

# Green Water Breaking New Ground

Blue water is scarce, but rain is plentiful and water management *should* incorporate activities “beyond the river”

In the developing world, more and more water is needed to support development and food production, but rivers and groundwater are getting increasingly overcommitted. This has raised interest in making better use of the naturally infiltrated rain, i.e. the potential of green water. In other words, finding water where there is believed to be none. Increasingly, therefore, rainwater is being thought of as a manageable water resource.

A major water challenge involved in the Millennium Development Goal efforts is finding the water required for the food production needed to secure hunger alleviation. The blue water now involved in food production amounts to around 1800 km<sup>3</sup>/yr, while the consumed green water amounts to almost 3 times more, or 5000 km<sup>3</sup>/yr. Due to blue water constraints, most of the additional 4 200 km<sup>3</sup>/yr, that will have to be appropriated by 2030 to produce the food required to feed the people of the developing world on an acceptable nutritional level, will in fact have to be provided by green water.

## Interest in green water spreading rapidly

The emergence of the new green-blue water paradigm represents the start of a new era in development work. The South faces a water-problem dichotomy: in irrigated regions with closing river basins, blue water reallocation is a central issue for debate, while in rainfed regions, the core problem is to find out how to release the green water potential. There, the ultimate goal is to generate wealth by better and more careful use of local rain.

At a workshop in Stockholm in June 2005, a number of international institutions showed their active interest in incorporating green water as an essential complementary water resource to focus on and research further.

## New agricultural revolution emerging

The “blue revolution” called for by UN Secretary-General Kofi Annan in Johannesburg in 2002 will have to involve the meeting of the MDGs without much in-

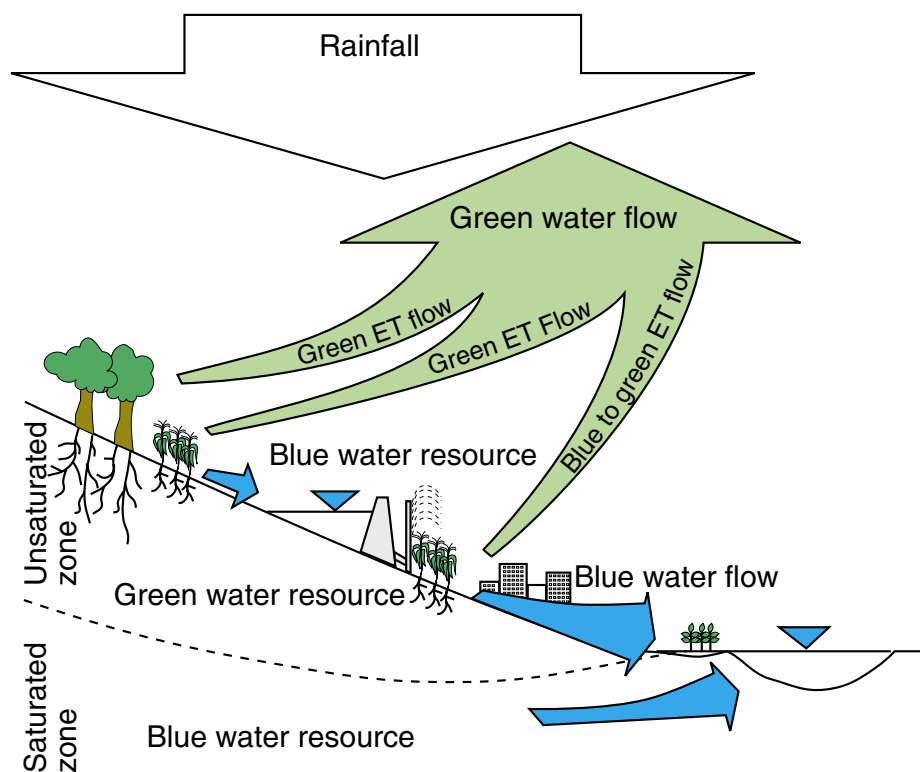


Illustration: Kristina Rockström

Since stream flow in MDG top and high priority countries is either unreliable or already overcommitted, increasing focus now goes to making better use of the green water resource in the soil, i.e. naturally infiltrated rain. “ET” in the illustration is evapotranspiration, the process by which water is discharged to the atmosphere as a result of evaporation from the soil and transpiration by plants.

crease of blue water withdrawals. Generally, a 15 to 20% increase in withdrawals is seen as the limit, since increased levels of depletion in rivers requires that adequate attention be paid to aquatic ecosystems and their water requirements. One of the goals of the Challenge Programme, carried out within the CGIAR group of international institutions, is in fact to reach the MDGs without an increase in blue water withdrawals.

The top and high priority countries focused on in the MDG programme are to a large degree located in the semiarid savanna zone. There, the basic challenge is to cope with a large climatic variability: a short rainy season interrupted by dryspells, recurrent drought years and a high evaporative demand which limits the generation of runoff. The agricultural revolution will therefore have to be a “triple green revolution”: green for production increase, green

for green water, and green for environmental sustainability.

## Adding an L to IWRM

Today’s governance discourse has its focus on blue water: the Dublin Principles, Integrated Water Resources Management, environmental flow requirements, etc. Evidence clearly indicates, however, that blue water will not do the job foreseen for the coming decades, in terms of water-consuming biomass production of not only food but also plantation-based carbon sequestration. It has therefore to be complemented by green water policies closely linked to land management. Until now, green water has largely been governed in a less formal manner by communities, individual farmers and agricultural scientists whose view of it merely as “soil moisture” unfortunately neglects the larger hydrological picture.

Land use, however, influences runoff generation by easily modifying the partitioning of the incoming rainfall into green and blue water flows. The challenge is now to broaden water governance to manage both green and blue water flows from a catchment in a coordinated way. The goal is upstream-downstream benefit sharing of the rainfall over the catchment. Water management will in other words also have to incorporate activities beyond the river.

#### **L for land and livelihood**

Broadening the attention to incorporate both green and blue water opens the possi-

bility for much clearer attention both to the realities of the livelihoods of smallholder farmers, and to the important links between humans and ecosystems. In the blue water discourse, ecosystems enter only as aquatic ecosystems, basically floodplains, fishery and coastal water issues.

However, 70% of the rain over the continents is consumed by terrestrial ecosystems, most of it by the major biomes: forests, grasslands and wetlands. Only some 10% is consumed by croplands. Alterations of these terrestrial ecosystems through clearing of land, deforestation, forest plantations, etc., are reflected in altered stream-

flow and groundwater recharge. Forest plantations are in fact seen as a streamflow-impacting activity in the South African national water law, for example.

These land use-runoff generation linkages make an integrated approach essential to land, water and ecosystems. The new green-blue water paradigm has opened the possibility for such an integration.

*By Professor Malin Falkenmark, SIWI,  
e-mail: malin.falkenmark@siwi.org, and  
Professor Johan Rockström, Executive Director,  
Stockholm Environment Institute,  
e-mail: johan.rockstrom@sei.org.*

#### **Taking Green-Blue to the Next Level: International Initiative Launched**

The newly-launched Green-Blue Initiative (GBI) is a joint programme established by the Stockholm International Water Institute and the Stockholm Environment Institute together with a group of international core partners interested in developing the new green-blue paradigm. The partners are the International Water Management Institute (IWMI), International Food Policy Research Institute (IFPRI), IUCN-World Conservation Union and the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).

“The goal is green water policy development and proper linkages to land use management policies, by integrating green and blue water governance in integrated water resource management,” says Mr. Anders Bertell, Executive Director of SIWI. “Water is seen as a leverage in driving livelihood improvements. This ambitious initiative will find out what local level mechanisms will be needed to benefit more effectively from the green water potential to alleviate poverty.”

The program involves efforts from the local to the global scale. Until now, water resource planners have in fact been operating within a partial reality, based on a rather narrow set of blue water data. Such data are inadequate to address the emerging investment options available; livelihoods and poverty alleviation aspects; and the environmental sustainability complexities.

The core focus of the GBI programme will be at the local scale, assessing the role of green-blue water flows in poverty reduction. A green and blue water paradigm opens new opportunities for investments in water management for livelihood improvements. Field activities will be carried out in pilot river basins where strong partnerships will be established with both river basin and community based organisations. Studies will focus on governance approaches which integrate green-blue water management. In seeking ways towards upstream-downstream benefit sharing, farmers and foresters might for instance be seen as delivering blue water to downstreamers by managing the critical green-blue interface. This might involve green water credits as an additional source of income for rural populations.

On the global scale a new integrated green-blue water resources assessment is being planned, generating new maps and tables, to be compiled in a new report on global freshwater resources.

