Federal Ministry
of Education
and Research

FONA
Sustainable
Water Management
BMBF

MoMo – Integrated Water Resources Management in Central Asia: Model Region Mongolia

Integrated Water Resources Management: From Research to Implementation – IWRM

The catchment of the river Kharaa in Mongolia reflects the multiple region-specific challenges of water management in Central Asia. Located between Mongolia's capital in the South and the Russian border and Lake Baikal in the North, it is one of the most dynamically developing parts of Mongolia. Water scarcity and contamination are already a reality, and only a holistic management concept can prevent further and irreversible damages to natural ecosystems and local livelihoods.

Extreme environmental conditions...

The highly continental location of Mongolia and neighboring regions of Central Asia has important implications for water management. Because of the large distance to the nearest ocean, water resources are naturally limited. Even in the most humid parts of the country, annual precipitation is considerably less than in Central Europe. Cloudless skies and the intensive radiation of the sun mean that a large part of the precipitation evaporates. Therefore, only limited amounts of ground and surface water are available. Extremely low winter temperatures, which often fall to -40°C and less, are a major challenge for water management. In urban areas, both drinking and waste water infrastructures are either underdeveloped or in a poor technical state.

... and increasing water problems...

The water consumption in the project area has been increasing in recent years due to positive economic development in the mining sector and an expansion of irrigated agriculture. A series of relatively dry years since the mid 1990s and a rising pressure on the natural vegetation have resulted in a drastic reduction of forested areas, and consequently to reduced runoff generation and the partial drying of streams. At the same time, both ground and surface water resources face increasing chemical contamination, which damages aquatic ecosystems and puts local drinking water supply at serious risk. The most relevant problems include riverbank erosion due to intensive grazing, nutrient and pathogen intrusion due to inadequate waste water treatment and high livestock densities, and chemical contamination resulting from mining activities.
Because of a growing competition on limited resources, efficient water use and consequent waste water treatment are necessary

... require adapted solutions

Urban water management is of central importance to the project – with regard to both drinking water supply and waste water management. However, there are large differences between urban centers which are connected to central infrastructures, and periurban fringes and smaller settlements without centralized water supply and sewage systems. In Darkhan, the third largest city in Mongolia, about half of the population is connected to the municipal water supply. In this distribution system,

Typical Mongolian scenery: Nomads keeping large herds of sheep and goats

at least 40% of the water is lost due to leakage. Since pipelines are typically installed at a depth of about 4 m to protect them against low winter temperatures, the project developed an innovative methodology for sensor-based leak detection. For the city's almost completely dysfunctional central waste water treatment plant, a rehabilitation concept was developed which is based on the well-established sequencing batch reactors (SBR) principle, which was adapted to Mongolia's harsh environmental conditions. One specific advantage of this system is its scalability: it can simply grow with the city. Two more waste water treatment plants were implemented and tested for decentral settings. One of them, using a special biofilm carrier system, has already been duplicated due to its simple and robust operation even under adverse conditions. The other treatment plant is based on constructed wetlands and integrates waste water treatment and wood production. Such concepts can help to ease the deforestation pressures in riverine floodplains.

The dry separation toilet system iPiT is another example for an integrative approach: While improving sanitary conditions in urban ger districts and preventing the contamination of local drinking water sources, the system constitutes the basis for nutrient recycling (i.e. fertilizer production) and energy production (fermentation of feces in a biogas reactor). Even though these approaches are very diverse, they are all components of one holistic concept for sustainable water management.

Funding Measure
Integrated Water Resources Management: From Research to Implementation – IWRM

Project title
Integrated Water Resources Management in Central Asia: Model Region Mongolia (IWRM MoMo)
(Reference Code: 033L003A-B)

Project duration
01.08.2006 – 31.05.2014

Funding volume of the joint project
€ 12.423.000

Contact (Project coordination)
Helmholtz Centre for Environmental Research GmbH
Prof. Dr. Dietrich Borchardt; Dr. Daniel Karthe
Brückstr. 3a
39114 Magdeburg
Germany
+49-391-8109104
daniel.karthe@ufz.de
www.iwrm-momo.de

Project partners
Helmholtz Centre for Environmental Research (UFZ)
Fraunhofer Application Center Systems Technology (FhAST)
Leibniz Institute for Freshwater Ecology and Inland Fisheries (IGB)
German Development Institute (DIE)
Bauhaus-Universität Weimar (BUW)
Kassel University
Heidelberg University
Training and Demonstration Centre for Decentral Waste Water Treatment (BDZ) e.V.
Bergmann Clean Abwassertechnik GmbH (BCAT)
Passavant-Roediger GmbH
p2m Berlin GmbH
terrestris GmbH & Co KG
seeconsult Germany GmbH

Publisher
German Federal Ministry for Education and Research (BMBF)
Department of Resources and Sustainability,
53170 Bonn, Germany

Editorial work and design
Project Management Resources and Sustainability
Project Management Jülich (PtJ)

Printed by
Systemedia GmbH, 75449 Wurmberg

Photo credits
IWRM MoMo, Daniel Karthe

Bonn, Berlin 2014

Printed on chlorine-free bleached paper