WOCAT Symposium

'Promoting Sustainable Land Management for its Local and Global Impacts'
20 October 2008; Bern, Switzerland

Proceedings

Foreword

Over the last 15 years WOCAT (World Overview of Conservation Approaches and Technologies) has built up a network of sustainable land management (SLM) specialists from over 50 partner institutions worldwide. Many national and regional programs have been initiated to document, evaluate and spread SLM Technologies and Approaches.

The aim of the symposium was to reflect on achievements, and to align current and future efforts for enhancing and promoting the simultaneously positive local and global impacts of SLM. The symposium brought together various partners and donors of WOCAT, and those interested in SLM and natural resource management. International development and agricultural professionals and institutions, as well as the public participated in the event. As the symposium took place on the first day of the 13th WOCAT Annual Workshop and Steering Meeting, the main WOCAT partners were present, thus offering an exceptional chance to meet and exchange experiences and visions.

These proceedings have been prepared for the participants of the symposium, and for all those who are interested but could not attend. It gives a short overview of the various presentations on the topics addressed during the symposium. All the presentations are also available in pdf-format on www.wocat.org.

WOCAT would like to thank all the speakers for their presentations and also the participants and partner institutions for their interest and active contributions.

WOCAT
World Overview of Conservation Approaches and Technologies

Programme

Moderator: Markus Giger, CDE

08.00 - 09.00	Registration
09.00 - 09.15	**Opening Statement** *Martin Sommer, Swiss Agency for Development and Cooperation*
09.15 - 10.00	**Review of 15 years WOCAT** Achievements, global issues, synergies and challenges for the future *Hans Hurni, CDE and Hanspeter Liniger, Coordinator WOCAT*
10.00 - 10.30	Coffee break
10.30 - 12.00	**Regional WOCAT initiatives and experiences** *EthioCAT documented SLM practices for up-scaling in Ethiopia* *Daniel Danano, Ministry of Agriculture, Addis Ababa* Use of NepCAT Fact Sheets and future network plans *Sanjeev Bhuchar, ICIMOD, Kathmandu* Multi-Institutional partnership in the dissemination of SLM Technologies *Romeo Labios, University of the Philippines Los Baños, Laguna* No-till experiences in Switzerland *Wolfgang Sturny, Bernese Soil Protection, Stefan Minder, Swiss farmer cost634*
12.00 - 13.30	Lunch break
13.30 - 15.10	**Global partnership and future development** Mapping degradation and conservation: from local green spots to widespread SLM (FAO-LADA, ISRIC, Ministry of Agriculture South Africa) *Lehman Lindeque, DoA, South Africa* Climate change and SLM: TerrAfrica's aligned efforts for Sub-Saharan Africa *Anne Woodfine, FAO Consultant and Frank Sperling, World Bank* SLM Knowledge management for monitoring impacts of investments *Brigitte Schuster, UNU and Andrea Kutter, GEF/UNCCD* Decision support for effective implementation and upscaling of SLM *Gudrun Schwilch, WOCAT/ CDE, EU-DESIRE*
15.10 - 16.30	Coffee break and group work **Feedback and discussions on the way forward** group work on – Database & decision support – Global issues – Knowledge gaps and research – WOCAT coordination and funding – Linkages of CDE to WOCAT
16.30 - 17.00	Presentation of group work with discussions
17.00 - 17.15	**Closing** *William Critchley, CIS, VU-University Amsterdam and* *Hanspeter Liniger, WOCAT coordinator*
17:15 - 18.30	**Apéro** Drinks and informal discussions

Opening Statement

Martin Sommer, Swiss Agency for Development and Cooperation (SDC)

It is my privilege and great pleasure to welcome you here in Bern to this Symposium which simultaneously constitutes the launch of the 13th WOCAT Annual Workshop and Steering Meeting (WWSM). This is a wonderful opportunity to learn about the good - and also the more problematic - practices of natural resources management, to share innovative ideas and to jointly assess the progress of the international network.

At an ever faster rhythm and at a more global scale, major issues are chasing each other. It seems as if the world is approaching rock-bottom. But looking at it more closely, most of the current, and topical, global issues have one thing in common. They have their roots in an unsustainable and often irresponsible use of the natural resources.

And WOCAT is right there, in the middle of these issues and concerns. Everybody is searching for enhanced sustainability and more efficiency in resource management. I can say, with a touch of pride, that SDC has been a reliable supporter of the cause ever since the original launch of WOCAT. Whoever is concerned with sustainable agriculture simply cannot manage without referring to the outstanding database on SLM provided through WOCAT.

But without you - the WOCAT-participants gathered here today - this precious knowledge would never have been made available to a broader constituency. The value addition of WOCAT is to have facilitated access to such precious knowledge and to have related this to agro-ecosystem properties, to socio-economic impacts and to related risks. Unlike many other databases of this kind, WOCAT is not satisfied with merely descriptive products, but it further provides pointers for decision makers and for extension workers to enable realistic assessment of the scaling up potential of a wide range of approaches and technologies.

DC, as the initial supporter, has consistently encouraged WOCAT to diversify its funding basis and further enhance the financial sustainability of the network. Through persistent participation in the relevant processes, WOCAT has drawn the attention of eminent global organisations, including FAO, UNEP and the World Bank, but also the secretariats of global environmental conventions, notably the UNCCD, and furthermore that of important private sector partners such as the Syngenta Foundation, and finally other bilateral donors such as DANIDA. SDC stays committed to supporting these institutional diversification efforts for the years to come.

On a more personal, though professional, note, I can assure you that I intend to continue considering the WOCAT tools and approaches as a key reference wherever appropriate, and to encourage local partners in the respective countries to associate themselves with the network.

Opening statement of Martin Sommer, SDC
(Photo: Mats Gurtner)

Through persistent participation in the relevant processes, WOCAT has drawn the attention of eminent global organisations, including FAO, UNEP and the World Bank, but also the secretariats of global environmental conventions, notably the UNCCD.

Review of 15 years WOCAT - Achievements, global issues, synergies and challenges for the future

Sustainable land management in response to global challenges

Hans Hurni, CDE

Global Disparities: Sustainable land management (SLM) is a response to the global challenge of land degradation, from arid to humid environments. There exist immense global disparities between and within wealthy and poor states, and we have to deal with them appropriately. This applies equally to the design and implementation of SLM. The number of poverty-stricken people world-wide is still increasing. There are about 900 million poor people globally, amongst whom 70% (about 600 million) live in rural areas. Food security and the production of agro-fuels are currently competing strongly for the land and its resources – and this struggle is all the more important given that the world stock of cereals would suffice only for 1-2 months. About 40% of the world population are small-scale farmers (2.6 billion), occupying about 40% of all cultivated land. Approximately 40% of all farmers are poor; that is surviving on less than US$ 1.0 per day. For comparison, in the current financial crisis, the Swiss Bank UBS lost about US$ 100 billion so far – enough to pay for one year of international world aid.

Sustainable Land Management: SLM is crucial for sustainable development, not only for controlling land degradation and desertification, but also for managing water resources and biodiversity. Furthermore SLM brings with it many new opportunities for adaptation to, and mitigating of, climate change. Finally, it leads to improved food production and provides other agricultural and ecological services not only to the farmers, but to all humankind.

World Overview of Conservation Approaches and Technologies: WOCAT was designed in 1992 for furthering SLM knowledge. Since then, it has evolved from a simple project idea to a global network and institution. In 1997, the project became an international programme, and a few years later it changed into a global network and became the institutional network as we know it today. In the near future, WOCAT may grow further from an institution to an international standard for SLM in agriculture. My vision is, that by 2017, WOCAT will be known world-wide and institutionalized at national levels. A final hope is that by 2022 WOCAT will be visible through improved SLM practices on all farms throughout the world.

Introduction Speech of Hans Hurni, CDE
(Photo: Mats Gurtner)

My vision is, that by 2017, WOCAT will be known world-wide and institutionalized at national levels. A final hope is that by 2022 WOCAT will be visible through improved SLM practices on all farms throughout the world.

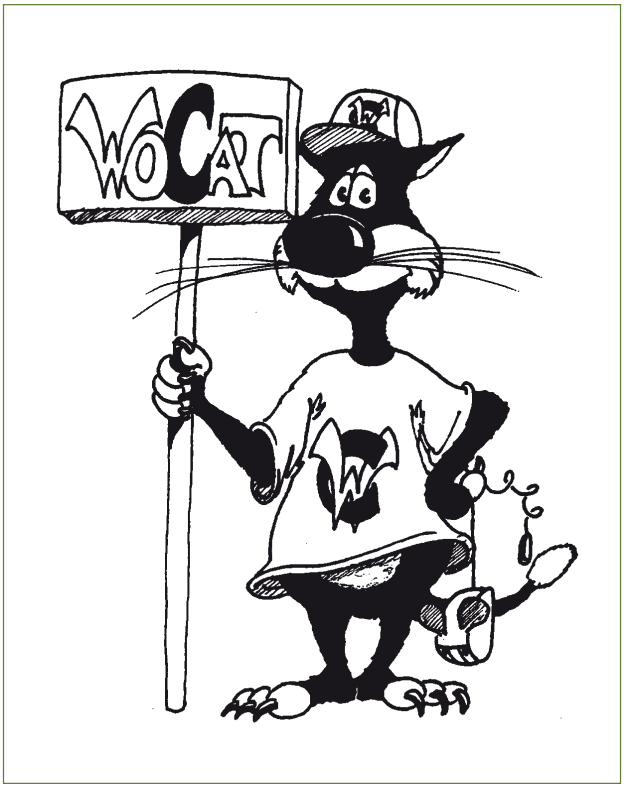
WOCAT and the way forward

Hanspeter Liniger, Coordinator WOCAT, CDE

WOCAT's vision is that land and livelihoods can be improved through sharing and enhancing knowledge about sustainable land management. Thus the focus has been on achievements rather than degradation. In the last 15 years four dimensions of knowledge have been developed: SLM know-how; tools and methods; information sharing and networking; research, training and education. These are described in brief, below:

SLM know-how: the book, "where the land is greener" published in 2007 was a major breakthrough with respect to the acceptance of WOCAT, and in raising WOCAT's profile. The book comprises standardised presentations of case studies on technologies and approaches, as well as an analysis and policy implications. This book is being used as a prototype for regional and national compilations of SLM technologies and approaches in several countries, including Nepal (see presentation on 'Use of NepCAT Fact Sheets and future network plans '), Ethiopia, Bangladesh, and China. Thus many more books (and fact-sheet compilations) are under preparation.

Tools and methods: Over the last 15 years the programme has developed a well-accepted framework for documentation, monitoring, evaluation and dissemination of SLM knowledge, covering all steps from data collection, to a database and to using the information for decision support (see presentation on 'Decision support for effective implementation and up-scaling of SLM'). All network partners have been involved in formulating the needs, and in testing and developing these tools. While the methodology for the case studies has been accepted for several years, the mapping of degradation and conservation has only recently taken-off – thanks to the support of, and collaboration with, the FAO-LADA programme (see presentation on 'Mapping degradation and conservation: from local green spots to widespread SLM '). The idea behind the mapping exercise is to capture land use, degradation and conservation, and to spatially assess the impact on ecosystem services, including agricultural production, organic matter, and water availability. This information is intended to support decision making at the local, regional and national levels to indicate where land degradation needs to be addressed, and which SLM technologies should be spread.



Cartoon: Karl Herweg

Information sharing and networking: the decentralized network is managed by the global management team from CDE Bern (coordination and secretariat), FAO Rome and ISRIC Wageningen. WOCAT is incorporated in the activities and programmes of over 60 institutions world-wide: these constitute WOCAT's network partners. Annual workshops, steering committee meetings and taskforces are key features of the network. WOCAT's major recent emphasis has been on research projects under FAO- LADA, GEF, UNCCD, TerrAfrica and the EU, as well as on national level programmes.

Research training and education: So far, over 500 SLM specialists have been trained to use WOCAT tools and over 30 WOCAT-related MSc and PhD studies have been carried out. The role of WOCAT's research is to assist in filling knowledge gaps, as well as testing and developing methodologies. The key issues addressed by research are: (a) area coverage of degradation and conserva-

WOCAT Review by Hanspeter Liniger, CDE
(Photo: Mats Gurtner)

Long-term commitment and continuity is needed. Synergies between partners can be further developed, as WOCAT is not an additional burden but can help and be incorporated into existing programs.

tion; (b) the assessment of local and global impacts (social, economic and ecological) of degradation and conservation, both on-site as well as off- site, and their relation to poverty reduction, food production, carbon sequestration, desertification, biodiversity, water, and sensitivity/ tolerance to climate variability and change. Some current challenges include using satellite image processing and groundtruthing for assessing "hot" and "bright" spots, and quantifying impact. The involvement of students in WOCAT-related research activities is an asset – for example under the NCCR North South project of CDE, and under EU- DESIRE.

So, what is the way forward under these four dimensions?

SLM know-how: Further building-up of the knowledge base is needed and this requires more data as well as trained and committed people. Addressing the global issues related to SLM and degradation such as poverty, food security climate change, water, and desertification are priorities to donors and investors in SLM and rural development.

Tools & methods for knowledge management (KM) and decision support: Further development of the global and national standard tools and methods with flexible options/ alternatives is important as needs are constantly changing. Impact monitoring of degradation and SLM as well as the assessment on ecosystem services needs further efforts. Up-scaling and decision support are growing demands. The question of how to achieve "maximum impact" through "least effort" is constantly being asked at the local, national and at the global level.

Information sharing and networking: Long-term commitment and continuity is needed (SDC amongst other collaborators have set such an example). Synergies between partners (local, national and international) can be further developed, as WOCAT is not an additional burden but can help and be incorporated into existing programs. WOCAT maintains the principle of being open to new demands and to needs of its partners. The principle of building on its own experiences, while simultaneously learning from others must be further pursued.

Research training and education: Filling knowledge gaps though research, postgraduate training, and capacity building of both specialists and land users is a key investment for the future of SLM. Investment in knowledge management is needed: SLM is complex - and "best-bet" solutions are needed.

Eventually land users will (or may not!) implement SLM. Our role is to support them in the best possible way. woCAT needs a woDOG: Worldwide Orientation towards Development On the Ground"maximum impact" through "least effort" is constantly being asked at the local as well as at the global level.

Cartoon: Karl Herweg

Impressions from the annual WOCAT workshop and steering meeting.
(Photo: Mats Gurtner)

Investment in knowledge management is needed: SLM is complex - and "best-bet" solutions are needed.

Regional WOCAT initiatives and experiences

1. EthioCAT documented SLM practices for up-scaling in Ethiopia

Daniel Danano, Ministry of Agriculture and Rural Development (MoARD), Addis Ababa, Ethiopia

Ethiopia's economy is heavily dependent on agriculture. However the performance of this sector over the last 30 years has been poor, failing to keep up with demands of a growing population. Within Sub-Saharan Africa Ethiopia is considered to be one of the countries most seriously affected by land degradation.

There is thus an urgent need to reverse the current serious levels of land degradation through promoting and scaling up successful SLM technologies and approaches. However this will require overcoming a number of major gaps, bottlenecks and barriers that have hindered the successful scaling up and mainstreaming of SLM within Ethiopia, in particular technical, political, financial or institutional barriers.

Therefore an Ethiopian Sustainable Land Management Investment Framework (ESIF) has been formulated providing a holistic and integrated strategic planning framework under which government and civil society stake-holders can work together. The ESIF provides guidelines for all donors and stakeholders to get aligned and harmonized efforts of current and future investments addressing the interrelated problems of land degradation and rural poverty. The overall development objective is to address the link between poverty, vulnerability and land degradation at the rural community level, through the promotion of SLM practices. Within the Ethiopian Strategic Investment framework (ESIF) WOCAT is used as the major tool for knowledge management and for scaling up successful SLM technologies and approaches. The bases of the knowledge base will be the documentation of best practices in the EthioCAT book covering 33 SLM technologies and 8 SLM approaches in Ethiopia. Therefore one of the anticipated outcomes would be an enhanced knowledge base contributing to the promotion and scaling up of SLM within Ethiopia.

The ESIF is planned to be implemented in three phases, over a fifteen year period starting in 2009. The budget of the framework is 6.4 billion US$ for 15 years (ESIF draft, 2008).

Ethiopia is participating in the WOCAT network since the beginning. With the integration of WOCAT in the ESIF playing a major role related to knowledge management, WOCAT will become even more established as the standard tool for documentation and scaling up of SLM practices in Ethiopia.

left: soil erosion on steep crop lands
(Photo: Daniel Danano)
right: Daniel Danano explaining the SLM framework in Ethiopia.
(Photo: Mats Gurtner)

The overall development objective is to address the link between poverty, vulnerability and land degradation at the rural community level, through the promotion of SLM practices.

Use of NepCAT Fact Sheets and future network plans

Sanjeev Bhuchar and NEPCAT team, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

Nepal has rich experience in natural resource management, watershed management and soil and water conservation. These experiences have not been adequately documented in a format which can be widely accessed. There has also been an absence of a vibrant network of sustainable land management practitioners in the country. These gaps have seriously limited the spread of potential options in the country and beyond.

It is for these key reasons that NEPCAT (Nepal Conservation Approaches and Technologies) fact sheets have been published and a loose and open NEPCAT network established.

The most salient features of NEPCAT fact sheets are as follows:

- They describe 21 simple technologies and 9 approaches related to on-farm production, sustainable agriculture and soil and water conservation from Nepal, which hold potential for replication in other environment with similar characteristics.
- This constitutes a collaborative effort of ICIMDOD and Sustainable Soil Management Programme of Helvetas/ Intercooperation.
- It was inspired by WOCAT's "where the land is greener" overview book.
- Support came from SDC, ICIMOD, Helvetas Nepal, Intercooperation, WOCAT and the Ministry of Agriculture (Nepal).

For more information on NEPCAT fact sheets go to:
http://dev.icimod.org/elibrary/index.php/search/subject/3

The NEPCAT team's future plans are as follows:

- continue to disseminate the publications and be involved in network activities;
- translate selected NEPCAT fact sheets into the local Nepali language;
- give an orientation on WOCAT to more organizations in Nepal in December 2008;
- conduct a training on WOCAT methodologies for interested organizations in Nepal in 2009;
- facilitate experience sharing on the application of WOCAT methodologies among new network members; and

It is hoped that these efforts will support rural development in Nepal and provide impetus and ideas for decision makers, development actors, and land users. For more information on NEPCAT please contact himcat@icimod.org and join HIMCAT extranet *www.himcat.icimod.org.*

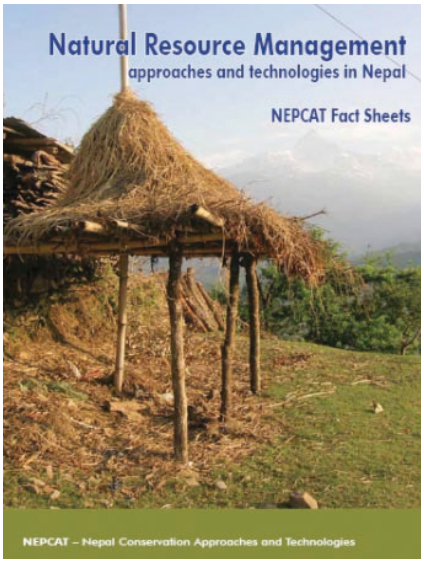


Figure 1: Cover of the NEPCAT fact sheets.

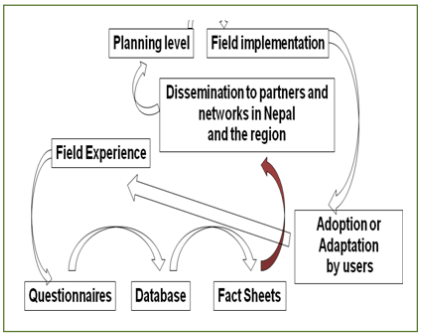
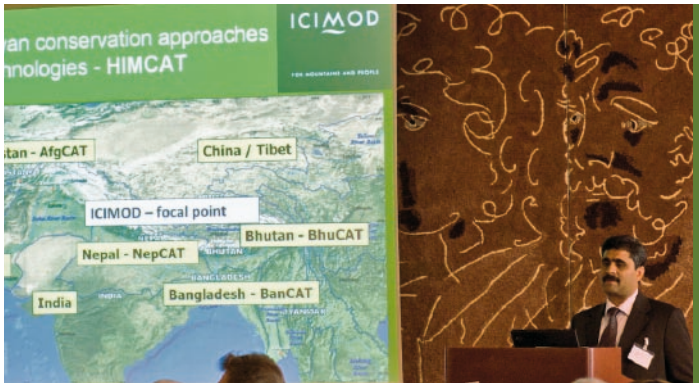


Figure 2: The NEPCAT fact sheet process



Presentation of Sanjeev Bhuchar at the symposium.
(Photo: Mats Gurtner)

It is hoped that these efforts will support rural development in Nepal and provide impetus and ideas for decision makers, development actors, and land users.

Multi-Institutional partnership in the dissemination of SLM Technologies

Romeo Labios[1]***,*** *Virgilio T. Villancio*[2]*, Jesus Javier*[3]*, and Arnulfo Gesite*[4]*, International Rice Research Institute*[1]*, University of the Philippines Los Baños*[2]*, Department of Environment and Natural Resources*[3]*, Department of Agriculture*[4]

The Philippine Conservation Approaches and Technologies (PHILCAT) was formally organized in September 1999 through a Special Order of the Secretary of Agriculture. It is an Inter-agency Committee for WOCAT and the Asia Soil Conservation Network (ASOCON) in the Philippines. The committee is represented by different universities, research institutes and also by professional societies, and is chaired by the Director of the Bureau of Soils and Water Management, Department of Agriculture. The idea behind PHILCAT is to actively promote and disseminate conservation, development and management of soil and water resources. Through the committee, a number of conservation approaches and technologies have been documented using the WOCAT tools and were included in the WOCAT global data base. Three technologies and one approach were included in the global overview book "where the land is greener" (WOCAT, 2007).

The functions of the PHILCAT committee are diverse, and include the following:

- Prepare documentation and analysis of SLM technologies and approaches
- Develop a joint program proposal for WOCAT and PHILCAT for internal and external funding
- Conduct workshops/ trainings
- Formulate policy recommendations
- Preparation of up-to-date information and extension materials relevant to SLM
- Link PHILCAT to other international institutions and initiatives
- Meet regularly, plan and implement related activities and accomplish its mandate
- Maintain contacts/ networks with local/ international partners, institutionalize technical information exchange on conservation farming

WOCAT tools are used in the academe in the undergraduate and graduate courses in Soil Science, Agricultural Systems, and Forest Resource Management, particularly in the University of the Philippines Los Baños, Leyte State University and Benguet State University.

PHILCAT brings together different SLM initiatives from public institutions/ agencies, international agricultural research centres and private industries. The 'Landcare' project is a SLM initiative by the World Agroforestry Centre Philippines, an international agricultural research centre. Farmers who are interested in learning and sharing knowledge about SLM and new SWC measures organise themselves into the so-called 'Landcare' associations. These self-help groups are vehicles for knowledge exchange, training and dissemination of SLM technologies.

The Conservation Farming Village (CFV) is a modality for enhancing the transfer of conservation farming technologies and practices anchored in participatory planning, monitoring, and evaluation processes at the community level. It is an in-situ showcasing of a model S&T (Science & Technology) based farm within a model village where practitioners, farmers and other stakeholders can observe and have hands-on experience in technology application.

A partnership of different institutions/ agencies - as maintained within PHILCAT - brings greater benefits and results than working individually, and enhances the knowledge, skills, and resource capacity of partners.

left: SLM training course with farmers.
(Photo: Arnulfo Gesite)
right: Romy Labios during the presentation of the PHILCAT committee.
(Photo: Mats Gurtner)

A partnership of different institutions/ agencies - as maintained within PHILCAT - brings greater benefits and results than working individually, and enhances the knowledge, skills, and resource capacity of partners.

No-till experiences in Switzerland

Wolfgang Sturny, Andreas Chervet, Peter Hofer, Bernese Office for Agriculture and Nature, Soil Protection Service

Inappropriate soil tillage causes various land management problems. The increasingly heavy weight of the machines and tractors used in Swiss agriculture lead to decreased water infiltration and soil compaction. Furthermore, intense soil tillage aimed at creating a fine seedbed can lead to severe soil erosion problems - especially in hilly areas. Additionally, experiments have shown that there is no correlation between seedbed fineness and plant yield.

Since 1994 a unique long-term field experiment of the Bernese Soil Protection Service has been conducted in Zollikofen, Switzerland comparing no-till, with conventional tillage using a mouldboard plough. While the experiments demonstrate results in favour of no-till, the overall performance of, and knowledge about, no-till is still inadequate. No-till is actively promoted in different Swiss cantons. In Bern, Aargau, Fribourg and Lucerne farmers receive financial assistance to apply no-till over a sustained period of years. To further promote no-till in Switzerland the Swiss soil conservation association named 'SWISS NO-TILL' was established. The members are mainly farmers and contractors, but also extension agents, researchers and teachers (www.no-till.ch). SWISS NO-TILL provides a platform to disseminate knowledge about no-till, and is also actively involved in research projects.

Even though no-till provides many advantages compared to conventional tillage, there are still a few unsolved challenges remaining. These can be summarised as follows:

Challenges of no-till	**Possible solution**
– develop risk of mycotoxins	– crop rotation
– require herbicides such as glyphosate	– cover crops (that freeze off)
– novel, expensive no-till technology	– requires corporate ownership and utilization
– lack of know-how	– learning by doing, need for research

No-till in practice

Stefan Minder, MIGAMO no-till cooperative, Switzerland

In 1998/99 the 'MIGAMO-association' consisting of a machine-sharing and no-till company was founded in the region of Oberaargau (50 km east of Bern). The aim of this cooperative was to establish a customer service for no-till drilling. In a second phase in 2004 the "MIGAMO no-till-cooperative" originated as an organisation for customer service, consulting and developing the no-till system in the region. Currently, in 2008, the organization consists of 11 members, and works with 5 drills and a single planter.

The incentives for farmers to change to a no-till system are numerous. Tillage costs associated with fuel, machines, and labour can be saved. There are also ecological arguments including improved soil structure, through encouraging the breeding of earthworms, that can play a role in the farmer's decision.

Various factors aspects have lead to a domino effect and increasing adoption of no-till in Oberaargau. These aspects are: reliable service, conclusive results, close collaboration with research, word of mouth advertising and publicity, and good quality consulting services.

Due to the active promotion of no-till by MIGAMO in Oberaargau the total area on which no-till is applied has grown from 140 hectares at the beginning of MIGAMO (1998-1999) to 1,000 hectares in 2008.

left: First no-till drill modified and developed by MIGAMO.
(Photo: Stefan Minder)
right: First no-till drill modified and developed by MIGAMO
(Photo: Mats Gurtner)

The incentives for farmers to change to a no-till system are numerous. Tillage costs associated with fuel, machines, and labour can be saved.

Global partnership and future development

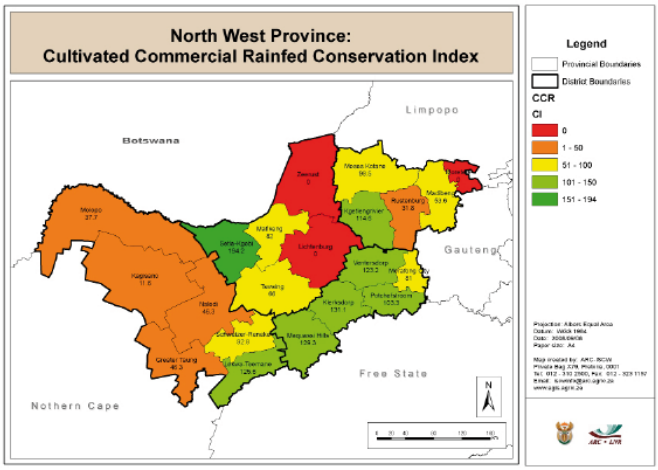
Mapping degradation and conservation: from local green spots to widespread SLM (FAO-LADA, ISRIC and Ministry of Agriculture, South Africa)

Lehman Lindeque, DoA, South Africa

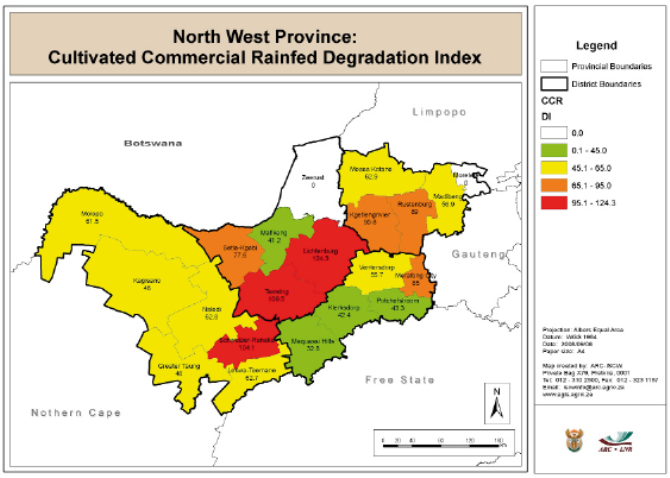
The magnitude and impacts of land degradation vary greatly from place to place and change over time. There are, however, wide gaps in our understanding and observation of degradation processes and their underlying factors. A better delineation of degradation would enable cost-effective action in areas affected by it. The WOCAT/LADA Mapping Questionnaire (QM) for Sustainable Land Management provides a well-established methodology for land degradation assessments at different scales.

The aim of the LADA Programme is to assess the causes, status and impact of land degradation in drylands in order to improve decision making for sustainable development in the drylands. In South Africa, Land Use System (LUS) units (e.g. grassland or cultivated irrigated land) within the boundaries of local municipalities are considered as mapping units for the completion of the WOCAT/LADA Mapping questionnaire matrix. Data capturing is done in a participatory way during a Participatory Expert Assessment Workshop with a range of local stakeholders and experts. In the North West Province for example, 102 experts participated in 4 PEA Workshops and the average years of experience for these participants were just over 15 years.

The Driver, Pressure, State, Impact and Response Framework (DPSIR) provide the bridge to overcome the gap between QM Matrix data on the different land use systems and management information for better decision making at district, provincial and national levels. Different variables from the QM Matrix were used to develop a Degradation and Conservation Index for the different mapping units. Together, with the variables of the DPSIR framework, the Index values provide the basis, not only for determining priority areas for future action, but also for understanding the phenomenon of land degradation and conservation. Once we understand land degradation and conservation better, we can identify leverage points whereby we can achieve the best possible SLM for different LUS, considering the limits of the specific ecosystem and resources available.



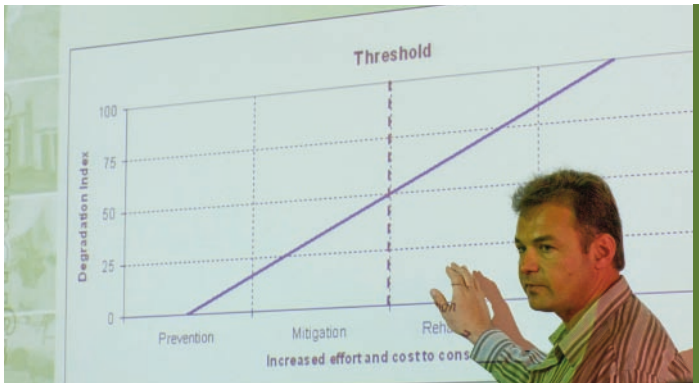
Map 1: Cultivated Commercial - Rainfed Degradation Index for the NW Province



Map 2: Cultivated Commercial Rainfed - Conservation Index for the NW Province

Map 1 and 2 are examples of the degradation and conservation indices for the land use "cultivated commercial – rainfed" for the local municipalities of the North West Province.

The WOCAT/LADA Mapping Questionnaire indeed provides a well-documented methodology for land degradation and conservation assessments at different scales and together with the DPSIR framework, a basis for better decision making towards Sustainable Land Management.



Lehman Lindeque showing a graph during his presentation at the symposium
(Photo: Mats Gurtner)

The WOCAT/LADA Mapping Questionnaire indeed provides a well-documented methodology for land degradation and conservation assessments at different scales

Climate change and SLM: aligned efforts for Subsaharan Africa

Anne Woodfine, *FAO-consultant and Frank Sperling, World Bank*

Africa's climate has long been recognised as complex; also varying - the historical climate record shows warming of approx. 0.7°C over the 20th century. Predictions for the next 50 years are that all regions of Sub-Saharan Africa (SSA) will experience increasing and more extreme temperatures - ranging from 0.2°C to more than 0.5°C per decade. The other main features of climate change (CC) will be drying of the Sahel and Southern Africa, with increased rainfall in the Horn and East Africa, and increased precipitation intensities in the latter.

Conversion of natural systems to cultivated agriculture results in losses of between 20 and 50 percent of pre-cultivation soil organic carbon (SOC) stocks in the surface metre: thus there is clearly carbon storage capacity in agricultural land in SSA. Wherever land use change has resulted in decreased soil carbon, soil carbon can be increased by a comparable (but not equal) amount.

SLM practices which will contribute to CC mitigation by increasing carbon storage include: reducing land clearing; avoiding deforestation; reforestation and afforestation; conservation agriculture and improved rangeland management. SLM can also reduce emissions of other GHGs: (1) by reducing the need for/ careful use of/ avoiding overuse of N fertilisers (emissions of N2O are 296 times more potent than CO2); (2) changes in management of irrigation systems (emissions of CH4 are 23 times more potent than CO2); and (3) reducing farm energy demand.

Increasing SOC using SLM practices brings multiple adaptation benefits, including: increased rainfall infiltration rates; increased water holding capacity; creation of improved conditions for soil fauna (earthworms, termites etc) and related macropores (through root action also) to serve as drainage channels for excess water; stabilizing a much improved soil structure; enhancing fertility (nutrient retention); and increasing "the resilience of the land". The resulting improvement in overall plant growth, therefore, will increase crop and pasture yields in good years and reduce the risk of crop failure (due to drought or flooding) in challenging years - thus increasing food security.

Realistically, benefits can be achieved by gaining incremental improvements within farming systems through encouraging "win-win" SLM practices within the many components of SSA production landscapes (home gardens, arable fields, woodlands, rangelands etc). It is recognised that external help and advice will be necessary to rebuild or enhance the ecological resilience of rural communities - indigenous coping and adaptive mechanisms on their own are not enough to respond to the predicted rates of climate change.

A technical report on SLM potential for climate change mitigation and adaptation is being developed for FAO. This report highlights the potential for certain SLM practices to contribute to climate change adaptation (vital for land users across SSA) and mitigation (acknowledging that improved land management practices can sequester carbon and reduce GHG emissions). Based on its wide expertise in the field WOCAT is currently working with TerrAfrica to develop SLM technical guidelines on selected best-bet SLM technologies and approaches for SSA. The review will use information from the WOCAT databases to describe the technologies.

Appropriate SLM approaches to both mitigate and adapt to climate change offer the vital long term tools that can free local communities from their often chronic state of dependency.

Anne Woodfine about climate change in Sub-Saharan Africa (Photo: Mats Gurtner)

The report being developed for FAO highlights the potential for certain SLM practices to contribute to climate change adaptation and mitigation.

SLM Knowledge management for monitoring impacts of investments - The GEF Land Degradation Focal Area

Brigitte Schuster, *UNU-INWEH and Andrea Kutter, GEF Secretariat*

Sustainable Land Management (SLM) in the drylands is significantly impeded by a current incapacity to track its impacts and by the lack of comprehensive knowledge management fora.

The Global Environment Facility (GEF) has acknowledged the need to strengthen systematic knowledge management within its own Land Degradation Focal Area and thus initiated a long-term programme entitled "Knowledge from the Land" (KM:Land) together with a group of United Nations organizations and regional development banks.

It is perceived that a comprehensive approach to SLM assessment and knowledge management represents an important opportunity to guide the future strategic development of the GEF Land Degradation Focal Area, but also to strengthen the global basis for the design and assessment of SLM initiatives beyond the GEF portfolio. Executed and led by the United Nations University, the first phase of KM: Land focuses on selecting indicators to measure and track the environmental and livelihood benefits from GEF SLM interventions and to record results and best practices of projects in the GEF Land Degradation Focal Area. So far, a conceptual SLM framework (see figure below) has been developed, realigning traditional environmental indicator frameworks to a change in thinking on dryland poverty and resource degradation processes, as recommended by the Millennium Ecosystem Assessment.

Second, the initiative has identified four core global indicators, from which a baseline global SLM assessment can be drawn: land cover, land productivity, water availability and rural income levels. This assessment is anticipated to support the prioritization of resource allocation by the GEF.

The next step for the KM:Land initiative includes the development of indicators at the project level, in an effort to demonstrate environmental and livelihood benefits from SLM interventions and aggregate the impacts at the portfolio level. The project also intends to create an SLM Learning Network to promote the exchange of lessons learned and experiences between SLM professionals within and beyond the GEF realm. The main areas of collaboration with WOCAT are seen with regards to the Learning Network component and the development of tools and manuals to document, store and share SLM knowledge. The GEF project will also interact with the WOCAT Task Force on impact monitoring to ensure consistency between the global, national and local levels, to the extent possible.

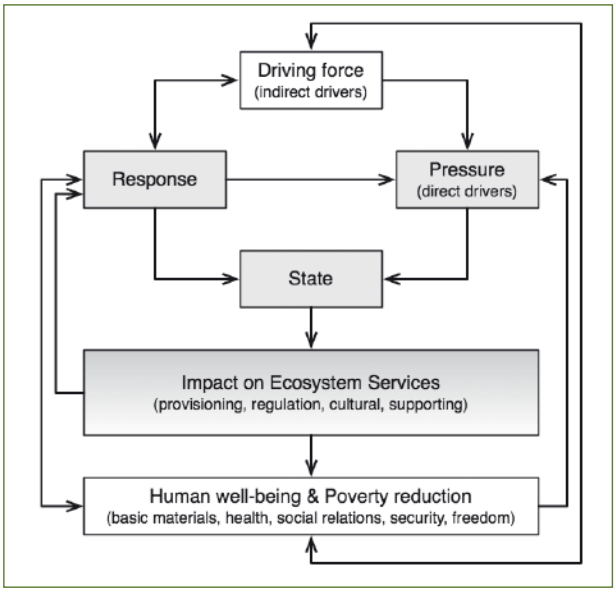


Figure: The universal SLM framework merging the DPSIR and MA frameworks.

Brigitte Schuster presenting SLM knowledge management.((Photo: Mats Gurtner)

The main areas of collaboration with WOCAT are seen with regards to the Learning Network component and the development of tools and manuals to document, store and share SLM knowledge.

Decision support for effective implementation and up-scaling of SLM

Gudrun Schwilch, *Felicitas Bachmann, Hanspeter Liniger and Ernst Gabathuler, Centre for Development and Environment (CDE), WOCAT, EU-DESIRE*

For a better understanding of the scope of the methodology presented, the audience was asked to imagine a hypothetical situation where an agricultural advisor in a desertification-prone area needs to find a way to combat degradation and improve land production in order to support the land users in his/her local area. Politicians at the district level may have mapped hot and bright spots and urge him/her to get active. But how and where would he or she find best practices, proven strategies or new ideas? And how would such a person proceed in appraising and selecting the best options and promoting SLM with, and among, land users? The main aim of the methodology presented here is to promote effective and widespread implementation of SLM at the field level - which we argue is only possible if strategies are socially acceptable and economically viable, thus requiring a local process with proper assessment and involvement of stakeholders in decisions. The methodology has been developed within the EU project DESIRE (www.desire-project.eu/), a 5-year global research initiative to mitigate desertification and remediate degraded land in collaboration with WOCAT (www.wocat.org).

The suggested framework for the appraisal and selection of options to mitigate land degradation consists of three parts: in the first step, prevention and mitigation strategies and innovations already applied at a selected site are identified, during a workshop, with representatives of different stakeholders groups. The workshop methodology is based on a 'learning for sustainability' approach, initiating a mutual learning process among the different stakeholders through sharing knowledge and jointly reflecting on current problems and solutions In the second step, these identified solutions are assessed in detail using the comprehensive WOCAT questionnaires. These help to document and evaluate all relevant aspects of technical measures, as well as implementation approaches. The third part consists of another stakeholder workshop where promising strategies for sustainable land management are selected and adapted for field trials at the local site. The stakeholder group thus works through a series of steps to reach a decision. The search in the WOCAT database, containing the local solutions evaluated (as above) and other practices from around the world, is facilitated by following a series of key questions, limiting the selection to 4-7 options. These potentially suitable options are then assessed with the help of a decision support tool that is based on multi-criteria evaluation. The stakeholder group identifies about 12 ecological, economic as well as socio-cultural criteria and their relative importance and thereafter scores each option against these evaluation criteria with a practical scoring tool. Open-source software helps to calculate and visualize the relative merits of the options from the identified criteria, and from scoring made by the stakeholders.

The methodology offers distinct challenges through the variety of stakeholders involved and the responsibility of the moderator as well as topically. The complexity of SLM needs to be recognized/ understood to find successful solutions and it is therefore also crucial to involve SLM specialist and multidisciplinary researchers into such a process. Selection of viable options requires a critical mass of local - as well as external - data on best practices to broaden the variety. Each user of the WOCAT database should therefore be a provider at the same time by documenting the own success stories. The development of such tools for decision support and up-scaling SLM is fully in line with strong current international demand (e.g. GEF, TerrAfrica, UNCCD, CGIAR, and UNEP).

left: Gudrun Schwilch presenting decision support (Photo: Mats Gurtner)
right: Land users and other stakeholders identifying and discussing SLM options in Morocco. (Photo: Gudrun Schwilch)

The complexity of SLM needs to be understood to find successful solutions and it is therefore also crucial to involve SLM specialist and multidisciplinary researchers into such a process.

Feedback and discussions on the way forward

Group work on:

1. Database & decision support

Report by Lewis Njeru, SWALIM and Gudrun Schwilch, CDE

Database enhancement / population
The group suggested making the WOCAT database a general standard within national programmes. Latin America should be included as well (e.g. through FAO, CIAT etc).

To enhance the size of the database, contributions might be acknowledged as peer-reviewed documents, which would require a form of review panel. The WOCAT database should - and can - be used as an internal working environment, before making it accessible to the global public. Further debugging of the database software was also requested, while the new on-line system must become more user friendly than the previous Access version. Language is a major obstacle to sharing information worldwide. For Chinese users, for example, it is difficult to work with the English version and to provide data in English.

It is important to know about the cost/benefits of a given technology/approach, but this is very difficult to estimate. Certain indicators might help (costs, yields, etc.) and these are already included into the questionnaires. The group agrees that the scope of the questionnaire is wide enough to cover all relevant aspects.

Use of WOCAT database for decision support
The collected and stored information within the WOCAT database should be used for decision support, not only at the national level, but also at the global level. The currently developed local decision support tool used in DESIRE should be linked with LADA/WOCAT national mapping and its developments for decision support. For this, NCCR methods on socio-economic aggregated data and pattern analysis might be used and included. Developing an interactive decision support system should be envisaged, to follow up on the DESIRE system that can be used at the national or regional level, and should include criteria selection, priority setting, scoring, etc.

The group discussed whether the scope of the DSS should be broader than SLM, and also focus on sustainable development (including livelihood aspects). This could be achieved, for example, by introducing components in the mapping methodology which relate to sustainable development. But there is a discrepancy between broader scope and being specific - and the group decided that WOCAT should remain focused on SLM.

Currently, the technologies and approaches described in the database give information about the human and natural circumstances under which they are applied. For up-scaling, the information about where it could potentially be applied is also essential. The group suggested overcoming this gap with modular tools, additional to the basic questionnaire.

It was generally felt that the local variability is often high, which therefore requires a local selection and decision process. Capacity building is needed on the use of the database for decision support as well as on moderating the decision-making process. The language problem is also evident here. Generally, the WOCAT database should also be used for awareness creation on SLM.

Lewis Njeru and participants during the group work session.
(Photo: Mats Gurtner)

Capacity building is needed on the use of the database for decision support as well as on moderating the decision-making process.

2. Global Issues

Report by Niranjan Sahu, OWDM and Rima Mekdaschi Studer, CDE

As a start to the group work the participants named today's relevant global issues in relation to SLM and WOCAT. Mentioned and briefly discussed were:

– Climate change (e.g. soil carbon sequestration, organic matter, impacts on land use)
– Pollution of water bodies
– Air pollution (e.g. deposition of nitrogen and pollutants from atmosphere)
– Food crisis and security (rising food prices)
– World economy crises (trade liberalization, impact of globalization)
– Biodiversity
– Population growth (people are expanding into more marginal lands)
– Poverty
– Resource conflicts (migration and brain-drain from rural to urban areas)
– Energy crisis (e.g. biofuels, renewable energy)
– Communication technologies

Further, the question regarding how WOCAT could integrate, react and cover current global issues was discussed. WOCAT has developed a flexible modular method/tool, which comprises the basic questionnaires on Technologies and Approaches as a core, to which complex and more specific topics can be linked to it as modules. Therefore the possibility to react and cover current global issues is present, thus the "how" and "what" were debated:

– Indicators for impact assessment for donors and policy makers (support the efforts of global partners)
– Provide evidence (link to research) to decision makers.
– Modules on carbon sequestration (C in the soil and in biomass, important for drylands)
– Module on how SLM can contribute to adaptation to climate change
– Modules for energy

Another point that is relevant in the discussion on global issues is the link from the global to the local level:

– Try to coordinate activities among all international actors as well as economic regimes, integrate among globally operating institutions and local institutions (a multilateral approach). Use technologies as a catalyst. As an example, the GEF pointed out the connections between SLM, climate change, international waters and biodiversity focal areas.
– Research, for example on C-emissions (source) and C-sequestration (sink) should start at a national (government) level, and then be extrapolated to the global level.
– Countries to contribute actively to the global data bases by documenting, evaluating and exchanging their experiences.
– Link to the education system
– Potential for agriculture extension
– Establish more partnerships
– Become involved with FAO, UNCCD, UNFCCC, CBD

There is an opportunity to profit from the current discussions on global issues, especially climate change and biodiversity as funding options/ opportunities for SLM activities. These opportunities are still underestimated in their potential to catalyse sustainable development. Also, a change in the funding pattern of donors was brought to attention: agricultural research and extension will in future receive more funding.

Niranjan Sahu contributing to the discussion on global issues. (Photo: Mats Gurtner)

There is an opportunity to profit from the current discussions on global issues, especially climate change and biodiversity as funding options/ opportunities for SLM activities.

In many parts of the world the foremost issue is relieving and helping the poor without forgetting the 'environment' and the challenges of an ever-changing environment

It was indicated Sustainable Land Management can be seen as the nucleus of good local governance and that WOCAT is also able to lobby more for SLM by:

- showing evidence using WOCAT tools (global/ regional/ national databases on Technologies and Approaches, decision support tools etc)
- maps as evidence to show where and what is taking place (WOCAT-LADA mapping tool)
- proper packaging to reach policy and decision makers (WOCAT templates and examples of outputs)

3. Knowledge gaps and research

Report by Godert van Lynden, ISRIC and Christine Hauert, CDE

In a first step the group tried to identify knowledge gaps, especially in relation to 'impact monitoring'. The group agreed that, very often, a comprehensive impact assessment is missing, but for measuring effects at the field level impact assessment is a crucial prerequisite. WOCAT and its questionnaires in general already provide indicators and methods for measuring impacts at field level. However, long term monitoring is very difficult within the WOCAT process, since people within institutions and organizations change continuously. Therefore WOCAT very often provides snapshot information rather than long-term data. The group members emphasised that there is a need for standardized monitoring tools or guidelines for impact monitoring. Members of the WOCAT taskforce on 'impact monitoring' explained that this is now in development. The WOCAT-taskforce is trying to develop a prototype for a participatory impact monitoring tool, with key indicators for ecosystem services and "rough" methods for the assessment of these indicators. The group agreed that it is very difficult and a major challenge to gather the hard data that would be needed to specify and quantify the impacts of degradation and conservation.

In a second step, different aspects of how to address knowledge gaps were discussed. It was mentioned that a thorough literature review1 and screening of existing research is very important. Students could become more involved in research activities addressing knowledge gaps and developing methods and tools. Furthermore, collaboration between different Universities and organizations needs to be enhanced - including internship of students, collaboration in specific research projects, collaboration in support of MSc theses, etc. Special focus should also be laid on interdisciplinary collaboration projects, for a broader perspective within research.

A further point of discussion was related to the WOCAT database. The group agreed that a good and broad database is a prerequisite for knowledge management. However, there exists the problem of updating old case studies and integrating the information gained with the new questions. On one hand the WOCAT tools should be a standardised methodology but on the other it is necessary to gradually adapt and integrate the newest global issues and requests in the WOCAT questionnaires and tools. The group discussed how WOCAT should handle this dilemma. Other participants of the group preferred documenting new case studies instead of expanding/ deepening existing ones with research.

Students participating at the symposium.
(Photo: Mats Gurtner)

Students could become more involved in research activities addressing knowledge gaps and developing methods and tools.

Statement: WOCAT is very comprehensive tool for assessment, but not for research.

[1] Literature: in relation to 'impact monitoring' is already a lot available, e.g.:
Earl, S, Carden, F., Smutylo, T. 2001. *Outcome Mapping – Building learning and reflection into development programs.* International Development Research Centre (Canada). ISBN 0-88936-959-3
Herweg, K., Steiner, K. 2002. *Impact Monitoring & Assessment. Instruments for use in rural development projects with a focus on sustainable land management.* Volume 1: Procedure & Volume 2: Toolbox. Centre for Development and Environment, Bern. ISBN 3-906151-58-1 & 3-906151-59-X

4. WOCAT coordination and funding: the way forward

Report by Sally Bunning, FAO and Hans Hurni, CDE

Topic 4 of the working group discussion was about donor expectations, donor coordination, the prospects of long-term funding for the global WOCAT system, and proposing the establishment of a donor core group.

Donor expectations

WOCAT Institution: WOCAT should now be considered as a global institution, which works internationally and is supported by its primary partner institutions with core as well as and supplementary operational funding, and which carries out activities in line with the WOCAT programme in addition to the tasks assigned by the participating institutions.

Well-evidenced results: According to the members of the working group, donors would like to see that continuous progress on the use and application of WOCAT be well demonstrated by the global network, both on the internet as well as in targeted publications.

Increased use: Despite its wide success among many national and international partners in over 40 countries, WOCAT can still further raise awareness about its knowledge and information base, and increase its use among research and development partners, such as the CGIAR institutes, FAO, GEF, and the WB. WOCAT could make better use of umbrella programmes such as TerrAfrica and MENARID for wider knowledge and use of WOCAT in their implementation processes.

Increased application: Donors would expect WOCAT to further build bridges from its products to investments in the land, particularly through knowledge for decision-making. For example, WOCAT could identify the potential for wider adoption of technologies and approaches; for example in the mountain-development programmes of such countries as well as bilateral donors. WOCAT should be a recognised source of knowledge/information on sustainable land management (SLM), as well as a database of resource persons knowledgeable in SLM.

Standard: WOCAT should ensure that its standards in technologies and approaches, and its tools, are accepted by GEF, development banks, investors. By using WOCAT tools these institutions can ensure that SLM responses are based on sound science and appropriate tools.

Mainstreaming: WOCAT should make use of the international poverty and development agendas and processes to raise awareness.

Conventions: WOCAT should use international conventions such as the UNCCD (desertification), UNCBD (biodiversity) and UNFCCC (climate) and their meetings (Conference of Parties) to demonstrate opportunities for the application of WOCAT tools.

Willi Graf the person in charge of WOCAT at SDC for several years. (Photo: Mats Gurtner)

Donors would expect WOCAT to further build bridges from its products to investments in the land, particularly through knowledge for decision-making.

Donor coordination and funding

Sensitisation: Donors could help sensitise relevant government ministries (e.g. for Agriculture, forestry, water sectors, etc.) and other concerned institutions to highlight the importance of SLM for enhanced productivity and food security (in addition to legal treaties and provision of inputs such as fertilisers, seeds etc.)

Funding: WOCAT funding requires streamlining. There is a general need to ensure continuity in funding, consisting of core funding to the WOCAT coordination, plus modular funding both at the global as well as at national levels. Current global agendas of the world community have a lot to do with land degradation and sustainable land management, such as food prices, the energy-biofuel nexus; mandates given by politicians, etc. There are a number of national and donors budgets that can potentially be tapped, including specific regular, and emergency, funds. There is also a need to "market" WOCAT for these different funding sources. In order to avoid donor fatigue, as is common for long-term initiatives, WOCAT should seek money for planned SLM actions to be carried out by the WOCAT institutional network, rather than for "WOCAT" as an entity itself.

Co-funding: WOCAT could make better use of 'silent' partners, through becoming a component of other programmes in the same field, and through this enabling its application in a co-funding mode. WOCAT could also make better use of national and partner programmes, for example poverty reduction programmes or large-scale GEF and other investment projects for SLM. This would help in scaling-up, but there is a need anyway to mainstream WOCAT tools towards such differential uses.

In kind contributions: There are a great number of national in kind contributions, which can be acknowledged more regularly and more explicitly in order to maintain such long-term commitments (e.g. in South Africa, China and Ethiopia.)

Donor core group and support committee

Proposal: WOCAT should establish a Donor Core Group that would (a) work on a common strategy and work plan, (b) rationalise and thus limit its reporting obligations, (c) inform other donors if funding is changing, (d) ensure wide funding sources from the private and public sectors, and (e) by including various technical sectors, attract new donors' interests (Kilimo, Gates, etc.).

Modality: The group would interact through email or telephone conference. However, this should be done regularly in order to update on prospects and progress, as with this current symposium, and should always be based on informed evidence of WOCAT outputs and products. The group could make good use of the next series of global events or meetings, such as the UNCCD, UNCSD, UNFCCC, etc., in order to have a common voice there. In addition, participating governments' voice should be added, for example where WOCAT is working well, in order to inform such policy forums of the results of using WOCAT tools.

Focus: Particular attention should be given to help National Focal Points in their efforts at the national levels. Through this, WOCAT would maintain its bottom-up approach, which has been the basis of its past success. Likewise, it would be advisable to consolidate existing donors rather than putting all efforts into finding new donors.

FAO representative Sally Bunning during a discussion.
(Photo: Mats Gurtner)

WOCAT funding requires streamlining. There is a general need to ensure continuity in funding, consisting of core funding to the WOCAT coordination, plus modular funding both at the global as well as at national levels.

5. Linkages of CDE to WOCAT

Report by Bettina Wolfgramm, CDE

This group consisted only of participants from the Centre for Development and Environment (CDE), University of Bern with the idea of discussing possible linkages/ synergies between CDE and WOCAT. All issues discussed, started off by acknowledging the great opportunity that the standards for documenting SLM systems and the existing database of WOCAT provide. Three topics were discussed where promising links between CDE and WOCAT exist and should be strengthened: (a) impact assessments, (b) spatial assessments/ mapping and (c) decision support.

Impact assessment: Data obtained from documenting SLM systems using the WOCAT questionnaires clearly indicates impacts on ecosystem services however only in a qualitative or semi-quantitative way. At CDE various MSc and PhD studies have already been conducted with the aim to better quantify the impact of SLM systems on soil and water conservation and on ecosystem services. The NCCR North-South (e.g. in the Eastern and the Horn of Africa as well as Central Asia) and COST 634 studies (within Switzerland) have shown that using WOCAT methodology in conjunction with new laboratory methods for fast, non-destructive and low-cost prediction of soil properties such as soil reflectance spectral measurements is promising. To estimate the C-sequestration potential and allow accounting of it, to determine the temporal frame of SLM impacts, but also to identify trade-offs, the efforts in quantitative impact assessment shall be extended. This will be done for example in a Research Project to be conducted in Phase 3 of the NCCR North-South to assess the impact of SLM systems on agricultural productivity and carbon sequestration in Tajikistan, Ethiopia and Kenya.

Mapping: Opportunities for WOCAT to make a better use of GIS and remote sensing were discussed. So far impact assessments focused mainly on the local scale, but information at the regional scale is also much required, which is a considerable challenge. The search for indicators suitable for information extraction from remotely sensed data as well as for being linked with the existing WOCAT classification system needs to be continued. Mapping of conservation, not only of degradation as commonly done, is strongly advocated by WOCAT and taken up by CDE research. Furthermore, linking participatory mapping with remote sensing and GIS is a topic that needs further exploration. CDE had the lead in the development of the recent WOCAT-LADA joint mapping methodology to assess sustainable land management practices and in linking them to degradation and conservation through a participatory expert assessment. The WOCAT/LADA mapping tool can be further enhanced. Research Projects in the new phase of the NCCR North-South and covering South-East Asia, Central Asia, Horn of Africa and East Africa provide great opportunities to test approaches in various region of the world.

Decision support: In the ongoing EU project DESIRE, a decision support tool has been developed that allows participatory selection of SLM technologies. It facilitates better assessment of SLM technologies and approaches, and better support of the negotiation process concerning the selection of best option(s) for a given human and natural environment. To develop this tool, WOCAT was linked to CDEs approach 'Learning for Sustainability' and an open-source software was used to come up with a user-friendly tool. In this way, WOCAT can also be a very suitable tool for extension services. Further development of such applications is foreseen, and has been included in various research proposal recently elaborated by CDE.

Bettina Wolfgramm presenting the linkages of CDE and WOCAT. (Photo: Mats Gurtner)

Opportunities for WOCAT to make a better use of GIS and remote sensing were discussed.

Closing

William Critchley, CIS, VU-University Amsterdam and Hanspeter Liniger, WOCAT coordinator

WOCAT has become an institution: this is a testimony to the dedication over more than 15 years of WOCAT's sponsors – most notably SDC – and its partners. This is further reinforced by the presence here today of so many people with longstanding commitments to the programme: partners from development organisations as well as research, and furthermore a number of students have participated in this symposium. There is every indication in what we have heard throughout the symposium (and this confirm what we all know) that WOCAT is alive and well, and being used in many different ways in various countries. WOCAT has become firmly embedded, and is setting standards worldwide as a knowledge management system for SLM and decision making.

The book "where the land is greener" has consolidated WOCAT's place at the forefront of new advances in sustainable land management. This is not simply because it presents well described and illustrated case studies, but it also provides clearly articulated policy pointers. And WOCAT is influencing policy makers. This impact on decision makers is strengthened further now that climate change has been linked to soil carbon, and thus SLM is recognised as a tool in the fight against climate change. WOCAT can thus claim to have even more "global" relevance than it did before.

Considerable mention has been made about the need to "upscale" successes. But it must be recognised that WOCAT has highlighted many examples where traditions, introduced technologies and /or local innovations in SLM have spread widely and rapidly: sometimes simply by farmer-to-farmer exchange of knowledge. This is why it is important to analyse and learn from both the approaches and the technologies. Once again the policy guidelines within the book give pointers to how this can be achieved.

The future of WOCAT is ensured in that it has been embraced by so many national programmes, and has firmly linked together so many different partners: individuals as well as institutions. Certainly there are challenges ahead such as further up-scaling of sustainable technologies, the need to develop maps of SLM, and the requirement to quantify impacts of SLM on ecosystem services, food security and poverty alleviation. WOCAT will also need to increasingly focus on adaptation to, and mitigation of, climate change, WOCAT is overcoming constraints and forging forward.

SLM is complex and we need to stand up for it: "as little as possible – but as much as needed" is the guiding maxim. In order to provide useful support to land users and decision makers all over the world the concluding policy point in the book "where the land is greener" is all important and deserves highlighting here:

Policy points: investing in soil and water conservation

Investment in rural areas and SWC is a local concern, a national interest, and a global obligation. Thus it must be given priority:

- at the local level: to increase income, improve food security, and sustain natural resources – thus helping to alleviate poverty in areas where the livelihoods of the majority depend on agricultural production;
- at the global and national level: to safeguard natural resources and ecosystem services and in many cases to preserve cultural heritage.

Investments in SWC must be carefully assessed and planned on the basis of properly documented experiences and evaluated impacts and benefits: concerted efforts are needed and sufficient resources must be mobilised to tap the wealth of knowledge and learn from SWC successes. These investments will give 'value for money' in economic, ecological and social terms.

Conclusions and policy implications

Closing words of William Critchley
(Photo: Mats Gurtner)

The future of WOCAT is ensured in that it has been embraced by so many national programmes, and has firmly linked together so many different partners.