Green Water Credits

Policy Brief

Green Water Credits create an investment mechanism for farmers' water management activities that are at present unrecognized and unrewarded.
The goals are to safeguard land and water resources and to secure rural livelihoods.

Water scarcity is undermining our habitat, economy and society

It already threatens food security, health and development; shortage is increasingly felt in cities. On present trends, 2.8 billion people will be suffering absolute water shortage by 2025 and two thirds of the global population will be suffering water stress[1]. This is where climate change will strike first.

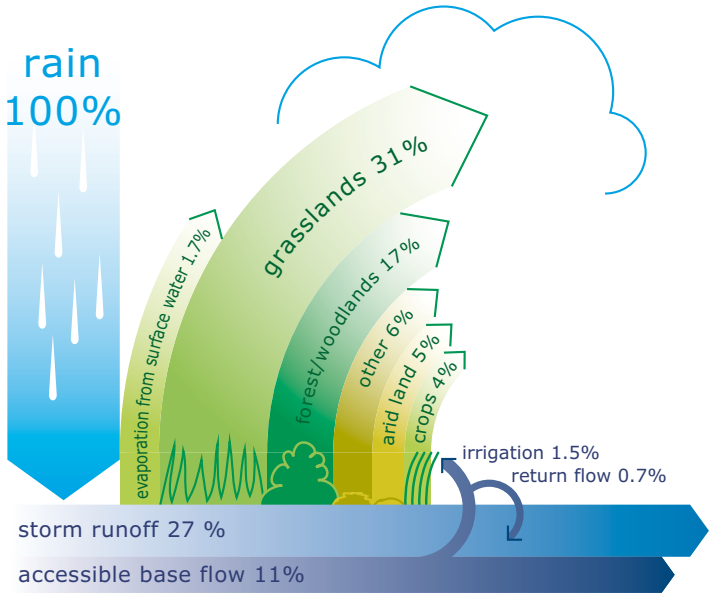

Figure 1 Green and blue water, global flows

We are caught unprepared

The source fresh water is rainfall; two thirds of which is held in the soil and used by plants - *green water*; only one tenth becomes accessible stream flow and groundwater - *blue water* (Figures 1 and 2).

Nearly all investment in water goes into abstraction of this easily accessible water. More than two thirds of the water abstracted is used for irrigation. Replenishment is neglected.

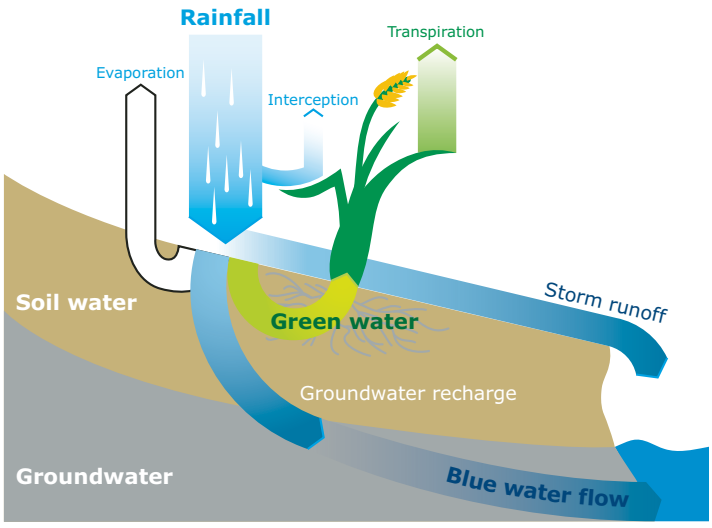

Figure 2 Partitioning of rainwater into green and blue water flows

A policy shift is needed ...

from coping with water scarcity to creating opportunities.

Management of the whole freshwater resource, including demands and uses even before the water reaches streams and groundwater, opens a wider stage for negotiation, trade-offs between competing claims, and action to optimize water flows.

Green water management: banking water in the soil

Water productivity can be significantly increased, the hazards of flood and drought mitigated, and rural livelihoods secured by two fundamental improvements in soil management: increasing infiltration of rainfall into the soil, thereby cutting storm runoff (Figure 3), and shifting unproductive evaporation to productive water use.

Figure 3 Storm runoff during heavy rain
Photo: Royal Tropical Institute

Figure 4 Soil erosion in farmland: sediment enters streams
Photo: Kenya Soil Survey

More infiltration means banking water in soils and aquifers which feed river base flow; less storm runoff means less soil and bank erosion, less flooding, and less siltation of streams and reservoirs (Figures 4 and 5).

Figure 5 Debris and sediment fills reservoirs
Photo: WOCAT

All this can be achieved by low-cost green water management (Figure 6).

Figure 6 Green water management techniques
Photos: WOCAT

Poverty is the constraint

Farmers are well aware of their private benefits from green water management - but they need immediate as well as long-term returns for their labour and material inputs. Where farmers are poor, with limited access to markets and low prices for their produce, poverty drives a preference for short-term returns – so that the short-term cost of green water management outweighs any long-term private benefits. Further incentives are needed for farmers to adopt and maintain best practice.

Green Water Credits bridge the incentive gap

Quite small, regular payments by downstream water users enable farmers to adopt sustainable management of land and water; at the same time, they combat rural poverty by diversifying income (Figure 7). This is a particular case of Payments for Environmental Services.

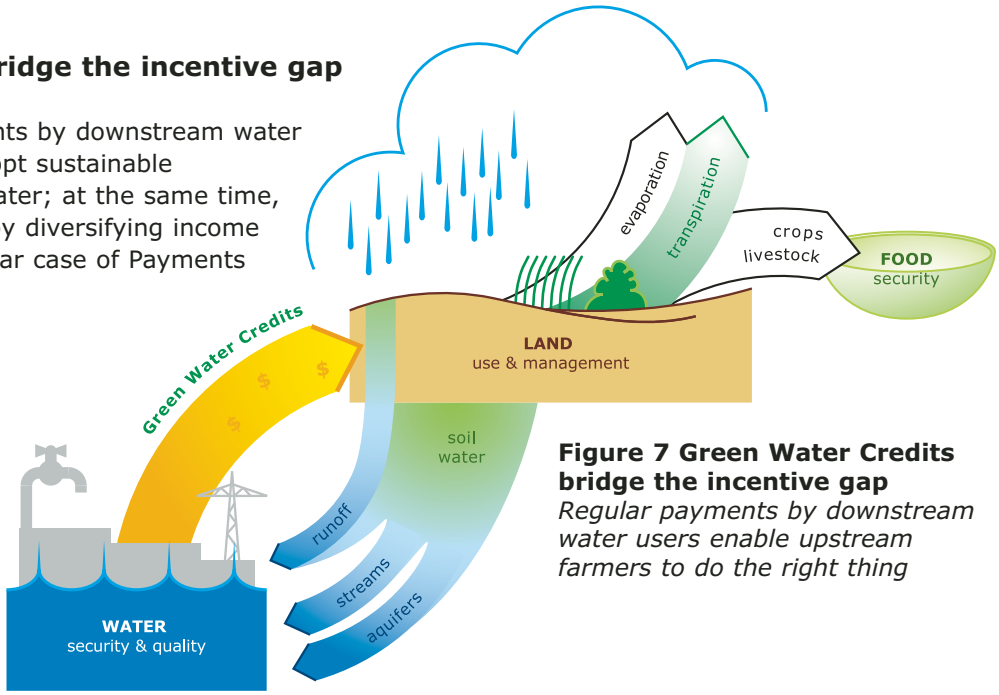

Figure 7 Green Water Credits bridge the incentive gap
Regular payments by downstream water users enable upstream farmers to do the right thing

The proof-of-concept in Kenya[2] demonstrates:

- Trade offs between upstream land use and management and downstream water availability, river regulation, and siltation of reservoirs;
- Practical ways to assess the resource, optimize water allocation, and appraise costs and benefits;
- The cost of green water management may be covered by the additional water revenues alone. For the Upper Tana, annual water benefits may reach $US 12-95 millions compared with costs of $2-20 millions; for a 20 per cent adoption scenario, annual water benefits are $6-48 millions and costs $0.5 to 4.3 millions.

How are Green Water Management and Green Water Credits different from soil and water conservation as it has been practised for half a century?

Generations of effort in soil and water conservation has made no appreciable difference to the degradation of land and water resources in most parts of the world because:

- It was never financially viable;
- Soil conservation has been handled by agricultural extension services, in isolation from water policy; it was seen as a benefit to farmers;
- Water management has been undertaken in isolation from land management by engineers and public utilities, concentrating on the very limited, easily-abstracted stream flow and groundwater- blue water;
- Green Water Management deals with water at source and flowing through the landscape; with rainfall; with green and blue water together;
- Green Water Credits is a financial mechanism in which the downstream users strike a deal with upstream land and water managers to maintain the resource and mitigate floods and droughts. Correcting the present market failure makes best practice financially viable. It also is the most practicable adaptation to climate change.

Proof of concept

In Kenya's Upper Tana catchment (Fig. 8), Green Water Credits is viable because of:

- Recognition of deteriorating land and water resources in the face of escalating demands on these same resources (Figures 9 and 10);
- Profitable downstream water users, willing and able to pay for water management in the catchment (Figure 11);
- The enabling framework of the 2002 Water Act, implemented by the Water Resources Management Authority requires water to be treated as an economic good.

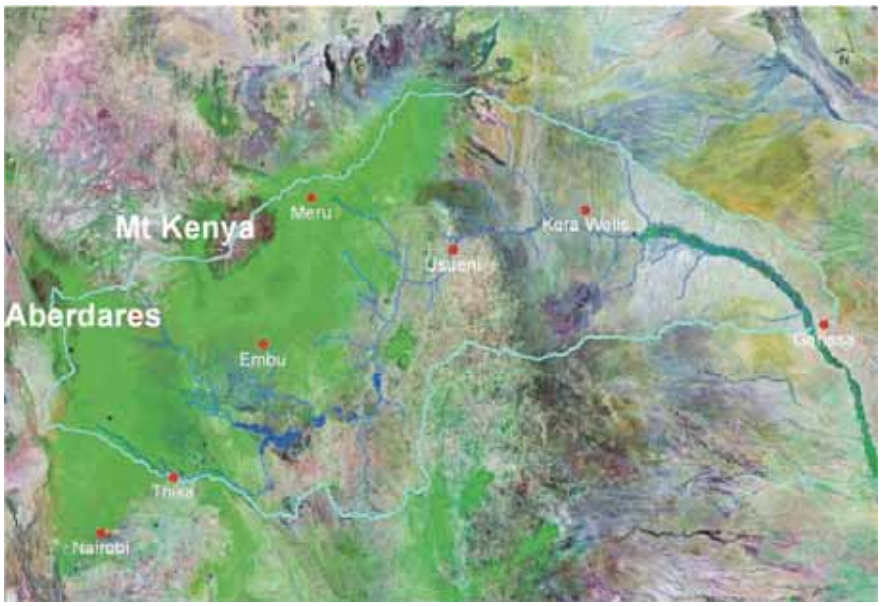

Figure 8 Upper Tana, Landsat image
True-colour image: well-vegetated, high-rainfall areas of Mt Kenya and the Aberdares Range appear green; catchment boundary overlaid in light blue, streams and reservoirs in blue

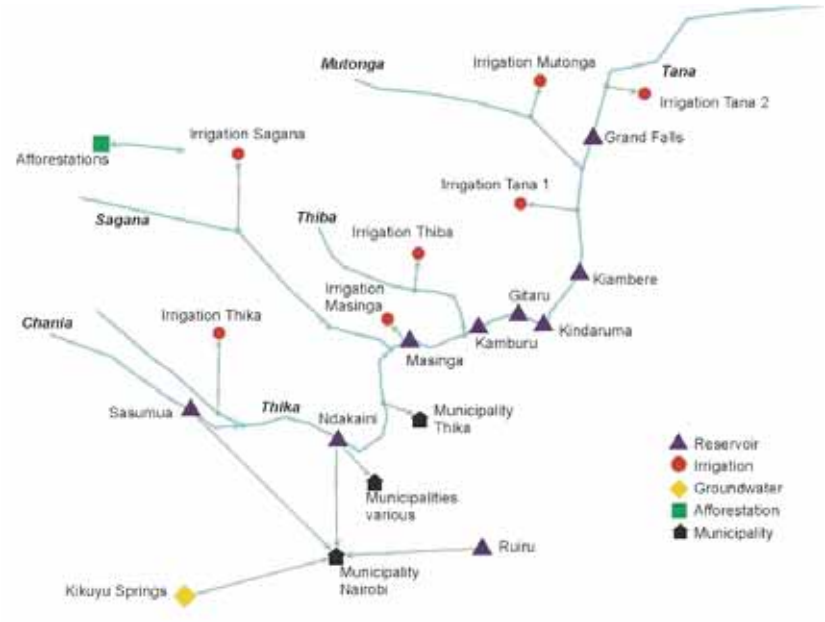

Figure 9
WEAP framework of water uses and supplies

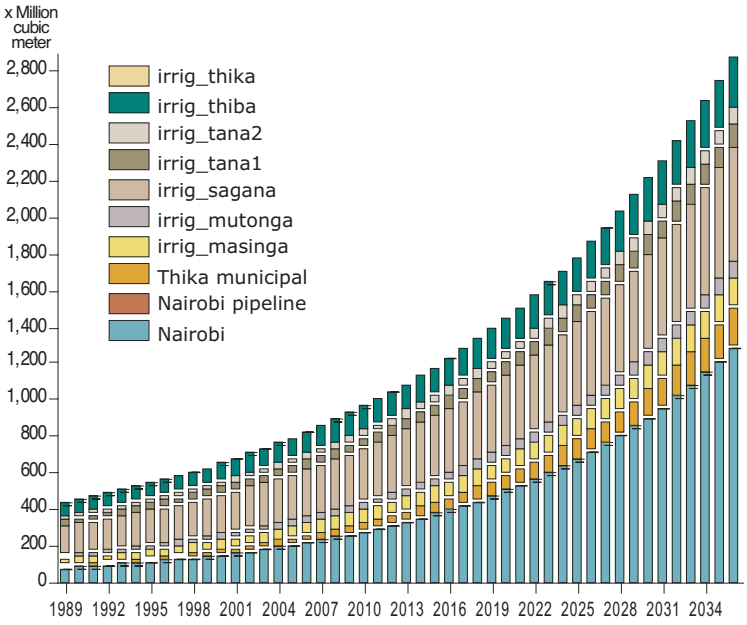

Figure 10
Water demand (business as usual) up to 2036

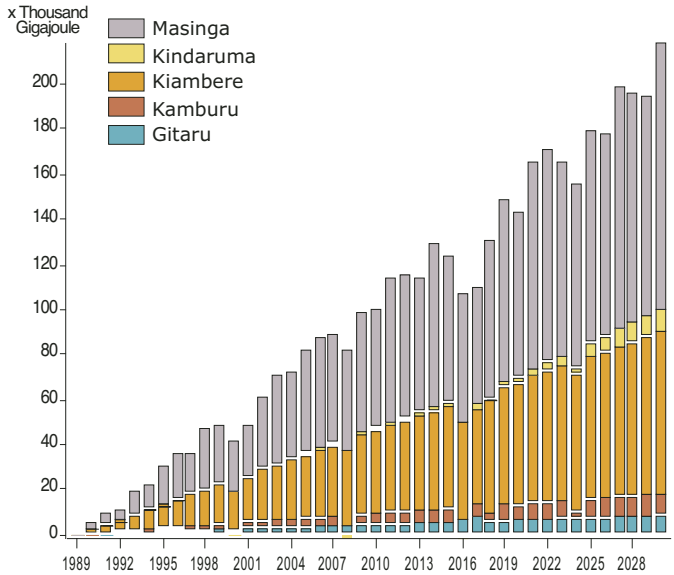

Figure 11
Increase in hydro-power generation for a green water management scenario compared with business-as-usual scenario
100 Gigajoules is equivalent to 51 000 barrels of oil

Operational steps

- Assess existing land and water rights and competing claims on the water resource.
- Assess the water resource, its value in all its competing uses, the costs of mismanagement, the extent to which green water management can optimize the resource, and the costs of this management (Figures 12 and 13).
- Establish a platform for negotiation between interested parties; ensure that each is well informed; seek optimum allocation; agree on a fair price;
- Establish a mechanism for collection and payment of credits, verification of claims, and settlement of disputes. Payments may be financed by a mix of water users and public utilities, insurers, and general taxation.

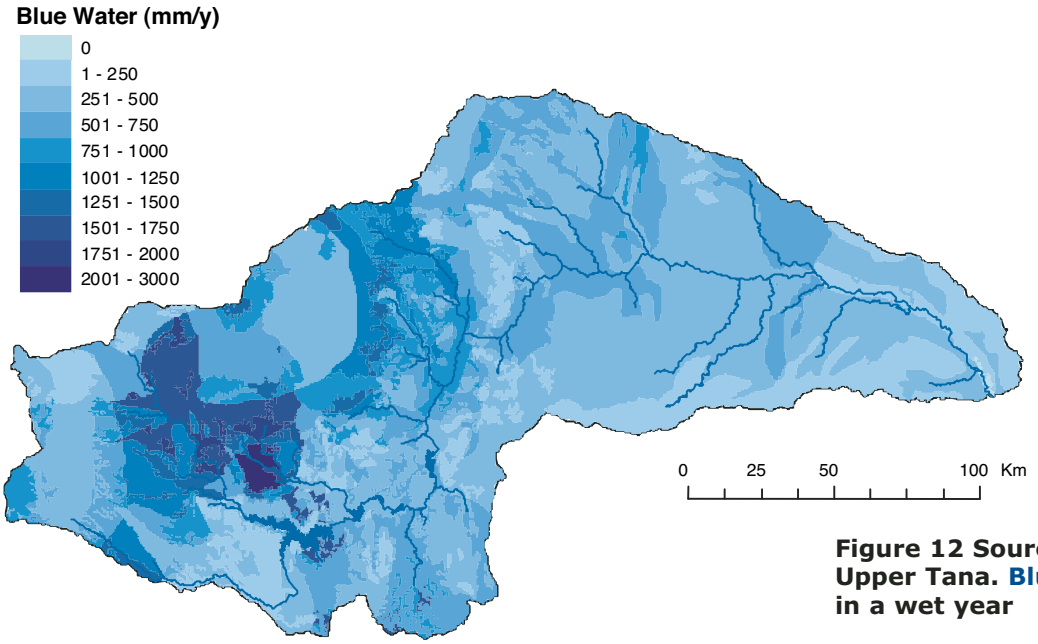

Figure 12 Source of water, Upper Tana. Blue water flows in a wet year

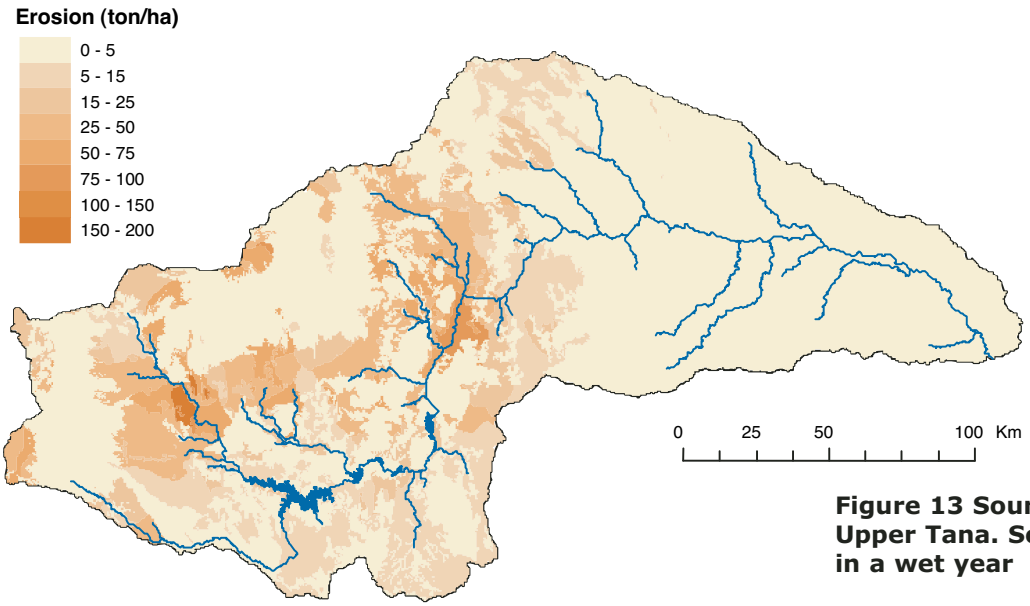

Figure 13 Source of sediment, Upper Tana. Soil erosion in a wet year

[1] *Water for food Water for life A comprehensive assessment of water management in agriculture*. IWMI/Earthscan London 2007

[2] *The spark has jumped the gap. Green Water Credits proof of concept*. Green Water Credits Rept 7, ISRIC - World Soil Information, Wageningen 2007

Ministry of Agriculture

Water Resources Management Authority

Kenya Agricultural Research Institute

University of Nairobi

Ministry of Water and Irrigation

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In Kenya, national agencies responsible for Green Water Credits include: Ministry of Water and Irrigation, Ministry of Agriculture, Water Resources Management Authority, Kenya Agricultural Research Institute, and National Agriculture and Livestock Extension Program.

Further information

ISRIC – World Soil Information – www.greenwatercredits.net
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