Ecohydrosolidarity – Towards Better Balancing of Humans and Nature

For decades, humanity has been stuck at a conceptual standstill. The serious failures through three or four decades to come to grips with environmental degradation have undermined the life support system for our and all other species. Dry rivers, severely polluted water bodies and land systems pushed beyond the ecological thresholds have created a continuous decline of ecosystem services. Since ecosystems are water dependent, they are easily impacted when water's functions in the life support system are being disturbed.

Photo: Thomas Henrikson/SIWI

The Swedish Society for Nature Conservation (SSNC), a Swedish environmental NGO with 181,000 members recently inducted Prof. Malin Falkenmark as an honorary member at a ceremony during the institute's 100th year anniversary on May 16,2009. The jury highlighted her internationally pioneering scientific work on water and environmental issues. Prof. Falkenmark has authored more than 400 publications and introduced pioneering concepts such as green and blue water and water scarcity/water crowding. She has been recognised as a Global 500 Laureate, and is a recipient of the Great Prize of the Royal Institute of Technology in Stockholm, the European Geophysical Society Henry Darcy Medal, the Crystal Drop Award of the International Water Resources Association, the International Hydrology Prize, and the Volvo Environmental Prize. She is currently Senior Scientific Advisor at SIWI and guest professor at the Stockholm Resilience Center.

Enormous driving forces increase our demand and dependence on ecosystems as our global life support system. Four mega-scale challenges must be addressed: water supply of growing cities; water for producing the food for another 2.5 billion people; water and climate change mitigation and adaptation; and water's role for economic growth and industrial production.

The overarching challenge is to avoid further undermining and secure long-term sustainability. The principal issue is the balancing of vital ecosystem functions and environmental sustainability while achieving the Millennium Development Goals, most of which are densely interlinked by water-related phenomena (See Figure 1).

A pathway has to be found through this nexus of interacting issues. Constructive and implementable proposals on what can be done to mitigate such impacts and resulting biodiversity decline are urgent.

The development process involves changing landscapes that present fundamental challenges for the social-ecological system in which we live. Water is needed to meet *societal needs* (municipal, industrial, irrigation, energy production, cooling and heating, etc.) and the land and vegetation components to meet *land-related needs*, including agriculture and biomass production (food production, biofuel production, forestry). Water's different roles in the landscape also result in linked impacts that result from human manipulation of water and land sources. Water-related environmental impacts include changed water flows and seasonality while the land manipulations relate to rainwater partitioning between vapour flow and liquid flow, altering river flow and seasonality, water table etc. These changes influence ecosystem determinants in ways that are difficult to avoid. The side effects tend to develop in steps. Impacts are felt first in the water and then spread to the organisms that depend on water and the ecosystems of which they are part. This ecological cascade may continue in a multi-scale fashion, producing distant effects, through e.g. atmospheric transport.

Towards better balancing of humans and nature

There are three main areas that will have to be addressed by ecosystem governance: land cover change, direct water use and massive waste production. *Land cover change* implies alteration of rainwater partitioning at the land surface between consumptive water use/evapotranspiration, surface runoff and groundwater recharge/dry season flow. *Direct water use* is the water withdrawn from rivers or aquifers, followed by a partitioning between consumptive water use and return flow. The consumptive use components tend to cause river depletion, which can now be seen over large areas of the planet. Many river basins are already or soon will be "closed", meaning that no more water can be withdrawn without even more serious effects on aquatic ecosystems. *Massive waste production* has come with socio-economic development in the past and resulted in a build-up of water pollution all over the world. This issue is serious in certain hot spots. Willful neglect of water pollution has made the problem quite difficult to get under control due to

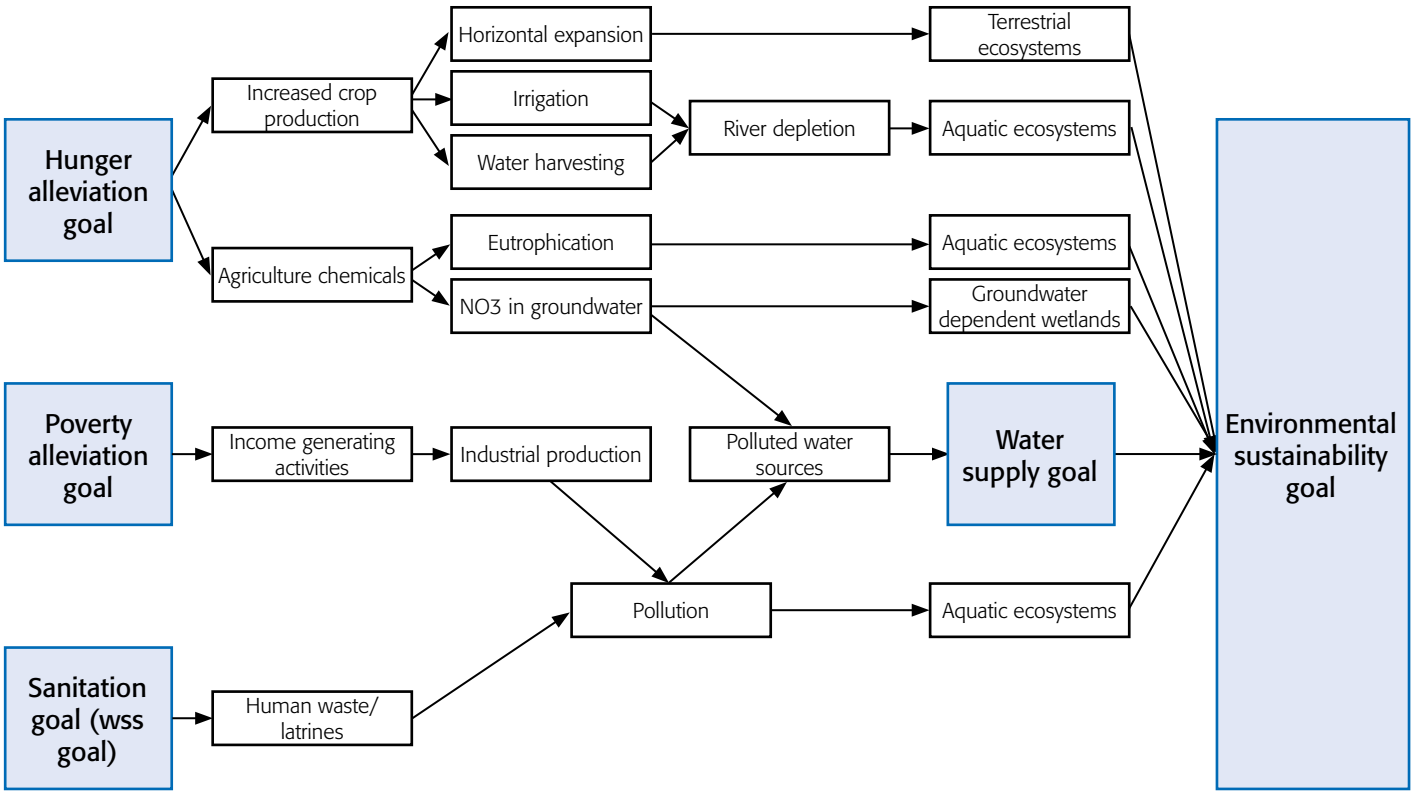

Figure 1. Water links many activities related to different Millennium Development Goals: societal water supply, income generation to alleviate poverty, food production to alleviate hunger, environmental sustainability, etc. (Falkenmark 2003, Millennium Project)

its close link to industrial activities, employment and economic development.

But water is not just a fundamental determinant for ecosystems and a mediator involved in translating landscape manipulations into degradation of ecosystems. The flows in the water cycle link all the different ecosystems within the unifying system of a catchment. To remedy the past shortcomings, adequate attention now must be paid to water's flow through the landscape so benefits are gained from this integrating function. This broader view of water should be captured in a catchment-based, integrated approach to governance that properly acknowledges fundamental land/water/ecosystem linkages. We also need to identify fundamental thresholds in related ecosystems; identify water's roles in resilience building; and introduce an "L" for "land use" in the IWRM-tool (Integrated Water Resources Management), turning it to ILWRM.

To secure a proper balancing of land, water and ecosystems, we must shift our perspective. In past, we have watched environments deteriorate, for instance the eutrophication of a lake, and then tried to react and repair them. With increasing pressure on water, land and environmental resources, a shift in thinking is absolutely essential to get out of this trap. A *future-oriented perspective* is urgent to minimise problems we can avoid and to strike trade-offs for those we cannot. The goal must be to balance humans and ecosystems and strive towards *ecohydrosolidarity*.

Photo: Getty Images

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Further Reading

Falkenmark, M. 2007. Good ecosystem governance: Balancing ecosystem and social needs. In: A.R.Turton et al, Eds. Governance as a trialogue: Government-society-science in transition. Springer Verlag 2007 pp 59-76

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