for efficient drinking water treatment such as ultrafiltration are needed. An algae-online-analyzer is applied to indicate changes in raw water quality in regards to algae concentration as well as the risk of toxin release. These values enable control of the ultrafiltration process, i.e. automatic selection of the respective optimal parameter matrices.

Precursors of taste and odor (T&O) compounds are identified by data evaluation and in-depth analysis of raw water and samples from different water treatment units. Formation of T&O compounds is reproduced in the laboratory by electrochemical oxidation coupled to mass spectrometry. Appropriate technologies for the reduction of the relevant precursors in the waterworks are developed. Biodegradation during drinking water treatment is also considered as an elimination option for pollutants.

Based on the newly gained knowledge about the occurrence of algae, T&O compounds as well as organic and inorganic pollutants, waterworks-tailored recommendations for improved water treatment are developed.

Partners:

BBE, FZJ, INGE, IWW, TZW

Suzhou Water, Tongji, Hua Yan

给水处理

主要目标：通过有效消除藻类细胞、藻类毒素和嗅味物质来提高给水处理效率

藻类水华为饮用水处理带来了很大挑战。因此，高效的饮用水处理需要像超滤技术这样的可操作、生态且经济的解决方案来完成。我们将藻类在线分析仪应用到给水处理系统，从而能够指明原水水质在藻类含量与毒素释放风险方面的变化。基于这些数据，我们得以高效地控制超滤工艺，例如自动遴选相应的最佳参数矩阵。

对嗅味物质前体物的鉴定则是通过对原水以及给水处理不同单元的水样的数据评估以及深度分析来实现的。通过耦合电化氧化与质谱分析，我们得以在实验室复制了嗅味物质的形成过程，从而开发相应的技术来削减水厂中的相关嗅味前体物质。此外，饮用水处理过程中的生物降解也被视为消除污染物的可选方法之一。

基于新获得的有关藻类、嗅味物质、有机和无机污染物的知识，我们将为水厂量身定制、推荐改善其水处理的方法。

合作伙伴：

BBE · FZJ · INGE · IWW · TZW

苏州水务, 同济, 华衍

Water Distribution

Main aim: Higher water quality and quantity in the drinking water network by advanced flushing and leakage detection methods

Drinking water leaving the waterworks in Suzhou has a good and stable quality. However, water discoloration and problems with T&O compounds reoccur during transport through the drinking water pipes. In order to remove deposits and thus increase drinking water quality at the consumer's tap, an innovative optimized flushing strategy is adapted and tested in a model region of the distribution network in Suzhou. Based on the deposit accumulation velocity, future flushing intervals are defined.

Due to technical, hygienic and economic reasons, water suppliers are urged to reduce the water losses from their water distribution networks to a minimum. Tools for the automatic acoustic detection of leakages within the drinking water pipes are adapted and tested for a model region of the distribution network in Suzhou. Data from the noise loggers are collected via wireless transmission, accessible via internet, and evaluated with a specialized software tool.

Partners:
FAST, TZW-DD
Suzhou Water,
Tongji, Hua Yan

饮用水输配

主要目标：通过先进的冲洗和渗漏探测技术来提高饮用水水网的水质与水量

尽管苏州水厂的出厂饮用水质量良好且稳定，饮用水变色及嗅味化合物等问题却在给水管网的输送过程中死灰复燃。为了去除给水管网沉积物、提高终端用户的饮用水水质，我们在苏州配水网络的一个示范区域应用并调试了一套创新式的优化冲洗方案。基于沉积物的累积速度，未来的给水管网冲洗间隔也得以确定。

出于技术、卫生和经济因素，供水企业必须将配水网络中的水损耗降至最低。在苏州配水网络的一个示范区域，我们在配水管网中应用并调试了自动化声波探测渗漏的各种工具。噪音记录仪的测量数据通过无线传输收集、网络可达、并通过专门的软件进行评估。

合作伙伴：
FAST，TZW-DD
苏州水务, 同济,
华衍

Governance, Dissemination and Capacity Building

Main aim: Implementation of the results among the different Chinese stakeholders

All results obtained are actively shared with the scientific community as well as with concerned Chinese stakeholders. German best practice examples of pollution elimination and improvement of water resource quality are evaluated in view of appropriateness for the Taihu region. Based on the existing Chinese standards and guidelines as well as on the raw water situation of Taihu, the most important parameters for drinking water quality are selected in order to facilitate future monitoring and control.

Achieving a sustainable urban environmental water cycle is not only a technical challenge, but also needs to be integrated in urban catchment governance. Feasibility, adequacy and performance of technical concepts are highly dependent on the socio-economic and institutional settings. Thus, approaches and recommendations to solidify the organizational, legal and fiscal foundations for the sound management of wastewater and rainwater are researched. Further initiatives for more effective disclosure management, public participation, and awareness-raising campaigns are suggested.

Lead partners:
TZW-KA, UFZ
CRAES, Tongji

管理、推广和能力建设

主要目标：在中方的各利益攸关方之间推广成果

SIGN所获的全部成果都将与科研界和中方利益相关方积极分享。SIGN将分析德国在消除污染和改善水资源质量方面的最佳实践案例在太湖地区的适用性。根据目前中国的相关标准、指南方针以及太湖的原水情况，我们会遴选出最重要的饮用水水质参数，从而辅助未来的水质监控。

追求可持续的城市环境水循环不仅是技术挑战更需要综合的城市流域管理。技术概念的可行性、充分性以及实施都高度依赖着社会经济与制度设置。因此SIGN同时也在探索可靠的废水和雨水管理方法和建议来夯实相应的组织、法制和财政基础，进而也会提出更高效的信息公开管理、公共参与和意识提升活动的建议。

合作伙伴：
TZW-KA，UFZ
环科院, 同济

Partners
合作伙伴

Coordination, Biodegradation, Water quality, Flushing
协调、生物降解、水质、冲洗

TZW: DVGW-Technologiezentrum Wasser
TZW: 德国燃气与水工业协会 水科技中心
www.tzw.de

TZW-KA: Department of Microbiology and Molecular Biology
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Prof. Dr. Günter Subklew | lippe2.gs@gmail.com
Dr. Kathrin Schmidt | kathrin.schmidt@tzw.de

TZW-DD: Distribution Networks
Dr. Andreas Korth | andreas.korth@tzw.de

TZW is an independent research institute working on all aspects of the water cycle – from the source to the tap.

TZW 是一家独立的研究机构，致力于水循环的各个方面-从源头到水龙头。

Algae sensors, Biological water early warning systems
藻类传感器，生物学早期水预警系统

bbe Moldaenke GmbH
bbe Moldaenke公司
www.bbe-moldaenke.de

Christian Moldaenke | CMoldaenke@bbe-moldaenke.de

BBE develops and produces measuring instruments and software for the monitoring of water quality.

BBE 开发并生产用于水质监测的测量仪器和软件。

Urban catchment, Stormwater management, River restoration
城市流域，雨水管理，河道修复

DBI: DAHLEM | Beratende Ingenieure | Consultant Engineers
DBI: DAHLEM 工程咨询公司
www.dahlem-ingenieure.de

Prof. Dr. Marc Illgen | m.illgen@dahlem-ingenieure.de

DBI is an internationally active engineering and consulting company and provides solutions for all fields of water and wastewater management.

DBI 是一家跨国运作的工程与咨询公司，为给水、废水与水资源管理领域提供解决方案。

Leak detection
渗漏检测

F.A.S.T. GmbH
F.A.S.T. 公司
www.fastgmbh.de

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FAST GmbH is a manufacturer of all kind of equipment to effectively detect leakages in water supply networks.

FAST 公司，制造商，专注于有效检测供水管网渗漏的各类设备。

T&O compounds
嗅味物质

FZJ: Forschungszentrum Jülich GmbH
FZJ: Jülich 研究中心公司
www.fz-juelich.de/zea

Dr. Stephan Küppers | s.kueppers@fz-juelich.de

FZJ is working on key technologies for energy and environmental research.

FZJ 致力于能源和环境研究的关键技术。

Ecotoxicology, Ecological modelling
生态毒理学，生态模拟

GAIAC: Research Institute for Ecosystem Analysis and Assessment at RWTH Aachen University
GAIAC: 亚琛工业大学，生态系统分析和评估研究所
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GAIAC develops solutions for a sustainable environmental management and is an expert in applied research and risk assessment in ecotoxicology and ecology.

GAIAC 为可持续的环境管理提供方案，是生态毒理学和生态学专业应用研究与风险评估领域的专家。

Lake water processes, Isotope monitoring
湖泊过程，同位素监测

Hydroisotop GmbH
Hydroisotop 公司
www.hydroisotop.de

Dr. Florian Eichinger | FE@Hydroisotop.de

Hydroisotop GmbH investigates isotopes in environment and hydrology to secure water quality around the water cycle.

Hydroisotop 公司从事环境与水文的同位素调查，以保证水循环各环节的水质。

Algae growth
藻类生长

IGB: Leibniz-Institute of Freshwater Ecology and Inland Fisheries
IGB: 莱布尼兹-淡水生态与内陆水产研究所
www.igb-berlin.de

Dr. Jan Köhler | koehler@igb-berlin.de

IGB is an interdisciplinary research center dedicated to the creation, dissemination, and application of knowledge about freshwater ecosystems.

IGB 是一家跨学科研究中心，致力于淡水生态系统知识的创新、传播和应用。

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Christian Staaks | cstaaks@inge.ag

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Organic and inorganic analytics, Drinking water supply
有机、无机分析，饮用水供应

IWW: Rheinisch-Westfälisches Institut für Wasserforschung gGmbH
Department Water Resources Management
IWW: 水研究公司
水资源管理部门

www.iww-online.de

Dr. Tim aus der Beek | t.ausderbeek@iww-online.de

IWW is one of Europe's leading institutes for interdisciplinary and applied research, training, and consulting for the water sector.

IWW是欧洲水界在跨学科应用研究、培训和咨询领域的龙头机构之一。

Urban catchment, Stormwater management, River restoration
城市流域，雨水管理，河道修复

ISAH: Leibniz University of Hannover
Institute for Sanitary Engineering and Waste Management
ISAH: 汉诺威大学 城市水务与废物资源管理研究所

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ISAH focuses on innovative approaches and technologies for a sustainable urban water cycle.

ISAH 致力于可持续城市水循环的革新方法与技术。

Multi-sensor monitoring, Inorganic pollution, Early warning
多传感监测、无机污染、提前预警

KIT: Karlsruhe Institute of Technology
Institute of Applied Geosciences (AGW)
Working Group Environmental Mineralogy & Environmental System Analysis (ENMINSA)
KIT: 卡尔斯鲁厄理工学院
应用地球科学研究所 (AGW)
环境矿物学和环境系统分析工作团队 (ENMINSA)

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Dr. Andreas Holbach | andreas.holbach@kit.edu
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KIT is working on environmental process understanding, substance fluxes, and interrelationships in environmental systems.

KIT 致力于研究环境过程、物质流以及各环境系统之间的关系。

Operation and maintenance of sewer systems
排水系统的运行维护

RWTH Aachen University
Institute of Environmental Engineering (ISA)
RWTH亚琛工业大学
环境工程学院 (ISA)

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RWTH is working on water pollution control and sustainable water management, developing innovative answers to global challenges.

RWTH 致力于水污染控制和可持续水务管理，为全球的水资源挑战提供创新方案。

Stormwater treatment
雨水处理，雨洪控制

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水泰和水科技公司

www.steinhardt.de

Dipl.-Ing. Jörg-Michael Steinhardt | info@steinhardt.de

Steinhardt GmbH specializes in innovative stainless steel equipment for storm and wastewater treatment and flood protection systems.

Steinhardt 水泰和水科技公司专注为雨水处理、废水处理及防洪体系研发并生产创新型不锈钢设备。

Governance
水务政策与管理

UFZ: Helmholtz-Zentrum für Umweltforschung GmbH
UFZ: 亥姆霍兹环境研究中心

www.ufz.de

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UFZ is one of the world's leading research centers in the field of environmental research, enjoying high social recognition.

UFZ 作为一家环境研究领域全球领先的研究中心，被社会高度认可。

Urban catchment, Stormwater management
城市水环境，雨洪管理

BUCEA: Beijing University of Civil Engineering and Architecture
School of Environment and Energy Engineering
BUCEA: 北京建筑大学 环境与能源工程学院

http://english.bucea.edu.cn
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Lake monitoring, Lake processes
湖泊监测， 湖泊过程

CRAES: Chinese Research Academy of Environmental Sciences
CRAES: 中国环境科学研究院

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Drinking water treatment
饮用水处理

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Water quality monitoring
水质监测

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Urban catchment, Urban drainage, River restoration
城市流域，城市排水，水体修复

Jiaxing Office of Comprehensive Water Control
嘉兴市五水共治办公室

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Dynamics of algae bloom, Lake eutrophication
藻类水华机制，湖泊富营养化

NIGLAS: Nanjing Institute of Geography & Limnology
Chinese Academy of Sciences
中国科学院南京地 理与湖泊研究所

http://english.niglas.cas.cn
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Drinking water distribution
饮用水输配

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Drinking water treatment, Drinking water distribution
饮用水处理，饮用水配水

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Urban catchment, River restoration
城市流域，排水系统，河道修复

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Urban catchment, Sewer systems
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J 水上试
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