TOWARDS SUSTAINABLE LAND MANAGEMENT – 'COMMON SENSE' AND SOME OTHER KEY MISSING ELEMENTS (THE WOCAT EXPERIENCE)

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Abstract
A recent review of the data gathered for the World Overview of Conservation Approaches and Technologies (WOCAT) program provided an opportunity to identify a number of the key elements, which if missing, will limit the effectiveness of local efforts to achieve sustainable land management. The key issues addressed are: common sense and critical questioning, preconceptions, biases and wishful thinking, poor understanding of land degradation processes, lack of impact assessment of conservation, lack of a holistic assessment and failure to understand the context, insufficient use of land users' own experiences, and the inflexibility of proposed solutions. A review of the WOCAT database indicates a wealth of untapped knowledge but also knowledge gaps, especially concerning the coverage and impact of soil and water conservation (SWC). The methodology and tools developed by WOCAT have been used by SWC specialists for critical sharing and review of their often fragmented knowledge, development of a database, identification of gaps and contradictions, and questioning and evaluation of their current perceptions and field experiences. This process builds understanding and capacity to support successful advancement of SWC and helps to avoid expensive and demoralizing mistakes.

Additional Keywords: soil conservation, documentation, evaluation, knowledge

Introduction
Any objective assessment of past efforts to promote sustainable land management will show that soil and water conservation specialists have all too often failed to achieve their intended objectives of controlling and reversing problems of land degradation. If land users, governments and donors are to be convinced that they should continue investing in sustainable land management activities, it is important to determine why many of the field-level technologies advocated and the development approaches used have not had the expected beneficial environmental and socio-economic impact. A recent review of data gathered for the World Overview of Conservation Approaches and Technologies (WOCAT) program provided an opportunity to identify a number of the key elements which, if missing, will limit the effectiveness of local efforts to achieve sustainable land management. Based on the WOCAT review and the authors' own field experience, this paper critically outlines key missing elements and the need to address them. The basic assumption and starting point for WOCAT is that a wealth of available but undocumented information needs to be compiled, evaluated, exchanged and used. The present paper focuses on knowledge gaps and misconceptions that must be addressed to enhance capacity building and use of existing knowledge.

The WOCAT methodology and tools
The World Overview of Conservation Approaches and Technologies (WOCAT) program was initiated during the 1992 ISCO conference, held in Sydney, Australia. Prior to the initiation of WOCAT, sharing of existing knowledge on the use of soil and water conservation (SWC) technologies and approaches was largely ad hoc, based on personal contacts and/or the proceedings and deliberations of international workshops and conferences. WOCAT was established with the aim of making a substantial contribution to sustainable land management (SLM) by facilitating local and international exchange of experience and lessons learnt. To do this, WOCAT has developed an internationally recognised standardised methodology, involving a set of three comprehensive questionnaires, for documentation and evaluation of individual SWC technologies and approaches, including area coverage. It has also created and maintained a global database system for storage, retrieval and dissemination of documented information (Liniger et al. 2002a, b, Van Lynden et al. 2002, WOCAT 2003, WOCAT 2004a, b)

Since Sydney, WOCAT has grown from the efforts of just a few soil and water conservation (SWC) specialists to become a truly global network of collaborating national and international institutions and individual experts. Currently, WOCAT tools are being used to document over 300 SWC technologies and 200 approaches in almost 40 countries in Africa, Asia, the Middle East, Europe and South America. To date, over 30 national and international WOCAT workshops have been held to develop and improve the methodology, train users, and enhance the network. While WOCAT provides a common platform and standardised methodology for the exchange of information and experience, it aims to allow flexible use of its outputs so that they can be adapted to different end

users and different bio-physical, socio-economic and institutional environments. The methods and tools developed and the experience garnered by WOCAT to date are available in books, reports and papers (Linger and Schwilch 2002, Liniger et al. 2002 a, b and van Lynden et al 2002), and are accessible in 3 languages (English, French and Spanish) on the Internet and on CD-ROMs (WOCAT 2001, WOCAT 2004a, b). Moreover, some WOCAT tools have been translated and are now available in six additional languages. One WOCAT output is overview books that present case studies of SWC technologies and approaches, along with an analysis of how and where they work, their strengths and weaknesses, etc. Most of the experience described in this paper comes from a recent compilation of over 30 examples from all over the world, (Liniger and Critchley, forthcoming).

Common sense and critical questioning

Surprisingly, many of the failings in past sustainable land management efforts stem from insufficient use of common sense. In many cases there is an over-reliance on assumptions when identifying area-specific problems, deciding on solutions, and anticipating specific benefits. The designers of a soil conservation project in central Tanzania stated that the project's activities would lead to farmers doubling their yields. During project implementation, visitors were regularly told by project management staff and farmers that yields had doubled. Given that livestock had been excluded from the area, farmers could not afford to replace previously available animal manure with purchased fertiliser, and the project offered no alternative fertility enhancing practices. Common sense should have raised the question, "how is it possible to achieve and sustain such a yield increase?" It was only during a technical evaluation mission, some 22 years after start up, that the standard project response was questioned, and subsequent informal probing of farmers revealed that yields had actually halved.

All aspects involved in soil and water conservation need to be questioned critically. How and why does it (not) work? Under which conditions? What is the reasoning of the land user and the SWC specialist? Often obvious contradictions which could not be explained (or did not make sense) were found. However, the information is only convincing and useful if these contradictions can be clarified. In one case study, water erosion was listed as the major degradation problem. An examination of slopes showed that SWC measures were applied on completely flat slopes. When questioned about it, respondents replied that it was actually not water erosion but salinization. In another technology, costs of US$ 1221 per hectare were indicated. When the authors were asked to list the activities and materials involved, it was apparent that the first figure given was 10 times too high. In other cases the costs initially given were more than 10 times too low. This makes quite a difference for land users and for project implementation..

Whereas at the beginning questioning was seen as a nuisance and a serious weakness of WOCAT, it also showed that an interactive dialogue between the authors of the information and users is necessary and beneficial for both. Sharing knowledge AND knowledge gaps helps to improve the quality of data as well as the user's understanding. The greater the interaction between providers of information and users, the better the result. This process is facilitated through the WOCAT network.

Preconceptions, biases and wishful thinking

A failure to recognise preconceptions and biases may result in wrong assumptions concerning the real problems, with the result that efforts to control land degradation are targeted in the wrong direction. In Northern Nigeria there is a widely held perception that agricultural production is threatened by the Sahara desert advancing southwards. In reality the problem of declining farm productivity is caused by in-situ land degradation, rather than an external threat of engulfment from sand dunes advancing into the country from Niger. This misconception about the real problem has led to proposals for planting a broad shelter belt to halt the Sahara desert at Nigeria's northern boundary. In reality it would be more cost effective to invest in addressing the local on-site degradation processes that are the direct cause of declining farm productivity.

The review of WOCAT data showed that the section on land degradation was rarely completed on the basis of field observations and interviews with land users, even though this would have provided a more accurate assessment of the different land degradation types. When undertaken as a purely desk-top exercise, the tendency has been to tick the boxes that match the author's preconceptions of the problem, which may or may not be correct. The various erosion boxes are invariably ticked, but other land degradation types are commonly overlooked. This seems to reflect a common bias towards seeing soil erosion as the main problem, rather than the consequence of other less obvious degradation processes.

In terms of conservation measures, there is still a widespread overemphasis on structural measures rather than recognition of the importance of agronomic, vegetation and management measures. Even when structures are part of the technology, the importance of vegetative measures, e.g. trees and grasses enforcing ditches, bunds and terraces, is often underestimated. Likewise the conserving effect of agronomic measures alone and combined with structural measures is often not sufficiently recognized, e.g. when cropland is ploughed and planted along the contour or even when mulch is applied.

Many projects are based on the assumption that once particular technologies and approaches have been implemented, land degradation problems will be solved. However, this may be 'wishful' thinking rather than something based on hard data. Project activity monitoring typically focuses on comparing project targets against actual accomplishments, e.g. hectares of land to be conserved or metres of bunds/storm drains to be constructed. It is common to find that, once a soil conservation project has been completed, it is assumed that degradation has been arrested and that the land is improving. However, it is rare that any environmental impact monitoring is undertaken to determine whether such an assumption is valid. During field visits to many of these so-called controlled areas, it was observed that, far from being controlled, soil erosion and other degradation processes may be continuing, and in some cases have been made worse by poorly designed and installed conservation measures. In particular, many examples can be found of poorly constructed structural measures concentrating runoff, leading to severe gullying and higher rates of soil loss than before. Similar wishful thinking applies to approaches where projects assume that the systems/structures they designed will continue after their withdrawal.

During the development and testing of the WOCAT questionnaires for documenting SWC technologies, it became clear that there is limited quantitative data available on the nature, type and level of benefits to be realised from the adoption of the documented technologies. Therefore, evaluation by the SWC specialist using different ratings from low/poor to high/good has been used. However, many of the subjective assessments (made by ticking a box) would appear to be wishful thinking on the part of the author rather than something based on real hard data. This can be largely explained by the fact that few attempts have been made to measure the field-scale environmental and socio-economic benefits of sustainable land management. Occasionally figures for yield increases may be quoted, but it is unclear whether this can be attributed solely to the documented technology, or whether it may in part be due to the simultaneous introduction of fertiliser, new varieties, and improved crop husbandry practices. For instance, as suggested by one described technology, can terracing alone result in a 500-1000% yield increase?

Poor understanding of land degradation processes and lack of impact assessment of conservation

Reviewing the WOCAT technologies has revealed that misunderstandings as to how land degradation processes actually operate under specific local conditions may result in false assessments as to the nature of the problem and therefore the effectiveness of particular technologies in controlling it. To properly document a technology and how it functions, the author(s) must have a good basic understanding of all the aspects involved. A review of the completed documentation would suggest that many SWC specialists have difficulty understanding the processes, and how a specific technology can, or cannot, combat land degradation. One documented technology suggested that a windbreak would prevent water erosion by controlling both dispersed and concentrated runoff. However a windbreak, with widely spaced trees, cannot by itself control surface runoff, as individual trunks will be too far apart to have any barrier effect. Perhaps as a result of the vegetative cover by the trees and the undergrowth, the soil under the wind break had a much higher infiltration rate and could thus control the dispersed and concentrated runoff.

This poor understanding of land degradation and conservation processes is a cause for concern and suggests the need for better training of SWC specialists. This need was borne out when reviewing a project in western Africa. The project document called for the planting of vetiver hedgerows as a run-off control measure. A number of vetiver hedgerows were planted, leading the project staff to believe they had fulfilled the objective of controlling soil erosion. Field inspection revealed that although vetiver had been planted, in lines on the contour, individual clumps were spaced at about one-metre intervals. The wide gaps between the clumps meant that the hedgerow was unable to act as a physical run-off control barrier. When discussing this with project staff, it was clear that no one had explained the process of run-off control, and therefore the staff were not in a position to judge the conservation effectiveness of the planted vetiver hedgerows. In an example from Niger, it was stated that runoff is controlled by stone lines made of two stones about the size of footballs at the base and one on top. However, this structure is not sufficient to stop surface runoff and enhance infiltration. This is done by the grasses that are established between the stones and help to increase infiltration and filtering of soil.

Farmers also need to understand the processes if they are to judge whether their field activities are likely to be in line with what is required for sustainable land management. Therefore, capacity building among land users is very important. During a visit to one of the field sites of a community-based natural resource management programme in the Philippines, it became clear that farmers, while they could quote the theoretical soil and water conservation reasons for planting trees and hedgerows on sloping land, were not relating this to observable processes on the ground. This was revealed during a site inspection of a communal orchard/woodlot plot, which farmers explained they had planted to protect the upper portions of a local watershed and prevent soil erosion. The reality on the ground was a plot that had been weeded clean up and down the slope, creating ideal run-off conditions that would lead to more erosion than had occurred under the original grass (*Imperata cylindrica*) cover.

The WOCAT experience reveals that poor documentation and evaluation of existing experience lead to loss of knowledge and at times poor understanding of how SWC measures really work. Decisions by projects on where to focus are seldom based on a thorough assessment of previously well-documented experience or on a proper assessment of which areas are still degraded and where there is good potential for SWC interventions (van Lynden et al. 2002, Schwilch et al, 2004). Thus decision making is often haphazard and the impact questionable.

Lack of a holistic assessment and failure to understand the context

In many situations the lack of a holistic assessment of the processes and causes of land degradation has ended up with efforts being narrowly focussed on addressing the visible symptoms rather than tackling the site-specific reasons for the occurrence of land degradation. Gullies are highly visible, hence gully plugging is promoted as a key activity by many soil conservation projects. In an example from Bolivia, gullies were rehabilitated with heavy external funding (farmers were paid for technology implementation), together with sensitisation work. It was hoped that farmers would use the money earned to implement SWC practices on their own fields in the catchment area above the gullies, which then would prevent further gullying. As this did not happen, the farmers' persistence with the traditional land use system was given by the project as the reason for not adopting those technologies. But this partly overlooked the fact that those benefiting most in the short term were the people living in the city downstream. In another project structures including stones were consistently promoted, even in areas where there were no stones closer than 5 km. Transport costs were beyond the means of the local farmers.

Some past projects have failed because those designing and implementing them have not recognized or paid attention to the context in which sustainable land management is to be practised. This can lead to the selection and promotion of technologieswhich, while technically sound, are economically and/or socially non-viable. In the Philippines, sloping agricultural land technology (SALT) involving alley cropping of annual crops between lines of fruit trees and hedgerows of leguminous shrubs has been promoted by many government and NGO programmes. However, although proven to be a technically sound technology for sloping land, and one that when fully developed can be highly profitable, it has not been spontaneously adopted, because the high incremental cost of switching from traditional upland farm management practices to SALT is beyond what most farmers can afford.

Insufficient use of land users' own experiences and inflexibility of proposed solutions

Underlying much of the research and extension work undertaken by SWC specialists is the mistaken belief that farmers know little or nothing about soil conservation and therefore have to be shown how to practice it. This blindness to the conservation effectiveness of farmers' own land management practices can lead to the imposition of unnecessary and often inappropriate 'expert' solutions. A project promoting farmer innovation (Critchley 1999) and an Ethiopian study (Yohannes Gebre Michael & Herweg, K., 2000) have shown that farmers often have a good understanding of what is required for sustainable land management, and given the chance, they can develop their own innovative, and location-specific, good land husbandry practices. The WOCAT database also includes a growing number of farmers' own, as opposed to research-based or extension- and project- promoted soil conservation technologies. It is therefore important that SWC specialists open their eyes, and see what it is that farmers are already doing that conforms to the requirements of sustainable land management, and that they recognise the value of the indigenous expertise and local knowledge, and adapt their own advice accordingly. However, we also have to bear in mind that land users can be blind at times and caught up in their own thoughts and perceptions of degradation processes and conservation achievements. Additionally some of them cannot adapt to the changing environment (socio-economic and natural), otherwise they would not need assistance. This is especially the case where the process of developing empirical knowledge is failing because change is happening

faster than experience can accumulate, or where farmers are migrating to other areas. Continuous learning and adaptation to a changing environment are needed, but farmers also need time and sometimes support to adjust.

Many of the failures of past soil conservation efforts stem from a lack of flexibility in implementation and rigid adherence to centrally determined conservation 'standards'. There is still a reluctance to accept that there are no universal tailor-made solutions. What works at one moment in time, or in a specific area, may not be appropriate at a later date, or in another locality, as circumstances change. Inflexibility and reluctance to make changes will usually result in the continuation of outdated technologies and approaches. A fear of local innovation and adaptation typically still leads to the promotion of nationally determined technical recommendations and the pursuit of 'top down' development approaches. The failure of local efforts to tackle land degradation often stems from an inability, or unwillingness, to critically question the local relevance of nationally determined technical standards, or to challenge local 'expert' wisdom. It still needs to be recognized that SWC must be flexible enough to be fine tuned to every specific (human and natural) environment.

Conclusions

SWC specialists have too often focussed on predetermined, inflexible or miracle solutions rather than critically questioning their suitability to the local situation. The underlying degradation processes, and the local constraints and opportunities of the land users, have not been sufficiently understood and addressed. By using the standardised WOCAT framework it has been possible to expose a number of key misconceptions, biases and knowledge gaps common to SWC specialists in different countries. The WOCAT tools offer a valuable means for sharing information between specialists on different technologies and approaches. These same tools are increasingly used by SWC specialists to critically review their often fragmented knowledge, to identify gaps and contradictions in what they already know, to question and evaluate their current perceptions and field experiences, and in so doing to identify locally appropriate ways of achieving the end objective of sustainable and productive land management.

The review of the WOCAT database indicates that (we as) SWC specialists need to be self-critical and humble, and not to pretend to know. Only if these knowledge gaps and weaknesses are exposed and openly discussed with land users and other specialists can a common understanding and a partnership between SWC specialists and land users be developed. "Dare to share" not only the knowledge but also the gaps: this is a precondition for improved land management. The growing WOCAT database contains information provided by the authors who filled in questionnaires, and at times many gaps and some contradictions can be found. In order to improve understanding and decision making, a high quality database on local experiences needs to be developed. Good quality information and a proper understanding of the functioning of SWC technologies and approaches can be gained firstly by using the WOCAT questionnaires and interactive process for carrying out a self-evaluation. This includes all the stakeholders who have experience with a particular SWC technology and approach (Figure 1). Secondly, the compiled information needs to be exposed to an external review facilitated through the WOCAT network. Therefore WOCAT should not be seen as a data collection exercise but first of all as a tool for self-evaluation, monitoring, capacity building, and knowledge enhancement and exchange. In this process of building up the knowledge base, the capacity of the land users as well as the SWC specialists is increased. This helps to enhance understanding of degradation processes and effects, the impacts of different possible solutions and thus enhances the quality of the knowledge database, in order to critically monitor the development and impacts of land management practices (SWC technologies) and continuously adopt to a new environment. In order to face the challenge of sustainable land management where solutions need to be fine tuned to the very specific natural and human environment, land users and SWC specialists need to form working teams and a strong partnership at the local level, but also at the regional and even the international level.

WOCAT was not primarily designed as a research programme, but it has shown that collaboration between development-oriented research and implementation is crucial for successful documentation and exchange of knowledge, and for addressing knowledge gaps. In order to address the established gaps, WOCAT has initiated research in collaboration with the Swiss National Centre of Competence in Research (NCCR) North-South (Hurni et al. 2004), the EU funded Soil and Water Protection SOWAP project (van Lynden G. and Lane M, in these proceedings) and CGIAR Centres. The main focus is on the impact assessment and monitoring of SWC, locally as well as regionally. Experience gained through WOCAT has been useful in analyzing degradation and achievements in SWC. However, the misconceptions, biases and knowledge gaps identified amongst SWC specialists and land users as to what constitutes a successful SWC technology or approach need to be addressed to further support SWC activities in the field and to avoid expensive and demoralizing mistakes. The experience of WOCAT clearly shows

that documentation, monitoring and evaluation of SWC have been badly neglected, and that this is causing a lot of problems in understanding and implementing SWC. Therefore, sufficient efforts (time and money) should be allocated in projects and in extension programmes to properly document, monitor and carry out self-evaluation of SWC activities (Figure 1).

Figure 1:
SWC specialists using the WOCAT questionnaires to compile farmers' knowledge about traditional rice paddies in Nepal (Photo H.P. Liniger)

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