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## **Review: Creating a return flow of the multiple benefits of good soil and water management practices**

The impact of soil degradation on agricultural production has been a long-standing issue of concern and the subject of much research – primarily looking at local-level individual plots of land. In contrast, research to support payments for watershed services (PWS) initiatives has generally focused on forest conservation and impacts at landscape scales that have been difficult to quantify. However, recent research on forests and water (e.g. Bruijnzeel 2004) reinforces the need for a greater emphasis on soil and ground cover management, rather than simply on the presence or absence of trees. This is both because of the multiple benefits it provides for ecosystem and agricultural productivity, as well as for the large numbers of people who reside in upper catchment areas.

Nancy Johnson (manager of the “Water and People in Catchments” theme of the CGIAR Challenge Program on Water and Food), asserts that an agricultural focus also supports a more pro-poor approach to PWS because it does not involve trade-offs between environmental and income/production objectives. Building on existing plot-level case studies in which the onsite benefits of soil and water conservation have already been demonstrated, researchers with associated projects now aim to determine the extent to which these practices also have offsite, landscape level impacts. A second objective of CGIAR’s work is to bring researchers together who work at these different scales, as well as in different sectors and disciplines, to better support the development of PWS schemes.

Given the risks of adopting new conservation practices, for which the costs are immediate but the benefits accrue over a longer period of time, key challenges for research are to demonstrate offsite or landscape level benefits, and to determine what will it take to motivate farmers to consider these in land management decisions. At a workshop held in Nairobi, June 27-29 2006, participants provided an overview of achievements so far, and identified major research challenges ahead. Further discussions were held at an International Forum on Water and Food in Vientiane, Lao PDR, November 12-17 2006.

Dry soil is a major culprit in the loss of these benefits because it leads to loss of porosity, organic matter, and water retention capacity. Loss of these characteristics in turn reduces the capacity of the soil to regulate the flow of water and sediment, store carbon, and support ecosystem productivity. Fragile lands and soil quality are then further degraded by the increasing urgency and pressure to produce food. Conservation practices that raise food productivity and hence support improved soil quality can, therefore, also be expected to have downstream benefits.

In the watershed of Lake Fuquene in Colombia for example, conservation practices were shown to reduce erosion, improve water retention and increase farmers’ incomes. This was sufficient to increase the confidence of financial institutions, who then provided farmers with more credit, thereby helping to make adoption of these practices possible. In subsequent economic games played among upstream and downstream stakeholders, it was found that additional support could eventually be provided by downstream stakeholders, who expressed a willingness-to-pay for conservation management practice, as impacts are better quantified.

Among the promising cases for demonstrating landscape level benefits is the Quesungal Slash and Mulch Agroforestry System (QSMAS). This is a traditional approach practiced by over 6000

small farmers on 7000 ha in the Lempira region of Honduras. In comparison with neighboring areas, QSMAS has resulted in higher productivity and profitability. Other benefits have included greater resilience to extreme climatic events of both drought and excess water (as witnessed during the El Niño hurricane of 1997 and Hurricane Mitch, 1998), lower rates of erosion, and improved water retention capacity of the soil. Among the key challenges now is to demonstrate the benefits of these practices for downstream municipalities who source 60% of their water and 57% of their hydropower from the upstream supply.

But to gain the support of potential buyers and to expand the system to neighboring areas, it will also be necessary to obtain specific information about the barriers to these practices, and the kinds of economic incentives, capacity building and technical innovations that are required. Given the complexity that is typical of upland areas, this is not trivial. For example, a case study in the Nyando basin, Kenya found that the effectiveness of soil and water conservation measures varies from 10 to 95% depending on a number of factors including ecological conditions, land use, land tenure, farm size, profitability, household livelihood assets, contribution of agriculture to household income, and duration of settlement. An early assessment, in collaboration with upstream land users, of the circumstances can better address a major challenge identified at the Forum in Vientiane: to get the right science and other forms of knowledge, by asking the right questions, all of which is a prerequisite to getting the science right. Payments can then be targeted to where they are expected to have a greater influence on the adoption of soil and water conservation practices, and more confidence can be provided to buyers. For those facilitating the development of PWS initiatives, emphasis on soil management across landscapes presents the challenge of including more diverse land uses – beyond just the maintenance of forests – in payment schemes.

## References and further information

CGIAR [Challenge Program on Water and Food](#)

"Payment for environmental services (PES) approaches to contribute to equitable and sustainable management of soil and water in upper catchments" at ICRAF headquarters in Nairobi on June 27-29. [Workshop presentations and other materials](#).

Upland Agriculture as a provider of ecosystem services? Session 9. International Forum for Water and Food IFWF, Vientiane, Lao PDR, afternoon session, Tuesday November 14th 2006. [Abstracts and convener report](#).

[International Forum on Water and Food](#), The Challenge Program on Water and Food (CPWF) in Vientiane, Lao PDR from November 12 – 17, 2006, hosted by the Mekong River Commission (MRC).

Bruijnzeel, L. A. (2004) [Hydrological functions of tropical forests: not seeing the soil for the trees?](#) Agriculture Ecosystems and Environment, 104.

[National Workshop on Valuation of Ecosystem Services in Agriculture](#), October 27-28, 2005. Michigan State University, Kellogg Biological Station Long Term Ecological Research in Row Crop Agriculture. Sponsored by the National Science Foundation.

[International Conference on Sustainable Sloping Lands and Watershed Management](#), 12 to 15 December 2006, Luang Prabang, Lao PDR. Hosted by NAFRI, the National Agriculture and Forestry Research Institute of Lao PDR. Presentations, posters and abstracts.

[Comprehensive Assessment of Water Management in Agriculture](#), 2007. Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture. London: Earthscan, and Colombo: International Water Management Institute.

Robertson, G.P. and S.M. Swinton 2005. "[Reconciling Agricultural Productivity and Environmental Integrity: A Grand Challenge for Agriculture](#)." *Frontiers in Ecology and the Environment* 3(1): 38-46.

Scherr, S J. and McNeely J A. 2003. [Ecoagriculture: Strategies to feed the world and save wild biodiversity](#). Island Press, Washington DC

Wall, Diana H. (ed) 2004. [Sustaining biodiversity and ecosystem services in soils and sediments](#). SCOPE 64. Island Press, Washington DC

## **Announcement:**

### **Views sought on water ecosystem services and poverty reduction under climate change**

You are invited to take part in a short online survey to provide your views on the key research areas and delivery mechanisms that the UK Department for International Development (DFID) should focus on in its work on water ecosystem services and poverty reduction under climate change. The survey is available in English, French and Spanish can be taken by clicking on the links below. The online survey is part of a scoping study that IIED is undertaking on behalf of DFID - further details on the scoping study can be found on [IIED's project webpage](#).

[English survey](#)

[French survey](#)

[Spanish survey](#)

## **New Resources**

Greenhalgh S., Guiling J., Selman M., St John J. (2007) [Paying for Environmental Performance: Using Reverse Auctions to Allocate Funding for Conservation](#). WRI Policy Note , Environmental Markets: Reverse Auctions, No. 3

Greenhalgh S., Selman M., Guiling J., (2006) [Paying for Environmental Performance: Investing in farmers and the environment](#). WRI Policy Note, Environmental Markets: Farm Bill Conservation Programs No. 1.

Krchnak, K. (2007) [Watershed Valuation as a Tool for Biodiversity Conservation: Lessons Learned from Conservancy Projects](#).

RUPES [Global Event on Payments/Rewards for Environmental Services](#). Lombok Indonesia. January 22-27, 2007. Materials presented

Sayer, J. (2007) [Policy learning in action: developing markets for watershed protection services and improved livelihoods. Report of an evaluation](#). International Institute for Environment and Development, London, UK.

Smith, M., de Groot, D., Bergkamp, G. (2007) [Pay. Establishing payments for watershed services](#). IUCN, Gland, Switzerland, 109 pp.

WWF [PES InfoExchange](#), April 2007, (Year 3, No. 19) This issue contains a feature on “Taking Stock of the most advanced GEF-World Bank PES Projects”

[Latin American workshop on WWF payment for environmental services experiences and projects](#). February 2007. Proceedings and presentations on WWF's PES activities in the region.

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## About the Flows Bulletin

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