Overseas Development Institute

Natural Resource Perspectives 108

September 2007

where the land is greener – experiences contributing to sustainable land management

Gudrun Schwilch, Daniel Danano, Sudibya Kanti Khisa, William Critchley, Hanspeter Liniger

*There are numerous positive experiences that contribute to sustainable land management – but this wealth of information is often not tapped, and commonly not even recognised. The World Overview of Conservation Approaches and Technologies (WOCAT) is a network and a methodology with the aim of sharing this valuable knowledge to improve livelihoods and the environment. Forty-two promising case studies were recently documented and analysed in a global overview book entitled **'where the land is greener'** (WOCAT 2007), from which a consolidated list of policy points were drawn. This paper highlights some of these conclusions and policy points.*

Policy conclusions

- More sustainable land management (SLM) can increase income, improve food security, and sustain natural resource productivity at local level; at global and national levels it can safeguard natural resources and ecosystem services, preserve cultural heritage, and contribute positively where water scarcity, land use conflicts, climate change, and biodiversity conservation are concerned.
- There are no 'silver bullet' ways of improving SLM. The ecological, social and economic causes of degradation need to be understood, and technologies need to be responsive to change.
- Concerted efforts to standardise documentation and evaluation of SLM technologies such as soil and water conservation (SWC) are needed, especially in the light of the billions of dollars spent annually on implementation.
- SLM/SWC approaches also require long-term commitment from research and policy organisations, in order to allow joint learning, monitoring and evaluation, and adaptation.
- More attention should be given to local innovations rather than focusing on project-based implementation of standard technologies.
- Prevention and mitigation of degradation are less costly and should be prioritised over rehabilitation.
- Further research is needed to quantify and value ecological, social and economic impacts of SWC, both on-site and off-site, and to develop methods for the valuation of ecosystem services.
- The enabling environment to support SWC investments should build on people's and nature's capacity, not overlooking indirect measures such as credit, market opportunities, legislation and security of land use rights.
- SWC may require heavy investment costs beyond the capacity of land users, but direct material incentives should only be considered to overcome initial investments and where environmental improvements and social benefits are likely to be realised only in the long term.

Background

The productivity of some 23 per cent of all usable land has been affected by human-induced soil degradation (UNEP 1997; Oldeman et al. 1990). Land users and soil and water conservation (SWC) specialists have a wealth of knowledge related to land management, improvement of soil fertility and protection of soil, water and vegetation resources, but the implementation of good practice still lags far behind: much knowledge about potential improvements is poorly documented and thus inaccessible both to other practitioners, and to those concerned with analysis, evaluation and dissemination.

It was in this context that WOCAT was founded, in 1992, as a global network of SWC specialists, and with the aim of developing standardized tools for documenting, monitoring and evaluating SWC know-how and for disseminating it around the globe as a means of facilitating the exchange of experience. The database developed by WOCAT currently comprises datasets on 400 technologies and 260 approaches from over 40 countries, of

Sida

This series is published by ODI, an independent non-profit policy research institute, with financial support from the Swedish International Development Cooperation Agency, Sida. Opinions expressed do not necessarily reflect the views of either ODI or Sida.

which a subset of 190 technologies and 110 approaches are quality assured. Approximately 60 participating institutions meet annually, help to further develop the WOCAT methodology and network and conduct relevant research and training. They use self-evaluation in a joint effort with land users and researchers, and use SWC/SLM knowledge to make informed choices and influence policy.

Box 1: Soil and Water conservation technologies in action

In Kenya, "more people mean more trees". Against all the conventional wisdom, small scale farmers around Mount Kenya are planting a multi-purpose tree called the "Silky Oak" (*Grevillea robusta*), often along farm boundaries or on terrace risers, occasionally scattered in cropland. The ancient forest may have disappeared, but a new agroforestry landscape has been created.

In Australia, sugar cane farmers have started harvesting their cane without burning it and simultaneously spreading the separated residues, leaving a dense mulch cover, the so called green cane trash blanket. The advantages: less greenhouse gas produced, improved biodiversity in the soil, and eroded sediment no longer pollutes the Great Barrier Reef.

Source: WOCAT (2007)

From case studies to policy points

A compilation of 42 **case studies**, each describing a technical intervention (from traditional to innovative) in conjunction with a specific implementation approach (from project-promoted to spontaneously), has recently been published by WOCAT (2007), including a thorough analysis, solid conclusions and practical policy guidance. The **analysis**, enriched with knowledge of additional technologies and approaches, provides an insight into what underpins successful and/or widespread examples of natural resource management (NRM). It seeks to present a balanced critique, drawing on a wide range of examples, regions and land use systems.

The **policy points** deriving from these case studies reflect 'what' needs to be done to improve how money is being spent for improved land management and environmental protection, whilst improving the livelihoods of people in rural areas, rather than 'how' it can be achieved. Similar compilations have been produced at national level in Bangladesh and Ethiopia (see Boxes 2 and 3).

Soil and water conservation technologies – measures on various land use types and their impacts

Most SWC efforts have been made on cropland, and out of 42 technologies presented by WOCAT (2007), 36 are applied under rainfed conditions. Although poor irrigation practices and associated problems (e.g. salinisation) are widespread, measures for the sustainable use of irrigated land have not yet been adequately identified and documented. Only three cases are concerned with grazing land, and none with forest land. Despite the fact that the livelihoods of many rural people are based on livestock production and are often located in dry and marginal areas, SWC investments are insufficient, in these locations and often hindered by common property problems.

An overarching lesson is that prevention or mitigation are generally more cost-effective than rehabilitation. Other lessons learned can usefully be broken down by agro-ecological characteristics: in dry areas, investments in water harvesting and improved water use efficiency, combined with improved soil fertility management, should be emphasised to increase production, reduce the risk of crop failure, and lower the demand for irrigation water. In humid areas, long-term investments are required to maintain soil fertility and minimise on-site and off-site damage caused by soil erosion. Conservation measures leading to increased soil organic matter and thus carbon sequestration represent a win-win scenario: land resources are improved at the local level and at the same time a contribution is made to the mitigation of climate change.

A useful distinction can be made among agronomic, vegetative, structural and management measures. *Agronomic* measures, such as manuring / composting and crop rotation can easily be integrated into daily farming activities. They are not perceived as an additional 'conservation' burden, as they require comparatively low inputs and have a direct impact on crop productivity. Many *vegetative* measures are both traditional and multipurpose: agroforestry systems have conservation effects through e.g. ground cover, but can also be directly useful for production of fodder, fruits, nuts, fuelwood and timber, as well as for nitrogen fixation. Successful SWC associated with intensive and diverse smallholder agroforestry systems can in some areas result in 'more people, more trees' (Box 1). Where vegetative measures compete with crops for nutrients, water and land, and are not directly productive (e.g. vetiver grass lines and windbreaks), the vegetation needs to be carefully managed, e.g. through pruning. *Structures* are hardly ever adequate on their own, and commonly involve high investment costs. Thus, terraces on steep slopes need to be complemented by agronomic and vegetative measures. The greater cost-effectiveness of agronomic and vegetative measures and their additional benefits — such as soil cover, soil structure and soil fertility improvement — means that they should be given priority over structures. *Management* measures are especially important on grazing land (e.g. area closure). More than half the technologies presented by WOCAT (2007) are combinations of various agronomic, vegetative, structural and/or management measures. Whether overlapping, or spaced over a catchment/landscape, or over time, such measures tend to be the most versatile and the most effective in difficult situations. They support each other and often address multiple degradation types.

Soil and water conservation approaches – enabling and stimulating implementation

The documented case studies span a wide variety of different approaches: about two thirds of the technologies are implemented under a project, while the others are based on local traditional systems, and individual initiatives. Two thirds of the case studies relate to small-scale farming systems. 31% are associated with subsistence farming. There are a number of preconditions for success, including a focus on production aspects, security of access, long-term commitment and investment, participation of stakeholders, capacity building, and a willingness to draw on human resources: people's knowledge, creativity and initiative. The analyses made clear that local innovation and traditional systems offer at least as much potential as project-based SWC experimentation. SWC requires long-term commitment from national and international implementation and research institutions. Here a clear strategy and partnership alliances are needed to sustain results beyond the project life-span.

Three quarters of the 'SWC' cases analysed are directly related to increasing productivity and/or farm income, with conservation coming in as a spin-off, so it is essential to identify the scope for conservation in parallel with economically-driven change. Generally, it is assumed that SWC implies high investment, but there are examples of conservation agriculture which are both cost- and time-saving. However, costs and benefits are difficult for contributors to assess and may not be free from bias.

Box 2: Natural resource conservation approaches and technologies in Bangladesh

Bangladesh Conservation Approaches and Technologies (BANCAT, www.bangcat.org) was established in 2004. It is a network of SWC and other NRM specialists. BANCAT aims to achieve healthy hill ecosystems with well-managed natural resources linked to improved and secure livelihoods of the people of Chittagong Hill Tracts (CHT) in particular and Bangladesh in general. Despite growing population pressure on the limited hilly land resources in CHT accompanied by land ownership conflicts and a non-conducive national policy regime, CHT farmers have managed to improve their farming and livelihood conditions by adopting appropriate (traditional and new) conservation farming approaches and technologies. However, most of their knowledge remains undocumented and so has not been shared. Through an integrated approach using WOCAT tools, BANCAT aims to explore, evaluate and document SWC approaches and technologies, to facilitate research and education, to build capacity for SWC documentation and dissemination including quality assurance, and to bridge the information gap between policy-makers and SWC practitioners. It also helps SWC and NRM specialists to share knowledge and assists them in their search for SLM technologies and approaches. An overview of 39 technologies and approaches for BANCAT (Khisa et al., 2006) is expected to contribute towards bridging important gaps in knowledge.

BANCAT is also committed to contribute to the implementation of UN Conventions, such as those on desertification, climate change, and biodiversity. BANCAT also works closely with WOCAT, HIMCAT (Himalayan Conservation Approaches and Technologies) and WASWC (World Association of Soil and Water Conservation) in pursuit of the Millennium Development Goals.

The establishment of an enabling environment is extremely important in the promotion of SWC, emphasising the 'pull' (motivation), e.g. better marketing channels or secure access to land, as well as the 'push' (enforcement), e.g. SWC legislation and national campaigns. Opportunities need to be seized that connect SWC with emerging environmental priorities – especially carbon sequestration (by increasing soil organic matter), biodiversity, conservation, watershed management and ecosystem service provision. Ways of recognition and payment for these services need to be further explored to justify SWC investments. Fair prices, certification, and labelling schemes for products can stimulate conservation. But the case studies showed that direct material incentives (money, inputs, etc.) should be used carefully – in 15 out of the 20 project-based case studies direct incentives did not play a major role. At best they offer a step-up to impoverished farmers, at worst they can distort priorities and by creating dependency and pseudo-interest in SWC.

Training and extension advice are key elements of project-based approaches. There has been a general switch to more participation, devolution of powers, and less authoritarianism. But increased empowerment requires enhanced capacity. Investment in training and extension to support the capacity of land users and other local and national stakeholders must be a priority to adapt better to changing environmental, social and economic conditions, and to stimulate innovation. Local innovation and farmer-to-farmer extension have proven to be wide-spread, effective and appropriate strategies, which are not yet sufficiently recognized.

Conclusions

The WOCAT (2007) review of selected SWC technologies and approaches reaches a number of general policy conclusions which will require local adaptation: some are new; others confirm what is already known but deserves re-emphasising.

Knowledge management – the basis for decision support

Concerted efforts to standardise documentation and evaluation of SWC technologies and approaches are justified, given the billions of dollars spent annually on implementation. Scattered knowledge about SWC needs to be identified, documented and assessed via a systematic review process that involves the joint efforts of land users, technical specialists and researchers. Once documented, experiences with SWC need to be made widely accessible so that land users, advisors and planners can review 'baskets' of options. New SWC efforts should build on existing knowledge from within a location itself or, alternatively, from similar conditions and environments elsewhere. There is need for a standardised methodology – like the WOCAT tools – to facilitate comprehensive data collection, knowledge management and dissemination.

Monitoring and evaluation – improve SWC and justify investments

Monitoring and evaluation (M&E), especially of the technical efficiency and cost-effectiveness of SWC technologies and approaches, are weak spots. Likewise, traditional land use systems and local land management innovations are rarely documented or assessed for their conservation effectiveness. M&E can lead to important changes and modifications in approaches and technologies: nearly all (17 of 20) of the project-based approaches presented by WOCAT (2007) reported changes as a result of M&E. SLM/SWC initiatives are constantly evolving. Land users have to be involved in M&E: their judgement of the pros and cons of SWC interventions is crucial. More investment in training and capacity building is needed for M&E, for impact assessment, and to improve skills in knowledge management including the dissemination and use of information. Although several countries and regions have land degradation maps, mapping of SWC efforts and areas under SLM has been badly neglected. Such mapping can enhance awareness of what has been achieved and where, as well as justifying further investments and guiding decision-making.

Complexity and knowledge gaps – the role of research

The problems of land degradation are complex and so are the solutions. Effective SWC depends on suitable technologies and

Box 3: WOCAT and Sustainable Land Management in Ethiopia

Ethiopia is one of the countries in Sub-Saharan Africa most seriously threatened by land degradation, and addressing this problem has been consistently identified as a major priority in virtually all national strategies and policy documents. Land degradation has posed an acute challenge to rural livelihoods and threatens the integrity and function of ecosystems of national and global significance. There is a close relationship between land degradation, drought, crop failure and malnutrition in Ethiopia.

The government of Ethiopia, with donor assistance, has recently designed a Country Partnership Program for Sustainable Land Management in Ethiopia (CPPSLM) with the aim of conserving and restoring landscapes of national and global ecologic, economic and social importance through the adoption of sustainable land management policies, practices and technologies. CPPSLM adopted WOCAT tools for its knowledge management system. Its components include: institutional strengthening, scaling up of best practices, developing a land monitoring system and establishing program coordination and management. The scaling-up of best practices will be based on a compilation done by EthioCAT (Ethiopian Overview of Conservation Approaches and Technologies) of 52 technologies and 28 approaches common in Ethiopia. Emphasis is placed on cost-benefit analysis, especially given the time needed for a return on investments.

approaches, and on flexibility and responsiveness to changing complex ecological and socio-economic environments. It is therefore important to understand the ecological, social and economic causes of degradation, to analyse what works and why, and how to modify and adapt particular technologies and approaches to locally specific circumstances and opportunities. Valuation of the ecological, social and economic impacts of SWC, both on- and off-site, is urgently necessary, as is the development of methods for the valuation of ecosystem services. This, and the further development of tools and methods for knowledge exchange and improved decision support, should be undertaken jointly with land users, scientists from different disciplines and decision-makers.

SWC technologies and approaches – improving impact and supporting implementation

It is commonly assumed that enough is known about SWC technologies, and that it is just a question of applying them. However, adaptations to technologies and approaches are often necessary to match them to locally specific social, political, economic and environmental circumstances and opportunities. Measures often need to be combined to become cost-effective. Evidence has shown that adaptations of local innovations often perform better and are more readily integrated into a land use system than introduced 'standard' SWC technologies. Direct material incentives have a limited role and good enabling environments have to be in place (e.g. land policy).

Overall policy – investing in SWC for ecosystem, society and the economy

The cases presented by WOCAT (2007) demonstrate the value of investing in rural areas.

Ecologically, SWC technologies can effectively combat land degradation. But a majority of agricultural land is still not sufficiently protected, and SWC needs to spread further. Beyond soil erosion and water loss, potential ecosystem benefits include regulation of watershed hydrological functions – assuring base flows, reducing floods and purifying water supplies – as well as carbon sequestration, and preservation of biodiversity.

Socially, SWC helps to improve food security and reduce poverty, both at household and national levels. It can also support social learning and interaction, build community spirit, preserve cultural heritage, and counterbalance migration to cities.

Economically, SWC pays back investments made by land users, communities or governments. Agricultural production is safeguarded and enhanced for small-scale subsistence and large-scale commercial farmers alike, as well as for livestock keepers. Furthermore, the considerable off-site benefits from SWC can often be an economic justification in themselves.

From a policy perspective, investment in rural areas, natural resource management and sustainable land use is a local concern, a national interest, and a global obligation. SLM has to be a core pillar of any rural development and agricultural policy, or investments in poverty reduction based on improving agriculture's performance may fail. Stronger representation of SLM concerns in national high-level policy documents such as Poverty Reduction Strategy Papers needs to be achieved (Bojö & Reddy, 2003). Given the political dimensions of SLM (Hurni et al, 2006), global environmental problems require international coordination. A major challenge (and opportunity) at all levels will be to learn from properly documented and evaluated experiences on SLM and SWC and apply this learning in current and future efforts towards sustainable management of natural resources.

References

Bojö, J. and Reddy, R., (2003) 'Status and Evolution of Environmental Priorities in the Poverty Reduction Strategies: An Assessment of Fifty Poverty Reduction Strategy Papers' *Environmental Economics Series 93*. World Bank Environment Department, Washington.

Hurni, H., Giger, M., and Meyer, K., (eds) (2006) 'Soils on the global agenda' in *Developing international mechanisms for sustainable land management*. Centre for Development and Environment, Bern.

Khisa, S.K., Shoaib, J.U., and Khan, N.A., (2006) *Selected Natural Resource Conservation Approaches and Technologies in the Chittagong Hill Tracts*. Bangladesh, BANCAT, CHTDB, Khagrachari.

Oldeman, L.R., Hakkeling, R.T.A. and Sombroek, W.G. (1990) *World map of the status of human induced soil degradation: An explanatory note*. International Soil Reference and Information Centre, Wageningen.

UNEP (1997) *World Atlas of Desertification. Second edition*. Co-ordinating editors: Nick Middleton and David Thomas. Arnold, London.

WOCAT (2007) '*where the land is greener*': Case studies and analysis of soil and water conservation initiatives worldwide. Editors: Hanspeter Liniger and William Critchley. Associate editors: Mats Gurtner, Gudrun Schwilch, Rima Mekdaschi Studer. CTA, Wageningen.

WOCAT (2004) CD-ROM V3: World Overview of Conservation Approaches and Technologies. FAO Land and Water Digital Media Series 9 (rev.). FAO, Rome.

Gudrun Schwilch *and* ***Hanspeter Liniger*** *are research scientists at the Centre for Development and Environment (CDE), University of Bern, Switzerland. Email: gudrun.schwilch@cde.unibe.ch hanspeter.liniger@cde.unibe.ch*

Daniel Danano *is the head of the Soil and Water Conservation Division of the Ministry of Agriculture and Rural Development, Addis Ababa, Ethiopia. Email: ethiocat@ethionet.et*

Sudibya Kanti Khisa *is Program Coordinator, Natural Resource Management at Bangladesh Social Advancement Program (BISAP), Chittagong, Bangladesh. Email: skhisha@yahoo.com*

William Critchley *is Coordinator of the Natural Resource Management Unit, CIS/Centre for International Cooperation, Vrije Universiteit Amsterdam, The Netherlands. Email: wrs.critchley@dienst.vu.nl*

WOCAT (**www.wocat.net**) is mainly funded by the Swiss Agency for Development and Cooperation (SDC). '***where the land is greener***' was co-financed by SDC, UNEP, FAO, DANIDA, Syngenta Foundation for Sustainable Agriculture, and the Technical Centre for Agricultural and Rural Cooperation (CTA).

odi

Overseas Development Institute

111 Westminster Bridge Road, London SE1 7JD

Tel: +44 (0)20 7922 0300

Fax: +44 (0)20 7922 0399

Email: nrp@odi.org.uk

Natural Resource Perspectives present accessible information on current development issues. Readers are encouraged to quote from them or duplicate them, but as copyright holder, ODI requests due acknowledgement. The Editor welcomes manuscripts for this series.

www.odi.org.uk/nrp

Series Editor: John Farrington

Administrative Editor: Jojoh Faal

ISSN 1356–9228