Water Uses as a mirror of development

Estimations of past freshwater use are an important information source for thinking about the future of water and the development of water-related sectors. The total amount of freshwater withdrawal and usage depends on many factors, including population dynamics, industrial development and technological advancements. Industrial development increases water consumption while technological improvements enhance water use efficiency and thus reduce the amount of water abstracted.

By analysing historical data on water consumption, which reflects socio-economic developments, implications for future sustainable water use can be derived. Although global assessments of water uses are crucial to understand how humans affect the water system, comprehensive data are often lacking.

In order to close the information gap with respect to historical water use, Flörke et al. calculated water use from 1950 to 2010 on a global scale by developing simulation models for domestic, thermoelectric and manufacturing water uses (see boxes above for definitions). The estimations cover over 177 countries worldwide and are based on available historical data such as national statistics. Historical

MORE WATER IN HOUSEHOLDS
Due to population growth and rising levels of wealth in many countries, global domestic water use continuously increased since 1950.

NEW ECONOMIES, NEW WATER USES
Industrial water use is again on a rise since the beginning of the 21st century as a result of the growing economies within newly industrialized countries such as China and India.

POLICIES AND TECHNOLOGIES FOR WATER
Policies and innovations in water-saving technologies play a major role in the use of water by reducing global domestic and industrial water uses.

60 YEARS OF WATER USE
Estimations of past freshwater use are an important information source for thinking about the future of water and the development of water-related sectors.

The total amount of freshwater withdrawal and usage depends on many factors, including population dynamics, industrial development and technological advancements. Industrial development increases water consumption while technological improvements enhance water use efficiency and thus reduce the amount of water abstracted. By analysing historical data on water consumption, which reflects socio-economic developments, implications for future sustainable water use can be derived. Although global assessments of water uses are crucial to understand how humans affect the water system, comprehensive data are often lacking.

In order to close the information gap with respect to historical water use, Flörke et al. calculated water use from 1950 to 2010 on a global scale by developing simulation models for domestic, thermoelectric and manufacturing water uses (see boxes above for definitions). The estimations cover over 177 countries worldwide and are based on available historical data such as national statistics.
turning points and events which
significantly influenced past water
use could be identified. The study
further addresses the estimation
of wastewater (both treated and
untreated) which is returned to
the water cycle by domestic and
manufacturing sectors.

DOMESTIC WATER USE

The study’s results reveal that
global domestic water use rose at
an average annual growth rate of
2.2% over the last 60 years. An
increase in global domestic water
withdrawals is apparent since 1995,
mainly related to growing water
demands due to rising population
and wealth in Asia and Africa.
The results highlight dominant
water-using regions with high
population density, e.g. western
U.S., Europe, India and China. Asia
shows an especially high domestic
water demand in recent years.

Increasing urban population leads
to concentrated domestic water
demand in many urban areas.

THERMOELECTRIC WATER USE

Global thermoelectric water use
peaked in 1979 / 1980 during the
oil crisis, followed by a decline
until the mid 1990s and a moderate
increase since then. Electricity
production continuously increased,
but technological advancements
resulting in enhanced water use
efficiency had a reducing effect on
water withdrawals. In China, water
withdrawals in the thermoelectric
sector nevertheless doubled over
the past 20 years as a result of the
growing population and economic
development.

MANUFACTURING WATER USE

Between 1950 and 2010, water
withdrawal in the manufacturing
sector increased by a factor of 3.6, despite water use efficiency
advancements in production
processes. The results show
how global manufacturing and
thus water use shifted from the
American and European economies
toward Chinese and South East
Asian economies. In 2005, 49% of
the global manufacturing water
was withdrawn in China, India and
Japan.

It appears that global water demand
in domestic, thermoelectric and
manufacturing sectors will continue
to rise in the next years due to population and economic growth. Especially in emerging countries, water use can be expected to further increase. This development poses challenges in particular with respect to the treatment of wastewater.

Wastewater

Between 2000 and 2010 wastewater produced by domestic and industrial sectors increased by 22%, threatening human health and the environment. Hotspots of untreated wastewater could be
found particularly in South and Southeast Asia, but also in Europe, Northern Africa, and Central and South America.

Since technological changes play a major role in both enhancing water efficiency and treatment of wastewater, investments in technologies are essential in order to reduce water withdrawals and the contamination of freshwater resources. Further growth of the global population and economies, particularly those of emerging countries, implies that also global water demand will continue to rise in the future.

Enhancing water security and the reduction of untreated wastewater are among the most important actions to be undertaken to reach the Millennium Development Goals.

**BASED ON THE PAPER**


**SUGGESTED READING**


The Global Water System Project seeks to answer the fundamental and multi-faceted question:

How are humans changing the global water cycle, the associated biogeochemical cycles, and the biological components of the global water system and what are the social feedbacks arising from these changes?

GWSP is a joint project of the four Global Environmental Change Programmes: DIVERSITAS, the international programme of biodiversity science, the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP) and the World Climate Research Programme (WCRP).