

DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
STRATEGY FOR RESEARCH AND KNOWLEDGE ON RENEWABLE NATURAL RESOURCES

NATURAL RESOURCES SYSTEMS PROGRAMME
FINAL TECHNICAL REPORT¹

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Project Title

Promotion of practical, approaches to soil and water conservation for smallholder farmers in sub-Saharan Africa

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Organisation

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NRSP Production System

Semi-Arid

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**DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
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FINAL TECHNICAL REPORT**

Executive Summary

In April 1995 a technical workshop on Soil and water conservation for smallholder farmers in semi-arid Zimbabwe (Twomlow *et al.*, 1995)² was held in Masvingo to review the recent developments in the field of soil and water conservation and to formulate recommendations for research and extension. One of the major recommendations of the workshop was the production of a farmer friendly guide documenting different soil and water conservation options, indicating the strengths and weaknesses of each, and providing examples of where *they* have been successful for a variety of climatic and geographical locations in Zimbabwe.

Four years on from this workshop this project has produced a series of guides under the collective title **A guide for farmers on good land husbandry** prepared, by a team of researchers, extensionists, dissemination specialists and farmers. The focus of this material was not to promote blue prints, but rather to encourage farmers to experiment and modify/adapt the different soil and water conservation options available to their own circumstances.

Experiences with participatory extension approaches and a review of the available literature strongly indicated this as the missing link in communication for successful dissemination. Most extension reference material is geared towards extension staff who then should teach farmers. It was found out, however, that this 'trickle down' of information through verbal communication is often weak and only reaches the few farmers who attend the extension sessions. Women, who often are not part of these meetings, but who carry out the main fieldwork only get information second hand, if at all. Therefore, this guide addresses farmers directly and will provide opportunities to all family members to get the information and will stimulate discussions among farmers even if there is no farmer extension agent available.

The guide draws upon various sources of information on technologies. The heart, however, are recommendations on advantages and disadvantages given by farmers who were involved in participatory technology development and extension activities. Their insights are to be disseminated to other farmers as a basket of technological options' they can experiment with, adopt or adapt. Conceptually the material forms an integral part of participatory technology development and extension as described by Hagmann, Chuma and Murwira (1997)³ and by AGRITEX 1998⁴.

Background

Much of the arable land in the small scale farming sector in sub-Saharan Africa is presently being used in a manner which is considered by many to be unsustainable. Some measures to reduce land degradation have been widely adopted, notably contour ridges to reduce gully and rill erosion. Unfortunately adoption of soil and water conservation (SWC) practices between contours is not widely practised, as the conservation technologies (CTs) promoted have given little consideration to the constraints faced by farmers, such as equipment, labour and draught animal availability. Consequently the adoption of technologies thought appropriate and currently being promoted to smallholder farmers has in general been disappointing, typically less than 1%

² Twomlow, S., Ells-Jones, J., Hagman, J. & Loos, H., 1995. (Editors). **Soil and Water Conservation for Smallholder Farmers in Semi Arid Zimbabwe - transfers between research and extension. Proceedings of a Technical Workshop, 3-7 April 1995, Masvingo, Zimbabwe.** Silsoe Research Institute Report OD/95/16. pp 212.

³ Hagmann, J., Chuma, E, Murwira, h., 1997: *Kuturaya; Participatory Research, Innovation and Extension.* In: van Veldhuizen, L., Waters Bayer, A., Ramirez, R., Johnson, D. & Thompson, J.: *Farmers' Research in Practice: Lessons From the Field.* IT publications, London, pp. 153-173.

⁴ AGRITEX, 1998: **Learning together through Participatory Extension. A Guide to an approach developed in Zimbabwe.** Published by the Dept. of Agric., Technical and Extension Services, GTZ and 1TDG Harare, Zimbabwe. 59 pp.

Since Independence, The Zimbabwean Department of Research and Specialist Services (DRSS) and the Department of Agricultural Training and Extension (Agritex) have undertaken to resolve this situation. This work has aimed at conserving soil moisture, reducing soil erosion, controlling weeds, and increasing yields utilising the resources available to small scale farmers, and it is apparent that there is no single method that will fit all circumstances. Each has advantages and limitations depending on agro-ecological (soil and rainfall) conditions, crops grown, availability of crop residues and other farmer resources.

In April 1995 a technical workshop on Soil and water conservation for smallholder farmers in semi-arid Zimbabwe was held in Masvingo to review the state of affairs in the field of soil and water conservation and to formulate recommendations for research and extension (Twomlow *et al.*, 1995). One of the major recommendations of the workshop was the production of a farmer friendly guide documenting different soil and water conservation options, indicating the strengths and weaknesses of each, and providing examples of where they have been successful for a variety of climatic and geographical locations in Zimbabwe.

Project Purpose

The Project addressed NRSP Semi-Arid purpose 1:

Commodity production increased through improved conservation and use of water resources.

The specific project purpose was:

Improved techniques for rainwater harvesting and conservation tillage developed and promoted

The project aimed at improving the sustainability of land use through the development and dissemination of appropriate materials that would enable farmers to select technologies appropriate to their individual environmental and socioeconomic circumstances.

Research Activities

Activities under this project commenced in January 1998 in Zimbabwe, and included:

1. A systematic and thorough literature search to review and document published and unpublished literature available within Zimbabwe on soil and water management, and identification of technologies that have been evaluated and are currently being promoted. This included a wide range of journal articles, books, dissemination material and grey literature available from Department of Research and Specialist Services Research Institutes (Agronomy Institute; Cotton Research Institute, Lowveld Research Station), Agritex, CIMMYT, University of Zimbabwe and NGOs such as IT-Zimbabwe.

Further details and outputs are given in Appendix A (see accompanying manual) , B (page 12), D (pages 20 to 24 and 3141) and G (pages 69 to 117).

2. Leading exponents of the different soil and water management technologies were interviewed to obtain information missing from reports (i.e. crops and soil types tested, geographic locations, adoption, limitations, labour rates etc., photographs, diagrams)!. The information available was extremely limited, as very little field work was of a participatory nature, the majority being researcher driven and managed and implemented on research stations outside of the farmers environment. Consequently there was no data on adoption rates, and only very limited data on labour available.

Further details and outputs are given in Appendix A (see accompanying manual) , B(page 12), C (see accompanying guides), D (pages 20 to 25), and E (pages 46-57).

3. A review of current dissemination material and promotion pathways used by Government and NGO extension agents_

Further details are given in Appendix D (pages 20 to 25), E(pages 47 to 49) and F (pages 59-62).

4. The materials collected during activities 1 and 2 were presented to two farmers group, one in Mwera (Mashonaland Central) and one in Zimuto (Masvingo), in the form of consultative workshops., facilitated by Zimbabwe Farmers Union (see Appendix D, Annex4 pages 42-45). The farmers were asked to assess the materials currently available in Zimbabwe on soil and water management in terms of their apparent usefulness and ease of use. Once the assessment exercises were completed, the farmers were asked to

describe the strengths and weaknesses of the current extension approaches, what they like and disliked about the current materials and make suggestions as to how they would like reference materials presented/packaged in the future.

Further details are given in Appendices B (page 14 to 14), C (see accompanying guides), D (Annex 4 pages 42-45).

- 5 Based on the findings of these meetings, and the concepts presented by Havet (1987)⁵ and Linney (1995)⁶, initial drafts were prepared and comments solicited from extension and development specialists with some limited field testing with farmers by ZFU (Appendix H, pages 118 to 128). Initial reactions were very



Figure 1: Farmers group in Mwera assessing extension and research materials

positive⁷ and a complete set of draft guidelines were prepared and evaluated with all interested stakeholders (representatives from research, extension, development and the farming community), to agree technical content, format and distribution procedures.

See Appendix B (pages 12 to 14), C (see accompanying guides) and F (pages 59 to 68) for further details of the workshop and the outputs.

- 6 Based on comments received from activities 4 and 5 the draft dissemination material was revised and appropriate art work commissioned. Draft English language versions of the guidelines were completed in January 1999, following some delays in the production of appropriate diagrams, and are now lodged with the Zimbabwe Farmers Union for translation into Shona and Ndebele. An English language draft of the booklets may be found in Appendix C (see accompanying guides).

Based on letters received from the Production Systems Leader, Mr C. Lewcock in January 1998, it was agreed that we should proceed up to activity 6 of the log-frame and prepare a draft report for the research managers so that the next steps could be agreed before proceeding with activity 7.

⁵ Havet, J., 1987. *Cartoons. Development Dialogue*: 2: 128-148

⁶ Linney, B. 1995. *Pictures, People and Power*. Macmillan Education Ltd., 195pp

⁷ Twomlow, March 1998. *Conservation tillage research and development*. OVR 921.

7. Draft guides have been disseminated initially in English, and will be disseminated at a wider scale in Shona and Nbele when translations have been completed by ZFU. The guides will be promoted by ZFUs network of district staff in collaboration with AGRITITEX and NGOs to the rural communities, with regional and local publications (Farmesa Newsletter and ZFUs own magazine), radio and TV used to make the research and extension staff aware of the guides, for example see Appendix B (pages 12-14)

Outputs

The planned output for the project was:

*'Consolidation of available soil and water conservation technologies into a clear and concise manual/guide that will allow farmers to select appropriate technologies': **Achieved, See Appendix C (accompanying guides).***

This has been achieved, through completion of all activities.

Activities 1 and 2

From the documents and information collected during activities 1 and 2, it is apparent that there is no single method of soil and water management that will fit all circumstances. Each technology has its own advantages and disadvantages depending on the agro-ecological (soil and rainfall) conditions, crops grown, availability of crop residues, farmer resources and farmers' diverse and complex criteria for decision making. However, significant increases in crop yields will only occur when improved conservation practices, like conservation tillage for example are combined with improved soil fertility management and effective weed control. The more recent research results also indicate that the performance of soil and water management technologies is highly dependant, not only on an extreme variability of the natural potential, but even more on the management capacity of farmers themselves. Unless smallholder themselves develop the understanding and the skills to manage their land in a way which combines production and conservation, the impact of all of this knowledge and research will remain a drop in the ocean.

Current practices that are being promoted and adopted by farmers in different areas of the country can be split into catchment/field margin techniques and infield practices. Catchment technologies range from the conventional contour ridge to *fanya juus* and infiltration pits. Infield practices range from primary land preparation techniques such as winter ploughing and tied ridging to mulching and reduced tillage techniques such as ripping, supported by improved weed control practices such as post emergent ridging.

The published and unpublished extension and research related materials have been compiled into a bibliography (Twomlow and Hagmann, 1998), published in the UK by Silsoe Research Institute, and to be published in Zimbabwe later this year by FARIvIESA. A web site is currently being created at Silsoe to give Internet access to the bibliography. In addition to the bibliography a review paper, given in Appendix G (pages 69-117), on sustainable dryland farming has been prepared and accepted by the **Annals of Arid Zone**.

Activity 2 and 3

A review of the available published and unpublished literature supported by interviews with leading proponents of soil and water conservation in Zimbabwe strongly indicated that there was a missing link in communication for successful dissemination. Most of the extension reference material available in Zimbabwe was geared towards research and extension staff who then teach farmers. It was the considered opinion of the participatory extension experts, and in subsequent farmer interviews, that this 'trickle down' of information through verbal communication was very weak and only reached the few farmers who attend the extension sessions, typically master fanner trainees. More importantly, women, who often are not part of these meetings, but who carry out the main field work, only get information second hand, if at all.

See Appendices D (pages 20 to 25), E (pages 47 to 49) and F (59 to 69) for more details.

Provision of appropriate reference material directly at the farmer aims to change the agricultural extension service delivery process from the traditional top down mechanism of information transfer, i.e.

Policy -t+ Research/Agricultural Extension Officers 4 Agricultural Extension Workers -1' Farmers

to a more demand driven approach, where farmers, having been exposed to information can request further information/guidance from Agricultural Extension Workers. The emphasis of the material is not only providing appropriate information on smallholder technologies to farmers, but to provide information on how to share experiences and problems and the concept of good land husbandry.

Activity 4

The materials collected during the first stage of this project were presented to a number of farmer groups, facilitated by the Zimbabwe Farmers Union and the Agronomy Institute (Appendix D pages 42 to 45). The objective of the workshops was to get farmers to describe the strengths and weaknesses of the current extension approaches and assess the available dissemination materials in terms of its apparent relevance to their farming situation and ease of use. Groups who participated in the consultative workshops expressed a dissatisfaction with the current dissemination pathways and the lack of available and a to ppropriate reference material, from which they could make informed choices on new and existing technologies. Once the assessment was completed, farmers discussed the strengths and weaknesses of the current extension approaches and what they liked and disliked about the materials available and made suggestions as to how they would like reference material presented.

The key issues raised by the farmer groups were that text should be simple and quite large (in English and vernacular if possible), supported by clear line drawings and cartoons where appropriate. Where a technology was being described, it should be presented as a series of numbered steps that would be easy to follow, and additional information should include details of resources required (equipment and labour), soil types and if possible expected productivity increases. This information has been frequently omitted from all previous publications, yet it is essential from the farmer's perspective, if they are to make an informed choice.

Activity 5

Based on the findings from activities 1 to 4, a meeting was held in the UK by the core project team to review the findings, agree a provisional approach and technologies to be included (see Appendix E pages 47 to 57), and prepare initial drafts for comment. These drafts were circulated to all stakeholders for their initial reactions/evaluation (examples are given in Appendix H, pages 118 to 128). No attempt was made to provide a guideline for this initial evaluation, as the background of stakeholders varied greatly and we did not want to bias responses by providing any guidelines. Comments were generally verbal in nature with some written comments on the technical content. However, the overall consensus was that the style and content was appropriate to the needs of the farmer. The major comment, made by all stakeholders, including farmers was on the page layout for describing a technology. Where a technology was being described, the consensus was that each step should be made discrete from the next by enclosing it in its own box. In addition, it was recommended that where available information on labour requirements for each technology should be included. No attempt should be made to provide fully costed options, as crop yield response vary considerable with soil type and from one to season to the next.

Based on these comments appropriate revisions in layout were made and a revised draft of the materials prepared. A full workshop was held in May 1998 with all interested stakeholders (representatives from research, extension, development and the farming community - see Appendix F, pages 59 to 68), to agree technical content, format and distribution procedures. It was agreed that the focus of this material was not to promote blue prints, but rather to encourage farmers to try out ideas and modify/adapt the different soil and water conservation options available to their own circumstances. The meeting agreed that the guide should be promoted jointly by the Zimbabwe Fanners Union and Agritex

Activity 6

Revisions of the material were made and a final draft lodged with the Zimbabwe Farmers Union for translation in January 1999. It is intended that the completed guides, 15 titles, will be available by the end of 1999. This will be the start of a 'Farmer Library' to which other booklets on a variety of farming topics can be added by other actors in research and extension. All it requires is the harnessing of the vast experience of many years of farmer-oriented research.

Activity 7

From discussions and communications with the NRSP Systems leader it was agreed that this activity would not take place until advice had been sought from the research managers after the English drafts had been completed. However, ZFU have approached the Development Division in Harare to source funds to complete translation of the guides into the vernacular and cover the cost of initial print runs. It is understood that these funds will be made available from DFID's contribution to the ASMP.

Contribution of Outputs

The outputs have contributed substantially towards the achievement of the Programme Purpose by ensuring that IARCS, NARS and NGOs have a simple generic format which will enable them to produce farmer friendly reference material, as and when new technologies and options become available.

The final version of the farmer reference guides draws upon various sources of information on technologies and presents them in a step by step format as requested by farmers. The heart of the guides, however, are recommendations on advantages and disadvantages given by farmers who were involved in participatory technology development and extension activities. Their inclusion in the guides means that these insights will be disseminated to other farmers as a basket of technological options' they can experiment with, adopt and adapt. Conceptually the material forms an integral part of participatory technology development and extension as described by Hagmann, Chuma and Murwira (1997) and by AGRITEX 1998

- a) **What further market studies need to be done** Programme managers and NR advisors need to assess the generic worth of the guides outside of Zimbabwe and provide appropriate support for any future modifications required.
- b) **How will the outputs be made available to the intended users.** Within Zimbabwe translation of the guides into Shona and Ndebele, and the dissemination is the responsibility of the Zimbabwe Farmers Union. It is planned that farmers will be charged a nominal fee to cover the cost of production, with dissemination/distribution taking place through the ZFUs district coordinators, their farmer groups and NGOs operating within Zimbabwe. An article, has been prepared for the FARMESA newsletter (see Appendix B) announcing that guides have been compiled and will be available from ZFU by late 1999. ICRAF have already expressed an interest in producing a generic version of the guide for sub-Saharan Africa with additional sections on agroforestry. In addition to the farmers guides, complementary material for extension staff is being prepared and the published and unpublished extension and research related materials have been compiled into a bibliography (Twomlow and Hagmann, 1998), published in the UK by Silsoe Research Institute, and to be published in Zimbabwe later this year by FARMESA, and a review document has been written (Twomlow *et al.*, 1999). A web site has been created at Silsoe to give Internet access to the bibliography with FARMESA putting a hot page link to this site from their pages.
- c) **What further stages will be needed to develop, test manufacture of the product. Translation of the guides into Shona and Ndebele and revision as required** needs to be completed by Zimbabwe Farmers Union. In addition, a number of the guides are being expanded into farmer group study materials for ZFUs Farmer Study Group Programme using funds from the Swedish Cooperative Centre.
- d) **How and by whom, will the further stages be carried out and paid for.** The ZFU is currently coordinating the translation of the materials and sourcing funds to cover these initial costs. To assist in this ZFU have had 100 copies of the guide, bound in an A5 file, produced using their own funds. ZFU have approached DFID Zimbabwe for financial assistance. It is understood that these funds will be made available from DFID's contribution to the ASMP in the near future. The study materials for ZFUs Farmer Study Groups is being financed by the Swedish Cooperative Centre. An initial print run of 250 copies has been produced by CARE-Zimbabwe for use on the 'Small Dams Rehabilitation Project', with 50 copies going to FARMESA for distribution to their regional offices/collaborators in sub-Saharan Africa.

Publications

1. Twomlow, S.J. And Hagmann, J., 1998. *A Bibliography of References on Soil and Water Management for Semi Arid Zimbabwe*. Silsoe Research Institute Report IDG/98/19.
2. Twomlow, Hagmann And Ellis-Jones, 1999. *A Guide for Farmers on Good Land Husbandry*. Article accepted for publication in *Farmesa News*. Farmesa, Harare, Zimbabwe.
3. Multi Authored, 1999. - *A Guide For Farmers On Good Land Husbandry*

Titles in Series

- 1 - Introduction to Good Land Husbandry
- 2 - Soil and Water Management
- 3 - Soil Fertility
- 4 - Primary Tillage and Land Preparation
- 5 - What is Important for Good Crop Establishment
- 6 - Planting Option 1 - Hand Planting
- 7 - Planting Option 2 - Traditional Third Furrow Planting
- 8 - Planting Option 3 - Open Plough Furrow Planting
- 9 - Planting Option 4 - Ripper Planting
- 10 - Weed Management
- 11 - Conservation Tillage Option 1 - No Till Tied Ridging
- 12 - Conservation Tillage Option 2 - Low Input Tillage and Weeding
- 13 - Alternative Soil and water Conservation Ideas
- 14 - Draught Animal Harnessing
- IS - Tillage Implements

These guides results from a collaborative effort based on the work and contributions from the following institutions and individuals:

Zimbabwe Farmers Union (ZFU) : Mrs V. Mandishona (Chief Education and Training Officer); Mr P. Zakariya (Training Officer); Mr J. Chimwanda (Masvingo Provincial Farmer Organiser); Mr P. Mushure (Masvingo ZFU Provincial Committee Member and Communal Farmer), Mr N. Ramwidzai (ZFU member and farmer from Sanyati Communal Area); Mr Mbayo (District Officer - Murewa); Mrs Zenu (Murewa District Training Officer); ZFU Farmers Groups in Murewa and Zimuto Communal Areas

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Ms B. Mudamburi (Training Officer Draught Animal Power)

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Masvingo Province: Mr. N. Rufu (Senior Agronomist and Crop Production Specialist)
Agritex/GTX Con till Project

Integrated Rural Development Programme (IRDEP): Dr M. Leupold (Team Leader), Mr. M. Connolly (Advisor to Agtitex Masvingo)-, Mr R. Shuva (Graphic Artist)

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Institute Of Environmental Studies (IES), University of Zimbabwe: Mr Edward Chuma

Cotton Training Centre (CTC)- Kadoma: Mr. G. Rabey (Director) and his staff

CARE - Masvingo: Mr. G. Tobaiwa (Assistant Project Manager, CARE Small Dams Project); Mr C. Mazhata (Senior Field Officer); Mr C. Gumbo (Field Officer); Ms K. Chamba (Field Officer); Mr. C. Chikomba (Field Officer)

Intermediate Technology Development Group Zimbabwe (ITDG): Mr K. Murwira (Programme Manager, Agricultural Programme)

Silsoe Research Institute: Dr S. Twomlow (Soil and Water Specialist); Mr J. Ellis-Jones (Economist); Dr J. Hagmann (Participatory Extension Specialist); Mr. Soren Dreyer (Soil Conservationist); Mr S. Briggs (Agricultural Engineer); Mr F.B. van der Meer (Soil Scientist)

Natural Resources Institute (NRI) : Dr C. Riches (Weed Scientist)

Swedish Co-operative Centre : Ms M. Brdarski

Out Reach Programme- Hinton Estates: Mr A. Norton; Mr. B. Oldrieve

4. **Twomlow, S. J., Riches, C.R., O'Neill, D., Brookes, P., & Ellis-Jones, J., 1999. Sustainable dryland smallholder farming in sub-Saharan Africa. In press *Annals of Arid Zone***

Internal Reports

Twomlow & Briggs, January 1998. *Conservation tillage research and development.* Silsoe Research Institute OVR 914.

Twomlow, March 1998. *Conservation tillage research and development.* Silsoe Research Institute OVR 921.

Twomlow, Ellis-Jones, Hagmann. May 1998. *Farnier Resource Material Rorkshop.* Silsoe Research Institute OVR 927

Twomlow, July 1998. *Farmers Resource Material.* Silsoe Research Institute OVR 935.

Twomlow, Oct 98. *Conservation Tillage, Weeding and Catchment Management.* Silsoe Research Institute OVR 944.

Final Inventory of Project No capital items procured.