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# WOCAT: Information Management and Decision Support for Soil and Water Conservation (SWC)

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## SUMMARY

WOCAT (World Overview of Conservation Approaches and Technologies) is a global network of institutions which are collaborating since 1992 to compile and standardise information through collecting, describing, and making available information on technologies, approaches and area coverage of successful examples of soil and water conservation world-wide. This paper describes the information management, methodology and organisational set-up of WOCAT and some experiences relating to the African mountains and highlands. It invites specialists and institutions to join the programme and to share their knowledge in sustainable land management with the other WOCAT participants. Benefits for doing so are multiple and mutual, and the chances to reduce problems and pitfalls in achieving better land management systems through the improved WOCAT decision support are manifold.

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## RÉSUMÉ

WOCAT est un réseau global constitué d'institutions qui collaborent depuis 1992 pour compiler et standardiser une banque de données par la collection, description et mise à disposition d'informations sur des technologies et approches de conservation du sol et de l'eau, ainsi que sur leur distribution spatiale. Cet article décrit le système d'information intégré, la structure, la méthodologie et l'organisation du programme, de même que quelques expériences faites dans les montagnes et hauts-plateaux d'Afrique. Il invite les spécialistes et les institutions à se joindre au programme et à partager leurs connaissances de la gestion durable des ressources naturelles avec les membres de WOCAT. Une telle participation offre des avantages multiples et augmente les possibilités de pallier aux problèmes de la gestion des ressources naturelles en développant un système d'aide à la décision.

## INTRODUCTION TO WOCAT

### PURPOSE AND GOAL

The World Overview of Conservation Approaches and Technologies (WOCAT) is a world-wide network launched in 1992 by the World Association of Soil and Water Conservation (WASWC). WOCAT is organised as a consortium of international and national institutions and implemented at regional and national scales by local teams. The consortium is co-ordinated by a Management Board which is listed in the acknowledgement. The WOCAT network has been developed based on the assumption that world-wide, many soil and water conservation specialists, planners, decision-makers and local land users are involved in maintaining and improving soil productivity. Most of this valuable experience is lost to people in other locations because it is not well documented.

In this context, WOCAT has been designed to help sharing this experience world-wide. It uses standardised questionnaires to collect information on SWC technologies and approaches at the regional and national level. Data are analysed, presented and disseminated on a global, regional and national basis. The information is available in the form of books and maps, as well as in digital format. So far WOCAT operates in English, French and Spanish. If needed, additional languages can be added.

#### WOCAT IN AFRICAN MOUNTAINS AND HIGHLANDS

On the African continent, WOCAT has so far been active in 22 countries since 1995 (cf. WOCAT, 1995; Critchley and van der Wal, 1996). In several of the countries with considerable share of mountains and highlands, such as Ethiopia, Kenya, Tanzania, Malawi, Lesotho, South Africa, Morocco and Cameroon, the WOCAT methodology has been tested and the collection of experiences in SWC has been initiated. Results have been presented in UNEP 1998, Liniger et al. 1998 and Giger et al. 1998

#### BENEFICIARIES OF WOCAT

SWC specialists, extension workers, and technicians are provided with a method to document and monitor their own experience. They have access to world-wide information on SWC approaches and technologies available in books and digital format, including comprehensive information about the biophysical and socio-economic context of SWC. This enables them to assess potentials and limitations of SWC options.

National and regional SWC institutions, planners and decision-makers benefit from an information management system to document SWC activities - collection, analysis, storage, dissemination - and from a decision support system to evaluate on-going activities and plan appropriately. Those tools to tap from existing experiences help avoid mistakes and duplications.

Donors are provided with tools and outputs that assist in monitoring the efficiency of investments in SWC. They help them to evaluate whether SWC activities are valuable contributions towards overall goals, such as poverty alleviation and empowerment through improving particularly the land users' situations, sustainable land management in the sense of AGENDA 21, and eventually to sustainable development.

WOCAT addresses land users, who are the ultimate target group for SWC, indirectly through improved support of the beneficiaries mentioned above.

## THE WOCAT METHODOLOGY

#### GENERAL ASPECTS

In order to be widely acceptable, the methodology has been developed through a participatory process involving various core collaborating institutions and SWC specialists world-wide. So far, 24 institutions from all continents have been involved in the methodology development through the delegation of 35 core collaborating SWC specialists (cf. Schwilch and Liniger, 1997).

The methodology is set-up to suit the needs of individual SWC specialists and institutions at different scales: from local to national, and regional to continental scales. Therefore, all methods established are largely scale-independent. The methodology's most outstanding achievement is that it provides a well-tested Information Management System (IMS) including a standard for the collection, storage and analysis of SWC experience and at the same time a framework for the evaluation, monitoring and exchange of SWC measures. It thus enables and facilitates the exchange and comparison of local knowledge within the region as well as between different parts of the world. The methodology may be adapted to suit a great variety of technologies and approaches all over the world and to consider local and regional particularities.

The methodology is designed to capture and integrate the rich experience of SWC specialists, such as implementers, extension workers, researchers, and land users. It helps to bring those people together, and to integrate their knowledge and views. However, the information provided will always have a personal (subjective) touch by the resource persons filling in the questionnaires. The same experience may be judged differently by different resource persons.

In the first phase, the methodology aims to cover activities that have been ongoing for a number of years, where local people and SWC specialists had sufficient time to test and develop the technologies and approaches to their human and natural environment. Very recently initiated activities that have not been tested properly or have not had a marked impact, will only be considered in a second phase of the WOCAT data collection.

The ultimate goal of this exercise is to provide a Decision Support System (DSS) for SWC specialists, planners and decision makers, in order to improve the effectiveness of SWC through analysing such field experience. To achieve this, a better understanding of the reasons behind successful experience with SWC must be obtained - whether introduced by projects or found in traditional systems. However, it is not only necessary to analyse so-called "successful" examples, but also those which may be considered - at least partially - a failure. The reasons for failure are equally important for analysis. In many cases there is no question of complete success or complete failure, but rather of some "good" and some "bad" aspects of a measure. These strengths and weaknesses need to be thoroughly documented.

#### QUESTIONNAIRES FOR DATA COLLECTION

Three questionnaires are used to analyse and evaluate SWC:

- (1) The questionnaire on SWC Technologies (QT) addresses the specifications of the technology, and the natural and human environment in which a technology is used (WOCAT, 1998a).

- (2) The questionnaire on SWC Approaches (QA) addresses the questions, how implementation was achieved, and who achieved it (WOCAT 1998b).
- (3) The questionnaire on the SWC Map (QM) addresses the spatial distribution of degradation and SWC (WOCAT, 1998c).

For definitions of technologies and approaches see box. The three questionnaires are mutually complementary. Information obtained from them will provide a data and information base for the evaluation of SWC.

The questionnaire on SWC Technologies (QT) addresses the following topics:

- General information: Contributing SWC specialist - Brief identification of SWC Technology - Area information - Land degradation
- Specification of SWC Technology: Description - Purpose and Classification - Status - Design, technical and management specifications - Natural environment - Human environment and land use - Costs - Supportive technologies
- Analysis of the SWC technology: Benefits, advantages and disadvantages - Economic analysis - Adaptation - Acceptance or adoption - Concluding statement
- Documentation: Available documentation - Evaluation of the questionnaire - Additional information - Categories for SWC technologies

After describing the technology, the next step is to specify how it was implemented in the field, by using the SWC Approach questionnaire (QA), which deals with the following issues:

- General information and background: Contributing SWC specialist(s) - Brief identification of SWC Approach - Area information
- Specification of SWC approach: Description, objectives, operation - Participation - Finance - Indirect subsidies - Direct subsidies
- Analysis of the SWC Approach: Methods used for monitoring and evaluation - Impact and analysis - Concluding statements
- Documentation: Available project/programme documentation - Evaluation of the questionnaire - Additional information

Both questionnaires are thus structured in the same way: After an introduction, the questions are always on the right page whereas the corresponding explanations, examples, photographs, drawings and cartoons are on the left side. The questions are arranged according to different topics. As much as possible a choice of answers is provided as well as the possibility to add answers. There is

## DEFINITIONS USED IN THE WOCAT METHODOLOGY

Sustainable land management (SLM) refers to the use of land resources such as soils, water, animals and plants for the production of goods – to meet changing human needs – while assuring the long-term productive potential of these resources, and the maintenance of their environmental functions

Soil and Water Conservation (SWC) in the context of WOCAT includes activities at the local level which maintain or enhance the productive capacity of the soil in erosion-prone areas, through prevention or reduction of erosion, conservation of soil moisture, and maintenance or improvement of soil fertility.

A SWC Technology consists of one or more measures belonging to the following categories:

- agronomic (e.g. intercropping, contour cultivation, mulching),
- vegetative (e.g. tree planting, hedge barriers, grass strips),
- structural (e.g. graded banks or bunds, level bench terrace),
- management (e.g. land use change, area closure, rotational grazing).

Combinations of the above measures, when they are complementary and thus enhance each other, are part of a SWC Technology.

A SWC Approach defines the ways and means that are used to realise and support a SWC Technology in achieving more sustainable soil and water use. Elements of a SWC Approach are as follows: All participants (policy-makers, administrators, experts, technicians, land users, i.e. actors at all levels), inputs and means (financial, material, legislative, etc.), and know-how (technical, scientific, practical). An approach may include different levels of intervention, from the individual farm, through the community level, the extension system, the regional or national administration, or the policy level to the international framework.

Besides SWC activities introduced through projects or programmes, WOCAT includes indigenous SWC measures and spontaneous adoptions or adaptations of SWC technologies. In using the term "SWC Approach", WOCAT intends to refer to a particular SWC activity (whether an official project/programme, or indigenous systems, or changes in farming systems towards more sustainable soil and water use). In the case of a project, WOCAT restricts itself to the SWC part within the project, i.e. the elements that are directly or indirectly relevant to SWC.

ample space to fill in comments, explanations and illustrations. Although this structured way providing both choices and free answers increases the length of the document, it considerably helps filling it in.

The WOCAT Questionnaire 'Map' (QM) constitutes the geographical component of WOCAT. It can be considered as a sequel to the Global Assessment of Human-Induced Soil Degradation (GLASOD) that was realised by ISRIC and UNEP (Oldeman et al, 1990). The QM evaluates what is happening where. It links information obtained through a data questionnaire to a Geographical Information System (GIS), which permits the production of maps as well as area calculations on various aspects of SWC. The QM should be considered complementary to the other two questionnaires. Linkage of all three questionnaires provides a powerful overview of SWC activities in a country, a region, or world-wide.

In principle any map can be used as a base for the WOCAT mapping exercise, but wherever possible it is proposed to use physiographic map units, delineated according to the SOTER methodology (van Engelen and Wen, 1995) , to provide the mapping basis for WOCAT. SOTER is an internationally endorsed and standardised methodology for storage and mapping of soil and terrain data. Physiographic maps at a scale of 1:5 M. have been prepared for Asia, Africa (draft) and Latin America, and at 1:2.5 M scale for Central and Eastern Europe. Linking WOCAT to SOTER produces a comprehensive database that contains information on terrain and soils, but ideally also on soil degradation, land use and climate (optional), and SWC activities.

## INFORMATION MANAGEMENT SYSTEM (IMS) AND DECISION SUPPORT SYSTEM (DSS)

### GENERAL PRINCIPLES

The WOCAT Information Management System (IMS) is a tool to electronically store and easily retrieve and analyse WOCAT questionnaire-based data. The main challenge for the WOCAT-IMS is to store the huge amount of complex answers of the questionnaires in a database that allows easy entry, retrieval and flexible analysis of the data. The database thus entails a user-friendly menu structure; a questionnaire look-alike data entry module; a search-facility based on a combination of general, bio-physical and socio-economic criteria; a suite of pre-defined queries for various types of analysis across different technologies/approaches (e.g. technologies applied on different land use types and altitudes, participation of the local community during different project



FIGURE 1: Example of 'graded Fanya juu', a soil conservation technology draining excess water which was adapted from Kenya, but not widely adopted by Ethiopian peasants in the extreme highlands due to many reasons. H. Hurni, 15.11.1984

phases, etc.). The database further entails reporting modules to visualise and/or print a summary of a selected technology/approach, special topics of a selected technology or approach and a whole questionnaire. Additionally, the IMS allows linkages to the WOCAT hypertext module and other special topic database, and finally, it allows the distribution on various media: diskette, CD-ROM and the Internet.

There is a keen interest in a computerised system that assists experts for evaluation and decision-making. But it is often neglected that data first have to be collected and entered, and that any output of a database is directly linked to the quality of the input data. The database should stimulate thinking of the users who may ask more questions, such as finding out why certain technologies and approaches worked in one place, and whether they could work in another place. It will, however, never provide a single solution by clicking a button; it cannot generate more information out of the data than was entered before, but it can assist in generating better knowledge and finding possible improvements and solutions. The IMS with the other outputs are building up the DSS of WOCAT. For all identified beneficiaries of WOCAT, the following expectations are in





FIGURE 2: Example of 'Food-for-work', a top-down approach commonly applied in Ethiopia in the 1980s, which resulted in a mixture of success and failure. H. Hurni, 7.12.1983

common: the different users are to learn and benefit from other experiences and avoid duplication, they are to narrow down the supermarket shelf to those possibilities they would like to try, and to identify „best-bet“ options and still have a choice of options with information on advantages and disadvantages.

#### SOFTWARE AND DATA ENTRY FOR THE QUESTIONNAIRES QT AND QA

The system used is MS-Access 97, taking into consideration that many users are familiar with Microsoft Software. Runtime versions are existing for users who do not have MS-Access 97. The software requires Windows 95 / NT, about 20 MB RAM, and about 30 MB space for each of the databases (technologies, approaches). The database system was developed by FAO and CDE and is freely accessible by all WOCAT contributors. A first CD-ROM was released in June 98 and it is planned to put it on the Internet in future.

Data entry is made as user-friendly as possible, with entry masks looking like the paper versions of the questionnaires. It is best to enter the data having the printed questionnaire beside, since the explanation pages are not yet viewable in the computer version. All optional replies can be selected by drop-down lists. Many text answers are not limited in length, allowing the user to enter

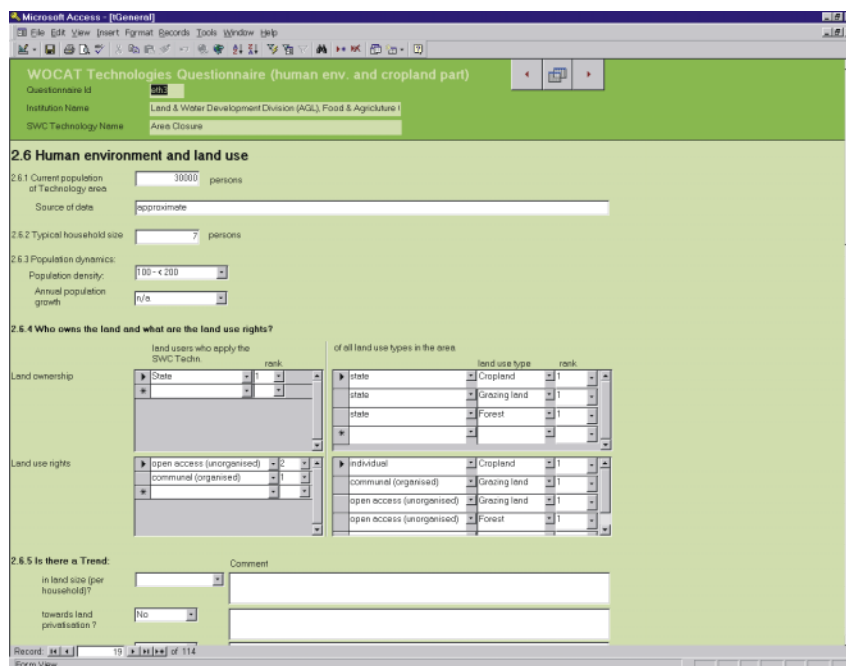


FIGURE 3. Example of a data entry format of the SWC Technology Questionnaire QT on screen.

comprehensive answers. Data can be entered in any regional WOCAT node, and be appended to the WOCAT World Database later on. An example of a data entry form is given in Figure 3.

DATA QUERY AND RETRIEVAL FOR QT AND QA

Probably the most powerful part of the database system is the analysis tool. There are different ways of retrieving, querying and analysing the database. All results are based on the latest data entered. A very useful example of analysis and presentation of outputs is the summary of a technology (or an approach) shown in Figure 5. Its aim is to give an overview over a technology / an approach over 2-3 pages. Answers to selected questions are displayed in a predefined way. A further example is the regional overview, which aims to provide an analysis of the answers to a certain issue for a continent or region. Figure 6 gives an example of a regional analysis relating to technologies and land use types described for the African highlands and mountains. Other issues

**WOCAT Technologies - Search by Criteria**

**General**

Key word(s)  and  or  or

Name of technology

Description of techn.

**Tips:**  
Don't be too restrictive by selecting many criteria!  
Click on the frame to remove a set of criteria.

**Geographic**

Continent  Region  Country

**Problems / Means**

Measures  or  Category  or

Main means  or  Soil deg. addressed  or

**Natural**

Climatic regime  or

Avg. annual rainfall  or

Elevation  or

Slope  or

Avg. soil depth  or

Soil fertility  or

Soil texture  or

Land forms  or

**Human / land use**

Land use type  or

Market orient.(Crops)  or

Market orient.(Grazing)

Market orient.(Forest)

Land ownership  or

Land use rights  or

Area per household  or

Costs <  US\$/ha <  US\$/ha  
Initial Recurrent

FIGURE 4. Data query system to search for technologies that meet user-defined criteria.

include multi-parametric analyses, as it was done for Eastern and Southern Africa (Linger et al, 1998), the question of incentives in SWC (Giger et al, 1998), or the spatial impact to reduce problems of desertification (UNEP, 1998).

As shown in Figure 4, a query system has been established that allows a database search for technologies and approaches that meet a set of user defined criteria, e.g. climate, land ownership, costs, etc.. Either all data sets are searched, or the user can narrow down the records to a continent, a region, or a country. A list is provided as a result, from which single technologies or approaches can be viewed (e.g. as summary).

DATA ENTRY, PROCESSING, AND PRESENTATION FOR QUESTIONNAIRE QM

In case of the map, the database is linked with a geographical information system (GIS).



*DRAFT OF AUTOMATICALLY GENERATED VERSION!*

**WOCAT** **Handbook on SMC Technologies**

Application of Technology: **Legend:**  low 1  low 2  low 3

Natural environment:

<b>Avg. annual rainfall:</b>	<b>Elevation (m):</b>	<b>Slopes:</b>	<b>Soil depth:</b>	<b>Soil secure:</b>
<500: <input type="checkbox"/>	<400: <input type="checkbox"/>	<10%: <input type="checkbox"/>	very shallow (0-20cm): <input type="checkbox"/>	completely stable: <input type="checkbox"/>
400-600: <input type="checkbox"/>	400-600: <input type="checkbox"/>	10-20%: <input type="checkbox"/>	shallow (20-50cm): <input type="checkbox"/>	medium (low): <input type="checkbox"/>
600-800: <input type="checkbox"/>	600-800: <input type="checkbox"/>	20-30%: <input type="checkbox"/>	moderately deep (50-100cm): <input type="checkbox"/>	low (high): <input type="checkbox"/>
800-1000: <input type="checkbox"/>	800-1000: <input type="checkbox"/>	30-40%: <input type="checkbox"/>	deep (100-200cm): <input type="checkbox"/>	variable: <input type="checkbox"/>
1000-1500: <input type="checkbox"/>	1000-1500: <input type="checkbox"/>	40-50%: <input type="checkbox"/>	very deep (>200cm): <input type="checkbox"/>	
1500-2000: <input type="checkbox"/>	1500-2000: <input type="checkbox"/>	50-60%: <input type="checkbox"/>		
2000-3000: <input type="checkbox"/>	2000-3000: <input type="checkbox"/>	60-70%: <input type="checkbox"/>		
3000-4000: <input type="checkbox"/>	3000-4000: <input type="checkbox"/>	70-80%: <input type="checkbox"/>		
>4000: <input type="checkbox"/>	>4000: <input type="checkbox"/>	>80%: <input type="checkbox"/>		

Human environment:

<b>Size of subsector and per household:</b>	<b>Land ownership:</b>	<b>Land use rights:</b>	<b>Market orientation:</b>
< 1 ha: <input type="checkbox"/>	state: <input type="checkbox"/>	open access (no rights): <input type="checkbox"/>	no: <input type="checkbox"/>
1-2 ha: <input type="checkbox"/>	company: <input type="checkbox"/>	community (open): <input type="checkbox"/>	low: <input type="checkbox"/>
2-5 ha: <input type="checkbox"/>	community: <input type="checkbox"/>	leased: <input type="checkbox"/>	medium: <input type="checkbox"/>
5-15 ha: <input type="checkbox"/>	group: <input type="checkbox"/>	individual: <input type="checkbox"/>	high: <input type="checkbox"/>
15-50 ha: <input type="checkbox"/>	individual, not titled: <input type="checkbox"/>		
50-100 ha: <input type="checkbox"/>	individual, titled: <input type="checkbox"/>		
100-500 ha: <input type="checkbox"/>			
500-1000 ha: <input type="checkbox"/>			
> 1000 ha: <input type="checkbox"/>			

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Adoption/assistance: **groups:** **members:** **reasons:**

with incentives: 100% ( 100 families)

no incentives with incentives:

without incentives: % ( families)

no spontaneous incentives:

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Evaluation: **Legend:**  negligible  low  medium  high

<b>On-farm benefits:</b>	<b>Production and socio-economic:</b>	cost of fix-off: <input type="checkbox"/>
	Farm income increase: <input type="checkbox"/>	
	Crop yield increase: <input type="checkbox"/>	
	Improved knowledge SMC/ASMA: <input type="checkbox"/>	
	Community/Institution strength: <input type="checkbox"/>	
	<b>Socio-cultural:</b>	Soil use reduction: <input type="checkbox"/>
	Ecological: <input type="checkbox"/>	Efficiency of roads/water drainage: <input type="checkbox"/>
	Other: <input type="checkbox"/>	increase in soil fertility: <input type="checkbox"/>
<b>On-farm benefits:</b>		increase dam water: <input type="checkbox"/>
<b>On-farm disadvantages:</b>	<b>Production and socio-economic:</b>	increased input costs: <input type="checkbox"/>
	Socio-cultural: <input type="checkbox"/>	increased labor costs: <input type="checkbox"/>
	Ecological: <input type="checkbox"/>	Socio-cultural conflicts: <input type="checkbox"/>
	Other: <input type="checkbox"/>	soil deterioration: <input type="checkbox"/>
<b>On-farm disadvantages:</b>		stability: <input type="checkbox"/>
		water loss: <input type="checkbox"/>

Author: Heinger Moses, Ministry of Agriculture, Bolivia.  
World Association of Soils Water Conservation 17-JUN-98

The data entry part is organised in a way similar to QT and QA, with user-friendly, questionnaire-look-alike entry masks.

From the Access database, the user can select the theme and the region to view. It is possible to view a map directly in Access. This also helps in immediately cross-checking and rectifying the entered data, which is important because the perception of e.g. the area covered by conservation measures, can vary from country to country, or from person to person. A quick view on the resulting map helps a lot in getting aware of slight differences in interpretation.

## ESTABLISHING WOCAT PROGRAMMES AT DIFFERENT SCALES

For global, regional and national levels, different responsibilities for carrying out the WOCAT programme and for producing outputs were identified.

### THE GLOBAL PROGRAMME

WOCAT is organised as a consortium of international and national organisations. Membership is open to all institutions that wish to participate in WOCAT either by carrying out regional and national WOCAT activities, and/or by participating in the development of the methodology and the global outputs. Annual international workshops and steering meetings are a key to allow participatory development of the programme, and to guarantee strong involvement of and exchange between the collaborating institutions. During these events the progress is being evaluated, methodological key issues are further developed, and the planning of future activities is discussed. The steering meeting, where funding institutions join the members of the collaborating institutions, provides the official forum to elect the Management Board, to make a review of the previous activities, and to approve the future plans of the programme.

The Management Board of WOCAT assures overall co-ordination and management, organises methodology development (guidelines, software), manages the global database, identifies regional partners, provides support for setting up regional institutional mechanisms, and provides support and backstopping for regional and national activities. Outputs of the global activities are questionnaires, an IMS (including software) procedures, manuals, guidelines; PR-Materials such as posters, booklets and CD ROMs, global handbooks of technologies and approaches, and maps.

#### THE REGIONAL, NATIONAL AND SUB-NATIONAL PROGRAMMES

At the regional and national scales, co-ordination is organised through regional and national institutions. Their mandate is to build up the capacity of regional and national networks of institutions and individuals, to motivate and provide guidance and training to institutions and partners, identify sources of funding, facilitate regional and national activities. They organize workshops, data collection, quality control of data, data entry, manage regional or national databases, provide outputs, make database and outputs available to local, national and regional SWC specialists and other users, and exchange experiences and information with global WOCAT programme and with other regional/national WOCAT collaborating institutions. Outputs of these activities are regional and national databases; handbooks, reports and analyses for technologies and approaches, and maps to be distributed to the regional partners and users.

The role of the (sub)national and regional WOCAT programmes is identified and approved by the management board and the annual steering meeting. Regional and national co-ordinators are also members of the global WOCAT consortium in order to assist in the development of the programme and to guarantee a link between the global, regional, and national programmes. These links are formalised through Memorandums of Understanding (MoU).

#### GUIDELINES FOR APPLYING THE WOCAT METHODOLOGY

Guidelines have been developed by the WOCAT consortium. According to them, WOCAT provides the methodology and the software free of charge, and assists national and regional institutions which have an interest in collaboration. National and regional institutions organise the national or regional data collection and analysis and assist in further developing the methodology. Collaborating institutions follow the standard methodology and provide the most promising and successful experiences, and maybe some important failures, to the global database. For the further development of regional and national data sets, standards may be adapted to the regional and national needs, always with the consequence that comparison and exchange with other data sets may become more difficult if not impossible.

#### GUIDELINES FOR DATA COLLECTION, QUALITY CONTROL, AND ANALYSIS

Procedures for building up an IMS and its database at the global, regional and national level have been elaborated (see box).

HOW TO MANAGE WOCAT REGIONAL AND NATIONAL INITIATIVES  
OVERVIEW OF PHASES AND ACTIVITIES

Preparatory Activities

1. Identification of relevant institutions at the regional/national level, their potential, capacities, expectations, needs, with respect to WOCAT, and their relevant partners.
2. Preparation of a proposal for the initiative following a standard proposal format.
3. Approval of the programme and the funding.
4. Familiarisation of partner institutions with WOCAT and prepare for participation in the programme.
5. Selection of potential contributors and participants.
6. Preparation of a base map for the questionnaire (map) in order to provide a reasonable spatial basis.
7. Finalising the programme for the following phases.

Implementation Phase I: Training and Establishment of the Database

8. Preparation for a WOCAT workshop (cf. steps 4-6).
9. Conduction of an initial training workshop (desirably of one week). The optimum number of participants is 2-3 per country/province with a total maximum of about 30.
10. Provision of additional training to regional/national WOCAT co-ordination staff in data management and analysis.
11. Carrying out in-country data collection (field work). Field visits are indispensable!
12. Gathering for a report-back (follow-up) meeting, presentation and first analysis, e.g. draft maps and short summaries of first results. Data correlation and troubleshooting. Participants: WOCATeers and others (govt. officials, donors, etc.).

Implementation Phase II: Analysis and Dissemination of Results

13. Data checking, quality control and ground truthing.
14. Preparation of outputs at regional level: maps, books on technologies and approaches. Conform to WOCAT standards.
15. Evaluation of SWC on the basis of WOCAT data
16. Application of WOCAT products, e.g. for project design/implementation or evaluation?
17. Linking to global database.

Follow-Up Activities

18. Regular monitoring of changes and updating the database
19. Continuous database Management
20. Expansion of database



## GUIDELINES FOR THE USE AND EXCHANGE OF DATA

Collaborating institutions are encouraged to provide their data to the global WOCAT database. From national and regional initiatives WOCAT would also welcome a copy of the data collected beyond the information that goes into the global data sets. The updating of the global database should necessarily be done centrally, either through the secretariat of WOCAT mandated by the Management Board. The updating, quality control and the distribution of the national / regional database will be handled by the leading national or regional institution. WOCAT operate on the principle that WOCAT outputs should be made available free of charge, first to collaborating institutions and contributing SWC specialists, and in a second phase to all interested parties world-wide, e.g. through the distribution of CD-ROMs and through Internet.

## CONCLUSION

## BENEFITS

The following benefits of the WOCAT programme have been recognised by its users:

- Self-evaluation: The methodology assists experienced SWC specialists in evaluating their own activities and thus in increasing the knowledge and capacity to improve their support to land users.
- Information Management: Much knowledge from field experiences is not or only improperly documented. The WOCAT programme assists in gathering this valuable information and making it available to others before it is lost.
- Overview: The information stored in the WOCAT database provides an overview of SWC activities in a country, region or world-wide.
- Understanding: The data and thus the knowledge of many SWC specialists can be analysed in a flexible way according to local or regional situations.
- Learning and decision support: Repetition of mistakes can be avoided by facilitating informed decisions on future SWC activities.
- Options: WOCAT provides SWC specialists, decision makers and ultimately the land users with different options of possible interventions rather than with fixed solutions.
- Networking: The programme stimulates exchange and further contacts between SWC specialists, land users, planners and decision makers.

## PROBLEMS, PITFALLS AND POSSIBILITIES

The following problems, and possibilities to overcome them, have been identified:

- Quality of information: Providing good information not only requires SWC specialists with good knowledge themselves, but also necessitates them to obtain more information either from documents, from other colleagues and, most importantly, from the land users themselves. This should be seen as a challenge to improve their knowledge and to enhance the interaction with colleagues and land users.
- Quality control: Because the system relies on the quality of the information provided by SWC specialists, there is a danger that other users can be misled if it is of a low standard. The regional and national programmes should take this as an opportunity to improve the local knowledge and database by setting up quality control procedures in order to reduce the amount of misleading information.
- Local specificity: The computer database system does not evaluate in terms of what is “good” and “bad”. Information from other areas should not be used without a proper prior analysis of the local environment. The computer Information Management Systems and its database are very valuable tools in the search for improved solutions. Certain options might look more promising than others. However, together with the land users, the SWC specialists, planners and decision makers have to analyse the problems and the environment very carefully before a solution is proposed. Other documents (mentioned in the database) should be consulted and the SWC specialists who provided the information on those promising SWC technologies and approaches should be contacted.
- Longevity: WOCAT needs a medium to long-term commitment: In order to provide the relevant information, the maintenance of the database requires updating with new information, exchange with other national, regional and global programmes. This task is demanding, and thus a proper evaluation should be made by stakeholders of the programme in order to assess the costs and the benefits.

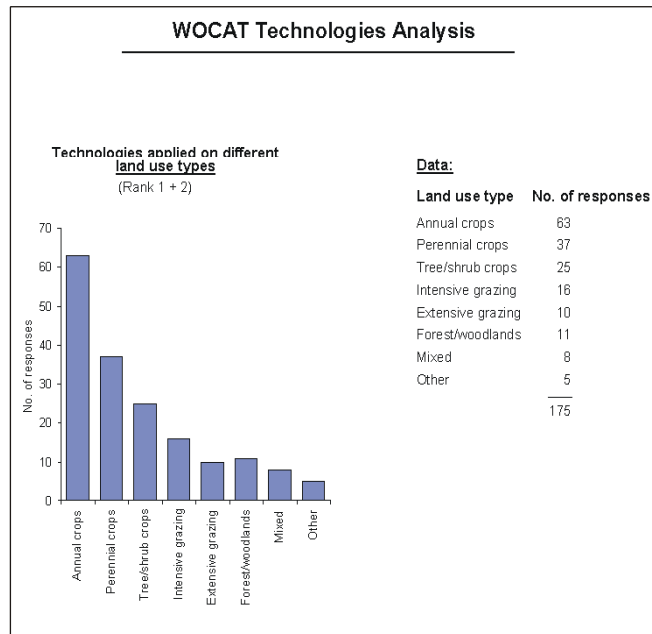


Figure 6: Example of computerised WOCAT outputs. The analysis classifies the SWC Technologies for African mountains and highlands in relation to their occurrence on different land use types. Source: WOCAT CD-ROM.

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## REFERENCES

- Critchley, W. and van der Wal, A. 1996: Workshop Report. Third WOCAT Regional Workshop, Southern Africa, Magoesbaskloof, 11-15 December 1995, 21pp.
- Giger, M., Liniger, H.P., and Critchley, W., 1998: Use of incentives and profitability of Soil and Water Conservation (SWC): Preliminary analysis of WOCAT data from Eastern and Southern Africa. Berne, draft, 16 pp.
- HERWEG, K, SLAATS, J. & Steiner, K. (1998): Sustainable land management - guidelines for impact monitoring. Working documents for public discussion. Workbook 79p. and Toolkit 128p. Bern.
- Liniger, H.P., Thomas, D.B., and Hurni, H., 1998: WOCAT - World Overview of Conservation Approaches and Technologies – Preliminary results from eastern and southern Africa. In: Towards sustainable land use, Vol. II. Advances in Geocology 31, Catena Verlag, Germany, p. 1037-1046
- Oldeman, L.R., van Engelen, V.W.P., and Pulles, J.H.M. 1990. The extent of human-induced soil degradation. Annex 5. ISRIC/UNEP/GLASOD, Wageningen.
- Schwilch, G. and, Liniger, H.P., 1997: Participation and networking with WOCAT: a World Overview of Conservation Approaches and Technologies. Dare to Share! GtZ, Margraf Verlag, Germany, p. 117-120
- UNEP, 1998: Desertification Atlas (second edition, including a regional WOCAT overview of eastern and southern Africa). Nairobi
- Van Engelen, V.W.P., and Wen, 1995: Global and National Soils and Terrain Digital Database. ISRIC, Wageningen.
- WOCAT, 1994: 2nd International WOCAT Workshop, Berne and Riederalp, Switzerland 11 - 15 October 1993. Centre for Development and Environment, Berne, 40 pp.
- WOCAT, 1995: First WOCAT Regional Workshop: Eastern Africa, Machakos, Kenya, 26 June - 1 July 1995. Centre for Development and Environment, Berne, 28 pp.
- WOCAT, 1997: World Overview of Conservation Approaches and Technologies: a programme profile. Centre for Development and Environment, Berne, 16 pp.
- WOCAT, 1998a: Questionnaire on SWC Technologies. Revised 1998. WASWC, and Centre for Development and Environment, Berne, 63 pp.
- WOCAT, 1998b: Questionnaire on SWC Approaches. Revised 1998. WASWC, and Centre for Development and Environment, Berne, 40 pp.
- WOCAT, 1998c: Questionnaire on SWC Map. Revised 1998. WASWC, and Centre for Development and Environment, Berne, 14 pp.
- WOCAT CD-ROM, 1998: Programme profile, SWC technologies and approaches database, maps, first results, addresses. FAO Land and Water Digital Media Series 3, Rome

