



RESOURCE EFFICIENCY IN URUMQI (China)

ACTION BRIEF

CODE: URU-AB5

HYDROLOGICAL MODELLING AND WATER INFORMATION MANAGEMENT

TOPICS:
RESOURCES

CHALLENGE

Urumqi is located in northwest China between the Junggar Basin and the Gurbantünggüt Desert to the north and the Tianshan Mountains covered by snow and glaciers to the south. Because of the semi-arid continental steppe climate the annual precipitation is only about 300mm. The Tianshan Mountain range intercepts humid air masses coming from the north, thus providing the natural basis of life in this region. Due to expanding irrigation areas, accelerated industrialisation and a growing population, water demand is increasing

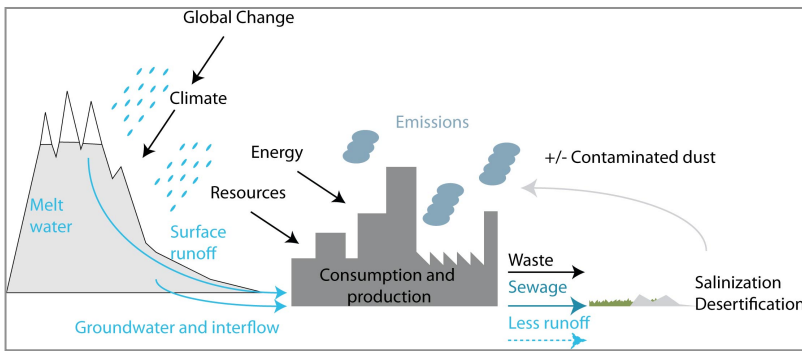
dramatically, resulting in the current use of 89 % of the surface water resources. This growing demand has led to an over-exploitation of groundwater resources. In addition, global climate change will have a large impact on the sensitive water balance in the region. A significant reduction of the glaciers and snow meltwater is anticipated. These forecasted effects will pose a major challenge to the key actors with regard to quantity and temporal availability of water.

ACTION

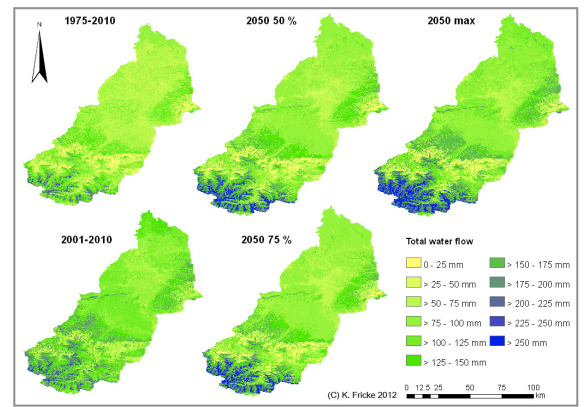
The aim of this measure is to analyse the actual consumption of water resources and to develop a sustainable water conservation strategy adapted to the specific regional changes. To achieve this objective, methods from hydrology, remote sensing, statistics, and geo-informatics are used:

- A **water balance model** is set up to assess and analyse the distribution of water resources in Urumqi Region and to simulate the effects of climate and land use changes. So far, the available water in the future is projected to depend mainly on the precipitation trend. Annual precipitation would have to increase by more than 13 % to balance the projected increase in temperatures. There will be a change in the spatial distribution and a higher total water flow will be generated in the high mountains, with less water on the plain.

- Due to the large amount of data extracted from globally available information, the **methodology can be transferred to other regions** with a similar situation.
- To enable the local usage of the collected data and simulations, an **information system for water resources** and related data is developed to manage the collected data and to support decision-making. Within the information system, the future water demand by population and economy is modelled. The simulation results and the water information system enable the **identification of the main problem areas** in the future, both spatially and thematically, and of starting points and potential for the implementation of technical solutions.



Overview of the hydrological system in Urumqi Region (Source: Fricke 2008)



Total water flow for the catchment of Urumqi simulated for different climate data sets (Source: Fricke 2012)

RESULTS

STATE OF IMPLEMENTATION:

- The hydrological model for water availability and the projections of the water demand have been developed and evaluated. The build-up of the water information system is under way.

LOCAL USERS / TARGET GROUPS:

- Simulation results and derived suggestions are embedded in the local context: the local geographical and climatic situation is considered in the hydrological model, while the water demand is projected based on the socio-economic development of the Urumqi Region
- Target groups for the usage are the interested public and stakeholders responsible for water management strategies in the local water and planning authorities

IMPACTS:

- Analysis and modelling of the distribution and local availability of water resources for the environment and population as well as prognosis of the of future water demand
- Intended as decision-making support available for political and institutional stakeholders

- The specific effects of certain changes and trends can now be presented and used to encourage action and to increase the awareness and acceptance of impending problems.

MULTIPLICATION:

- Our findings have been widely presented and discussed at international workshops and conferences and with our project partners. The methodology can be transferred to other settings based on generally available input data

LONG-TERM CONSOLIDATION:

- The aims are: an adaptation of long-term water resources and land use planning to include selected measures that were developed with the water resources information system; optimised water consumption and reuse within the industry
- The environment would profit from selected measures of water treatment and increased natural water flow in rivers and groundwater
- The public dissemination and long-term effect would be largest through a web-based user interface of the information system

CONTACT

Project: RECAST Urumqi - Meeting the Resource Efficiency Challenge in a Climate Sensitive Dryland Megacity Environment - Urumqi as a Model City for Central Asia
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