

## The IWAS-Initiative

### About IWAS

In IWAS around 80 scientists together with partners from industry and political decision-makers are developing specific solutions to water related problems in five hydrologically sensitive regions worldwide under the concept of Integrated Water Resources Management (IWRM). IWAS research addresses some of the most pressing water problems worldwide in the fields of water supply and sanitation, agriculture, ecosystem services and extreme events. Based on this research, a modelling tool box and concepts for capacity building are developed as cross-cutting themes. The project is planned to run from mid 2008 to the end of 2010.

### IWAS Regions

**Eastern Europe:** Focus in this region lies on the improvement of surface water quality within the western part of the river Bug which borders the Ukraine and Poland. While showing a good morphological quality, the river is strongly polluted with inputs from agriculture, industry, urban areas and mining activities. In view of the EU Water Framework Directive, which is being implemented in the neighbouring countries, IWAS develops and implements methods based on natural as well as social sciences, and technologies for the improvement of surface water quality.

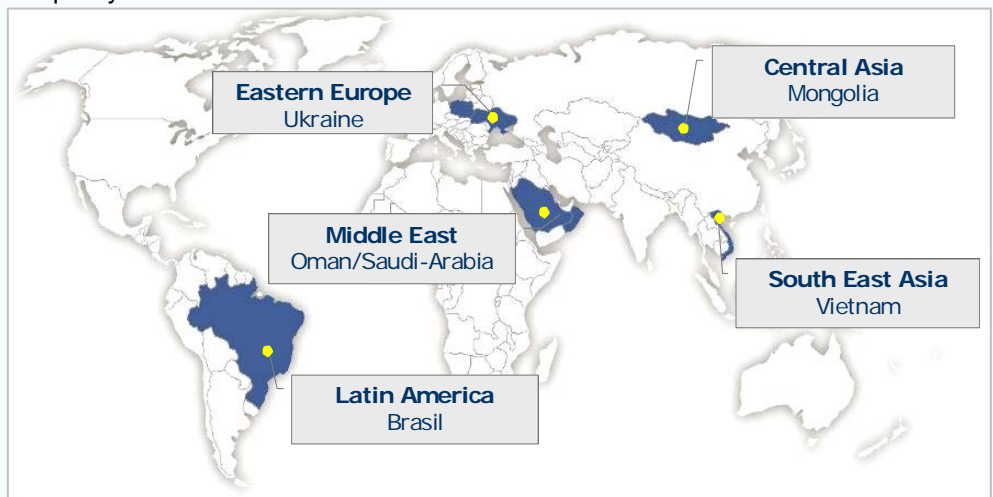
**Central Asia:** Extreme climatic conditions, increasing population, industrial, agricultural, and demographic changes – how do these global trends affect a region which to date shows near natural ecological conditions? Within the Kharaa catchment in Northern Mongolia, IWAS develops scientific innovations such as model coupling of socio-economic and natural systems under the influence of global trends. Interrelations of processes between hydrology and ecology are analysed, governance and decision systems are evaluated and innovative technologies for the treatment and reuse of waste water fractions in semi-arid regions are further developed.

**Latin America:** Future scenarios of the development of Brazil's capital show that Brasilia will face serious problems regarding the availability of drinking and

irrigation water. Together with partners from the Brazilian project AguaDF, IWAS aims at developing an IWRM system in order to secure a sustainable water supply.

**South East Asia:** As in many areas of Hanoi, Vietnam, problems of flooding and water pollution occur frequently, the IWAS team is developing a concept for a sustainable drainage system for the planned new suburb "Long Bien".

**Middle East:** In face of the economic and demographic growth on the Arabian Peninsula, the question arises of a sustainable use of water resources. How can sustainability be achieved in arid and hyper-arid regions? Highly precise methods for determining groundwater recharge and intelligent irrigation systems are to deliver an answer to this question.



### Modelling ToolBox and Capacity Development

The idea of the IWAS **ToolBox** is to develop tools for the efficient and user-friendly coupling of different models. The long-term goal is the provision of all sensible possibilities of coupling their models (e.g. for coupling different compartments) to all users of the different IWAS sub-projects.

Knowledge transfer on concepts and technologies developed in the IWAS subprojects plays a major role within the IWAS project. For the purpose of a sustainable **Capacity Development**, the needs within each region are investigated and adapted concepts for the development and choice of measures are being applied in order to further the competences within the respective regions.

## IWAS Central Asia (Mongolia)



### The Problem

Many areas in Central Asia face severe water shortages fuelled by drastic socio-economic changes, fast land use changes on large scales as well as extreme climate conditions. This creates a considerable potential for water resource conflicts at local, national and international levels. Hence, the challenge is to address issues related to the allocation, efficient use, and adequate protection of water resources in terms of quality and quantity, as well as securing a functioning infrastructure for drinking water supply and waste water treatment. Mongolia, a country in transition from a socialist to a capitalist regime, is characteristic for large parts of Central Asia. It is not only of great interest in terms of socio-economic change, but is also well suited for natural science process studies due to its environmental settings typical for semi-arid conditions.

### The Study Area

The focus of IWAS Central Asia lies on the meso-scale catchment of the Kharaa River, Mongolia, covering an area of approximately 15,000 km<sup>2</sup>. This catchment is part of the Selenge River basin (945,500 km<sup>2</sup>), which is shared by Mongolia and Russia and drains into Lake Baikal. The Kharaa sub-basin is a backbone of economic development in Mongolia and provides opportunities to study different types of land and water uses under change, including pristine head waters, nomadic herding, mining areas, industrial zones, agricultural irrigation, and urban development.

### Objectives of the Regional Project

The overriding goal of IWAS Central Asia is to contribute towards the development of catchment-based stakeholder owned strategies for a sustainable water use. IWAS develops integrative approaches and models with high predictive capacity, supplemented

with an analysis of the socio-economic framework conditions as a basis for decision-making. This includes the improvement of qualitative and quantitative methods for the assessment of water resources and water management systems in semi-arid and arid areas. The regional project contributes substantially to the development of the "IWAS-Toolbox", consisting of an information, modelling, and policy-evaluation system including the visualisation of results. IWAS Central Asia is complementarily linked to research being conducted within the ongoing BMBF-funded project "Integrated Water Resources Management in Central Asia – Model Region Mongolia (MoMo)" ([www.iwrm-momo.de](http://www.iwrm-momo.de)).

### Our scientific innovations:

**Socio-environmental systems:** Investigation and prediction of the dynamics of a coupled socio-environmental system through integrated modelling approaches: human activities are linked with major land and water use sectors in order to study the impacts of societal and environmental changes.

**Hydrology, biodiversity and ecosystem functions:** Evaluation of principle relationships between flow regime, suspended sediment transport and river ecosystem status in a typical semi-arid catchment. Research is based on a combined monitoring and integrated modelling approach.

**Policy Evaluation:** A policy evaluation method is empirically investigated and institutional frameworks, decision structures and user perspectives are analysed in order to identify prerequisites for the implementation of an IWRM in the region.

**Innovative strategies for the treatment and reuse of waste water fractions:** Development of novel technologies for the sanitation of wastewater fractions and basic research on the effects of the carbonised conversion products on crop performance. Development of aptamer-based pathogen sensors for fast, reliable, in-situ detection of water pollutants.

**Capacity Development:** Activities in Ulaanbataar and in the Kharaa basin follow IWRM's holistic approach: IWAS aims at addressing the academic, administrative, and technical levels as well as the general public.

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