

# Business Case for Green Water Credits

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Green water credits create a market for farmers' water management activities that are at present unrecognised and unrewarded. The goals are to safeguard land and water resources and to secure rural livelihoods. The arithmetic of diminishing access to fresh water is inexorable: by 2025, 1.8 billion people will likely be suffering absolute water scarcity and two thirds of the world's population will be under water stress; shortage is increasingly felt in cities. Water scarcity is bound up with land degradation, climatic change and poverty – poor people in developing countries are most afflicted. Land degradation and water scarcity are two sides of the same coin and flooding, always blamed on climate change and rainfall, is actually caused by runoff from farmers' fields – so every land use decision is a water use decision. Over the last quarter century, a quarter of all land has been degrading – mainly in Africa south of the equator, SE Asia and South China; more than three billion people face land degradation and water scarcity and there is urgent need for strategies to enable them to better manage their land.

We can't make any more water but green water resources can be much increased and downstream delivery of blue water better regulated by increasing infiltration at the soil surface – cutting destructive runoff and banking this water in the soil – and by reducing unproductive evaporation: mulching can achieve 65-90% reduction in runoff and 25% reduction in evaporation; conservation tillage 30-90% reduction in runoff; tied ridges, terraces and water harvesting 50-100% reduction in runoff. By arresting runoff, these practices conserve the soil and increase groundwater recharge and stream base flow. Soil and groundwater are free reservoirs that hold orders of magnitude more water than all existing or conceivable man-made reservoirs, so green and blue water management should be the first response to climatic change.

Conventional approaches to watershed management have been tried and tried again – and found wanting. Governments don't have the capacity manage every acre, and the project cycle has no mechanism for extension to the national scale. The alternative is to create a market in water management services that will trigger responses by many individuals. Farmers are well aware of the benefits of good husbandry but the costs are real – and higher for poor farmers because poverty imposes a short time horizon. Green Water Credits address the market failure by bridging the incentive gap with payments for specified water management services – linking upstream water managers with downstream water users who will pay for proper land and water management. This is not a handout. And the cost is no more than the marginal cost of good husbandry as opposed to bad – a fraction of the cost of conventional development projects.

A proof-of-concept in the Tana basin, in Kenya, applied a locally calibrated basin hydrological model (SWAT) and a water allocation and planning tool (WEAP) to assess the feasibility of the financial mechanism. The costs of green water management may be covered entirely by the additional water revenues and extension of the life of reservoirs. In the Upper Tana, estimated annual benefits of full implementation of Green Water Credits are \$12–95 million compared with annual costs of \$2-20

millions (at constant prices). With a 20% adoption scenario, the annual water benefits are \$6-48 millions compared with costs of \$0.5–4.3 millions – a ten-fold return on the investment. Half of this benefit comes from hydro-power generation. No account was taken of the savings on sediment damage to hydro-power equipment, flood mitigation, higher crop yields, or environmental benefits. The distribution of benefits depends on contract negotiations between the buyers and sellers – but there are benefits enough to go round.

Planning for pilot operation of Green Water Credits is now under way in the Tana Basin, Kenya, and the Changjiang Basin, for the South-North water transfer project in China; and preliminary studies in the Sebou Basin in Morocco.