IMPLEMENTATION COMPLETION MEMORANDUM

GEF-MSP GRANT NO. TF022859
P064440-LEN-BBGEF

Conservation of globally significant biodiversity in agricultural landscapes in South Africa through Conservation Farming.

CONTENTS

i. Basic Data

(1) Date of Completion Report:
March 20, 2005

(2) Project Title:
Conservation of globally significant biodiversity in agricultural landscapes in South Africa through Conservation Farming.

(3) GEF Allocation:
US $750, 000

(4) Grant Recipient:
National Botanical Institute (since 1 September 2004, the South African National Biodiversity Institute)

(5) World Bank Manager/Task Team:
Chris Warner

(6) Goals and Objectives:

Goal: to evaluate conservation farming practices in four regions in South Africa that have globally significant levels of biodiversity so that these practices can be more widely applied as part of an overall conservation strategy.

Objectives:

a) To identify and evaluate the economic and ecological costs and benefits (in terms of biodiversity, carbon sequestration, and ecosystem stability and resilience) of conservation farming practices compared with more widespread land use and management practices.

(b) To develop and compare ecological economic models for land use and management practices included in objective (a).

(c) To synthesise information on conservation farming in South Africa and develop a database of information.

(d) To evaluate the role of conservation farming as part of national and regional strategies to conserve biological diversity in South Africa.

(e) To transfer information to targeted user groups (farmers, agricultural departments, nature conservation agencies).

Co financing (Type/Source)	IA own Financing (000 US$)		Govt (000 US$)		Other* (000 US$)		Total (000 US$)		Total Disbursed (000 US$)	
	Plan	Act	Plan	Act	Plan	Act	Plan	Act	Plan	Act
Grants	750	750	0	0	0	0	750	750	750	750
Loans/Concessional/ market rate	0	0	0	0	0	0	0	0	0	0
Credits	0	0	0	0	0	0	0	0	0	0
Equity investments	0	0	0	0		0	0	0	0	0
Committed in-kinds support	100	150	660	500	44,5		804			
Other	0	0	0	0	0	0	0	0	0	0
Totals	850	900	660	500	44,5	0	1,555	750	1,550	1,400

(7) Financials

As a targetted research proposal Govt in kind financial contributions are estimated to have fallen short of the planned project design. However this did not impact negatively on the achievement of the PDO.

ii. Project Impact Analysis

(1) Project impacts

Project objectives and achievements

a) To identify and evaluate the economic and ecological costs and benefits (in terms of biodiversity, carbon sequestration, and ecosystem health) of conservation farming practices compared with more widespread land use and management practices.

This component of the project was very successful. Teams of researchers evaluated the benefits of different land use practices in terms of biodiversity (plants, ants, parasitic wasps, reptiles, rodents, threatened and endemic species), carbon sequestration, soil health (crusting, erosion, infiltration, conductance, microbial activity, respiration), other aspects of ecosystem health (water runoff, earthworm activity, nutrient cycling, seed dispersal), ecological processes, and direct benefits to farmers (primary productivity, shelter for stock, pest control, ecotourism). The economic and financial costs and benefits were also evaluated (e.g. costs of farming practices, willingness to pay for ecotourism opportunities). In total, these components were measured across 4 sites, 27 farms and 18 land uses.

b) To develop and compare ecological economic models for land use and management practices included in objective (a).

This component was successfully completed. An ecological economic model was compiled for each of the four sites discussed below, using data collected as part of objective (a). Due to inherent differences in the data, two methods were used. In *Nieuwoudtville* and the *Drakensberg*, models were based on different land use scenarios (using EXCEL spreadsheets), whereas dynamic systems models were constructed for the *Nama Karoo* and *Succulent Thicket*, using STELLA software. In each case, participants from each discipline spent 7-10 days compiling the initial model, which was then evaluated, tested, and refined. The models provide a tool for assessing the extent of win-win scenarios for conservation farming.

c) To synthesize information on conservation farming in South Africa and develop a database of information.

The initial objective was to synthesize the information collected as part of this project. This has been successfully achieved in two ways. First, a database of literature and information sources on conservation farming has been compiled and a version with limited search capabilities has been posted on the project website. (Currently an IT audit of the new South African National Biodiversity Institute is underway which has delayed the Conservation

Farming Project pages going on line, but construction of the pages is complete). Second, a book that synthesizes the results of the project is in the process of being published.

A broader objective, to synthesize all information on conservation farming, was more difficult to achieve. An historical perspective on the development of conservation farming and its achievements was completed as a contribution to a World Bank publication on mainstreaming biodiversity. (Donaldson J.S., Biodiversity and Conservation Farming in the Agricultural Sector in *Mainstreaming Biodiversity in Development, Case studies from South Africa* edited by Pierce, Cowling, Sandwith and MacKinnon) However, no further synthesis was possible as there are many different interpretations of the term conservation farming (our social assessments showed that almost all farmers regarded themselves as conservation farmers) and there is no effective way to evaluate the possible contribution of these different systems without some form of formal assessment, which was beyond the scope of this project.

d) To evaluate the role of conservation farming as part of national and regional strategies to conserve biological diversity in South Africa.

The main achievement of the Conservation Farming Project was to provide a sound basis for evaluating the role of conservation farming in strategies to conserve biological diversity. Other projects funded by the GEF and CEPF in South Africa have already established that conservation on private land is an essential component of national and regional conservation strategies. This project showed how and where conservation farming can make a contribution.

- The clearest outcome was the case for Succulent Thicket. Here game farming has a clear biodiversity benefit, which is also more financially viable than goat farming, and corresponds to the greatest carbon benefit. The win-win outcome suggests that conservation farming can play an important role in conservation strategies.
- In Nieuwoudtville, there is a definite biodiversity benefit associated with practices that retain existing vegetation remnants and where the veld is periodically rested from grazing. However, these farming practices result in a financial loss for farmers unless they are able to increase revenue from ecotourism. Conservation strategies in this region therefore need to find ways of compensating farmers for lost income or increasing farmers' access to revenue from ecotourism.
- In the southern Drakensberg, conservation farming practices occur within the context of dramatic conversions in land use from extensive rangelands to either afforestation or high intensity dairy farming. Although conservation farming provides benefits in terms of biodiversity, water provision, and carbon sequestration, there are limited benefits for farmers. Security problems, the high value of land, and the expansion of forestry have created a dynamic situation where land use and conservation planning are far more important for effective conservation strategies than the implementation of conservation farming practices.
- Finally, in the Nama Karoo, we were unable to discern any clear benefit associated with different grazing systems. However, Karoo ecosystems are known to take up to 40 years to respond to changes and part of the strategy for this area should be to monitor the status of biodiversity under different grazing systems.

e) To transfer information to targeted user groups (farmers, agricultural departments, nature conservation agencies).

Information arising from the Conservation Farming Project has been transferred to target groups in several different ways.

- Farmers in the study areas were involved in 6 workshops and events designed to facilitate a learning process between farmers and researchers.
- Specific feedback workshops were also held at three sites, with the Nama Karoo workshop attracting 60 farmers, many of them from well beyond the study site.
- Information on outcomes of the project was relayed directly to farmers either verbally or in the form of a report. The economics report emanating from the project was sent to seventy-three farmers – this included those on whose farms we worked, as well as a number of interested farmers in each area.
- A map of key biodiversity areas was compiled for the Nieuwoudtville site to provide farmers with key information on the biodiversity of the area.
- Information sheets on biodiversity issues, carbon sequestration, and ecosystem services were widely distributed.
- Key stakeholders were included in the project steering committee and attended three co-ordination and report back workshops.
- The findings of the project have been presented at more than 20 management, policy, or scientific meetings (including Landcare, Fynbos forum, Arid Zone Forum, Thicket forum, International Rangelands conference, and an ecoagriculture symposium).
- Information, including detailed reports have been posted on the project website (SANBI website under review and this is delaying the Conservation Farming project pages going on line).
- Twenty technical reports were completed, 20 scientific papers were published and a further 25 are under review, and 10 academic theses (Hons., MSc and PhD) were completed.

(2). Achievement of performance indicators

	Performance indicator	**Level of achievement**
a.	An objective appraisal of the impact of different farming strategies on biodiversity in areas of global importance is completed	The results provide an objective assessment and show that initial observations and categorisations of 'good' versus 'bad' farms are often misleading. The results confirm what is generally already known, i.e. that transformed areas have lower levels of biodiversity. However, the project also gave rise to several novel findings, e.g. in the Nama Karoo, large grazing camps appear to retain more biodiversity, possibly because grazing intolerant species can occur far from watering points; in Nieuwoudtville, practices that enrich natural pasture with legume species result in a loss of plant species, and systems that retain porcupines are important for maintaining plant diversity; that different land uses can result in invasion by different alien plants;

		and that some areas (e.g. grasslands) may have lost important components of biodiversity due to historical land use, irrespective of current land use.
b.	An objective appraisal of the economic costs and benefits to farmers of different farming strategies is completed	The objectivity of the economic appraisal was a key element in this project. Most farmers were more interested in this assessment than any biodiversity data. The quality of the data varied because we relied on farmers to divulge financial information. Despite the limitations of this method, the outcomes of the assessment appear to be robust and informative. The objective appraisal also provides a basis for further conservation action in each of the areas, e.g. to show that restoration of Succulent Thicket is economically justified or that the development of ecotourism in Nieuwoudtville can offset the costs of conservation farming to farmers.
c.	The effects of land use on carbon sequestration is evaluated	The project data contributed to more broad assessments of carbon sequestration taking place across southern Africa. It confirmed that sequestration is generally low in semi arid areas and higher in mesic areas such as the Drakensberg. The most exciting result was for Succulent Thicket where the project demonstrated that this semi-arid vegetation type has exceptional capacity to sequester carbon and that ca. 80 tonnes per ha could be gained from restoring degraded thicket. The main succulent shrub, *Portulacaria afra*, grows easily from truncheons and is ideally suited to restoring degraded vegetation. As a result, a pilot poverty relief project has been set up to employ poor people to restore thicket vegetation.
d.	There is increased awareness of the impact of farming practices on biodiversity and of alternative land use practices (conservation farming)	Awareness is always difficult to measure. However, many farmers involved in the project (plus many other farmers who heard about the project) requested more information on biodiversity in their areas so that they can plan for more biodiversity friendly farming. More tangible achievements were: the development of a conservation map for Nieuwoudtville involving local farmers; the publication of news articles in the country's main agricultural magazines (Farmers Weekly and Landbou Weekblad); a collaboration with other research groups to compile a book on the

		management of Karoo farms; and the continuation of research in the Nama Karoo to look more closely at the impact of intensive grazing systems - the main significance of this activity is the involvement of a range of partners including farmers, the Department of Agriculture, private companies, universities and government research agencies.

iii. Project Sustainability

This being a targeted research proposal, the aim was not to ensure sustainability per se. More importantly the knowledge base which has been built up is now being used to support support conservation actions in other projects and activities of government.

Links were developed and maintained with agricultural and conservation agencies as well as with a number of farmers' organizations. These include LANDCARE, National Department of Agriculture, Provincial Department of Agriculture in the Western Cape and Kwa-Zulu Natal and the Nature Conservation agencies in the Northern and Western Cape and in Kwa-Zulu Natal as well as farmers' groups in KZN, Beaufort West, Nieuwoudtville and Graaf Reinet. All the organizations are enthusiastic about the Conservation Farming Project and have expressed willingness to incorporate the findings into their operations. Publication of a book on Conservation Farming by John Donaldson, Jane Turpie and Noel Oettle (due 2005) will facilitate transfer of this information to farmers, students and policy makers as it synthesizes the information gathered and presents it in a user friendly format.

Perhaps most important for the continuation of the project benefits is the recent transformation of the National Botanical Institute to form the South African National Biodiversity Institute. The new SANBI has an expanded mandate for conservation of biodiversity, and the establishment of a new Directorate for Biodiversity Programmes, Policy and Planning highlights the strong commitment by the organization to carry out this mandate. SANBI is either implementing or closely linked with the following regional planning and conservation initiatives – National Biodiversity Spatial Assessment Plan (NBSAP), Cape Action Plan for People and the Environment (CAPE), Succulent Thicket Ecosystem Plan (STEP), Succulent Karoo Ecosystem Plan (SKEP), and is currently leading a National Grassland Initiative to mainstream biodiversity in production landscapes and sectors. Information from the Conservation Farming Project is being slotted directly into these projects. As an example, a CAPE project funded by the CEPF on rare and endangered plant species in the Cape Floristic Region was developed with information gathered during the Conservation Farming Project.

iv. Replicability

As this was a targeted research project it is unlikely that it will be repeated in the same format. However, methods developed during the project are already being used for new projects in this field. An example is a Working for Water funded project in the Succulent Thicket vegetation examining carbon-sequestration and rehabilitation of degraded vegetation. This project contains a research component that followed as a direct result of findings from the Conservation Farming project. Two scientists from the Conservation Farming Project are directly linked with the Thicket carbon-sequestration project. Publications emanating from the Conservation Farming Project provide hypotheses and methodologies that will stimulate research in this field. The publication list is appended (Appendix A) and on 31 March 2004 included: 20 scientific papers published or in press, 25 scientific papers under review, 20 technical reports,10 academic theses10 conference proceedings.

v. Stakeholder Involvement

At least two workshops in each of the four areas were held to involve and inform the local stakeholders. We received very positive feedback from farmers attending these workshops as they are eager for information and contact with people who might be able to help them in their decision making processes.

Conservation Farming Project researchers attended and made presentations at many local research fora (e.g. Fynbos forum, Arid zone forum, SA Association of Botanists conference, SA Entomological conference, SA Zoological conference, Grasslands conference, LANDCARE workshops, and an ecoagriculture symposium).

Personal contact was made with people within the agricultural and conservation agencies and they were invited to attend the project research feedback workshops, which they did with enthusiasm.

Personal contacts that have been followed up regularly appear to be the most effective way of involving people in the project.

vi. Monitoring and Evaluation

Overall monitoring of the project was carried out by a Steering Committee consisting of representatives from a wide range of stakeholders. The research component of the project was also monitored during a peer review process at three research workshops.

The Steering Committee consisted of representatives from the Botanical Society of South Africa, National Department of Environmental Affairs and Tourism, University of Cape Town, University of Port Elizabeth, Northern Cape Nature Conservation, Kwa-Zulu Natal Wildlife, National Department of Agriculture, LANDCARE, National Botanical Institute management and World Bank (observer). The members were chosen to represent interests in all four of the study areas as well as research (universities and NBI), the nature conservation agencies, agriculture, environmental affairs and tourism and NGOs. There was a high level of participation and interest in the project by the members of the steering committee who all attended two research feedback workshops and associated SC meeting, as well as a final SC meeting on 31 March 2003. The dedication and positive input from our steering committee members was a very constructive aspect in the monitoring and evaluation of the project.

In order to involve all the research participants in evaluating the work being done by their colleagues on the project, three research workshops were run. The first workshop was held at the start of the project to discuss research methodology and the following two were research feedback workshops in two of the study areas, Eastern Cape and Kwa-Zulu Natal. Participating researchers, steering committee members and invited local participants discussed interim results and alternative methods for problem areas. The workshops were extremely well received. The participants concurred that the research dialogue generated was tremendously beneficial for the project, as well as for ecological and conservation research in South Africa. The researchers found that sharing ideas with colleagues working on the same project was both supportive and helpful.

Unfortunately a closure workshop was not initially budgeted for. It was however proposed to hold one but this proved to not be possible with local currency strengthening.

vii Special Project Circumstances

This was the first major project, with outside funding, managed by the National Botanical Institute (now South African National Biodiversity Institute) and there were initially a number of problems regarding procedures for appointing staff for the project, and provision of up to date accounting records. There was, however, very strong support for the project by NBI management and these were overcome. This has paved the way for the NBI to now manage GEF Grant of $9 million.

viii Institutional Capacity / Partner Assessments

Strong support for the project by NBI management enabled the difficulties to be overcome. The NBI provided bridging finance at the start of the project when repeated delays in the signing of the MoU substantially postponed the project initiation. NBI management support also facilitated sorting out difficulties within NBI regarding appointment of staff and reporting on finances.

The transfer of funds to the NBI by the World Bank was efficient and timeous. The financial tranches to NBI were paid in advance, annually. This was found by the recipient to be very convenient and requiring far less administration than other outside funded projects that follow different procedures.

The recipient reported that the World Bank supervision was satisfactory and said: "The task manager (Chris Warner) showed interest in the project, attending all the research workshops and steering committee meetings as well as visiting the project coordinator at Kirstenbosch on a number of occasions. Email queries and requests to the task manager received immediate responses."

ix. Summary of Main Lessons Learned

- All farming systems have an impact on biodiversity, but some are better than others. However, it is important to develop objective criteria for assessments because factors such as land use history and the location of the farm (e.g. heterogeneity) can obscure the impacts of current land use.
- Farmers generally care about the environment and most view themselves as conservation farmers. This is partly due to confusion regarding what they are trying to conserve (soil, agricultural resources, or biodiversity) and it is important to make the case for biodiversity conservation more explicit.
- The social component of the study showed that land use decision making is a complex process that is influenced by a variety of needs and satisfiers. In addition to financial reasons, farmers may pursue certain practices because of support networks (extension services, social networks), quality of life decisions, or security needs. The mainstreaming of biodiversity in the agricultural sector needs to take this into consideration when developing enabling mechanisms.
- A review of past successes in conservation farming showed that enabling mechanisms (extension services, research) were more effective at achieving a change in behaviour than legal instruments, which were seldom applied. The challenge is to provide enabling mechanisms that focus on biodiversity.
- Farmers identified three relatively simple needs that would enable them to accommodate biodiversity in their farming practices. These needs should be addressed by the newly formed South African National Biodiversity Institute.
    - Information on WHAT biodiversity occurs on their farms
    - Information on the IMPACT of farming practices on biodiversity
    - Information on ALTERNATIVES. Most farmers articulate this as a need for further RESEARCH on sustainable land use practices
- At present farmers do not derive any benefit from the downstream value of ecosystem services (water provision, carbon sequestration). Land use decisions in places like the Drakensberg may be quite different if water provision and carbon sequestration provided financial benefits to farmers.
- The benefits to farmers from local (on farm) use of ecosystem services (pest control, soil health) is often too obscure to elicit a change in behaviour. This may be possible for services such as pollination, but is hard to demonstrate for many other services, especially services that may have different values at local and regional scales (e.g. water infiltration)
- Conservation farming practices are often linked to charismatic individuals with a good understanding of the ecology of their farms. Unless their insights and ideas are more widely adopted in the community, the conservation value of the land will decline when the land passes on to new owners.

- Farmers are inherently experimental, but often do not properly assess the outcomes of their experiments, either on farm production or the environment. Many farmers expressed interest in a research format that links scientists with farmers to test their ideas more rigorously. This should be taken up by research groups in South Africa.
- With hindsight the project could have been designed to have greater policy impact. Initially the project was not designed as a targeted research proposal. Perhaps this should have been maintained. Certainly the science of conservation farming has benefited considerably - more than the practice.

x. Financial Management Status

1. Statement of account (in hard copy).A financial statement from the NBI for the Conservation Farming Project fund is attached and a negative balance of R2840-00 is indicated.
2. Audit report and the opinion of the external auditors (signed in hard copy, not signed in electronic copy). Due date of statement of account and external audit: 30 September 2004

- Received by task manager:attached
- Period cover:1 April 2003 – 31 July 2004
- Results:"In my opinion the financial statements fairly present, in all material respects, the financial position of the project at 31 July 2004 and the results of its operations and cash flows for the period then ended, in accordance with prescribed accounting practice."Signed by MCM YIATSES, for the Auditor General of South Africa.
- Final bank statement:Final bank statements of the special dollar account are attached and a zero balance is indicated on 1 May 2003 when the account was closed.
- Unused funds:All funds have been used and the negative balance of R2840 has been covered by the NBI.

Appendix A.
List of reports and publications arising from the Conservation Farming Project. (30 March 2004)

Scientific papers

1. Bragg, C., Donaldson, J.S. & Ryan, P. In press. Cape porcupines as ecosystem engineers: density and disturbance in a semi-arid environment with high geophyte diversity. *Journal of Arid Environments*
2. Donaldson, J.S. 2002. Biodiversity and Conservation Farming in the Agricultural Sector. In: Pierce, S.M., Cowling, R.M., Sandwith, T., MacKinnon, K. (eds) Mainstreaming Biodiversity in Development, Case studies from South Africa. The World Bank Environment Department.
3. Donaldson, J.S. 2003. Conservation and sustainable use of pollinators in agricultural landscapes, a South African perspective. In: Kevan, P. (ed.). The conservation and sustainable use of pollinators in agriculture.
4. Donaldson, J.S., Mills, A., O'Farrell, P., Todd, S., Skowno, A., Nanni, I. 2003. Conservation Farming With Biodiversity in South Africa: A Preliminary Evaluation of Ecosystem Goods and Services in the Bokkeveld Plateau. In: Lemons, J., R. Victor, D. Schaffer (eds) Conserving Biodiversity in Arid Regions. Kluwer Academic Publishers, Boston
5. Donaldson, J.S., Nanni, I., Kemper, J. & Zachariades, C. 2003. Effects of habitat fragmentation on pollinator diversity and plant reproductive success in renosterveld shrublands of South Africa? Conservation Biology
6. Mills, A, O'Connor, T., Skowno, A., Bösenberg, D.J., Sigwela, A, Lechmere-Oertel, R., Fey, M & Donaldson, J.S. Ecosystem carbon storage under different land uses in three semi-arid shrublands and a mesic grassland in South Africa. *Agriculture Ecosystems and Environment*
7. Mills, A.J., & Fey, M.V. (accepted). Declining soil quality in South Africa: effects of land use on soil organic matter and surface crusting. South African Journal of Science.
8. Mills, A.J., & Fey, M.V. 2003. Factors affecting soil crusting in five contrasting biomes of South Africa. Soil Use and Management.
9. Mills, A.J., & Fey, M.V. 2003. Soil carbon and nitrogen in five contrasting biomes of South Africa. S. Afr. J. Plant Soil 2004, 21(2) p 81 – 90.
10. Mills, A.J., & Fey, M.V. 2003. Declining soil quality in South Africa: effects of land use on soil organic matter and surface crusting. South African Journal of Science 99, 2003. pp429 – 436.
11. Mills, A.J., & Fey, M.V. 2003. Frequent fires intensify soil crusting: physicochemical feedback in the pedoderm of long-term burn experiments in South Africa. Geoderma
12. Mills, A.J., & Fey, M.V. 2004. A simple laboratory infiltration method for measuring the tendency of soils to crust. Soil Use and Management 20, 8 –12.
13. Mills, A.J., & Fey, M.V. 2004. Transformation of thicket to savanna reduces soil quality in the Eastern Cape, South Africa. Plant and Soil 0: 1 – 11, 2004.

14. Mills, A.J., Cowling, R.M., Fey, M.V., Kerley, G.I.H., Donaldson, J.S., Lechmere-Oertel, R.G., Sigwela, A.M. and Skowno, A.L. A semi-arid thicket that rivals mesic forest as a carbon sink. *Austral Ecology*
15. Mills, A.J., Fey, M.V. & Johnson, C.E. 2003. Ionic strength as a measure of sulphate salinity stress: effects of sodium sulphate, sodium chloride and manganese sulphate on kikuyu (Pennisetum clandestinum) growth and ion uptake. South African Journal of Plant and Soil.
16. O'Connor T.G., Mills, A.J Influence of land use on nutrient stocks in the montane grassland of the southern Drakensberg, South Africa. Journal of Applied Ecology.
17. O'Connor, T.G. Influence of land tenure on populations of the medicinal plants Alepidea amatymbica, Eucomis autumnalis, and Gunnera perpensa. South African Journal of Botany.
18. O'Connor, T.G. Influence of land use on phytomass accumulation in Highland Sourveld grassland in the southern Drakensberg, South Africa: implications for carbon sequestration. Journal of Applied Ecology.
19. O'Connor, T.G., Uys, R.G., & Mills, A.J. 2003. Ecological effects of firebreaks in the montane grasslands of the southern Drakensberg, South Africa. African Journal of Range and Forage Science.
20. O'Connor: Influence of land use on plant community composition, structure and diversity in Highland Sourveld grassland in the southern Drakensberg, South Africa. Journal of Applied Ecology.

Manuscripts under review

1. Bragg C.J. & Donaldson, J.S. Effects of porcupine foraging behaviour on the diversity and abundance of geophytes in a variegated agricultural landscape
2. Breebaart, L. & Donaldson, J.S. Feeding selection in three grazing systems in the Nama Karoo and its implications for maintaining biodiversity in rangelands.
3. Kerley, G.H., Landman, M., Schoeman, D.S. The effect of transformation on browse availability for indigenous (kudu, bushbuck, duiker) and introduced domestic herbivores (goats) in subtropical thicket, South Africa.
4. Koelle, B., Oettlé, N, Thobela, M, Arendse, A. Learning in Partnership to Conserve Biodiversity.
5. Kotze, D.C., Walters, D.J., O'Connor, T.G. Influence of land use on community organization and ecosystem functioning of wetlands in the southern Drakensberg mountains, South Africa.
6. Mills, A.J., & Milewski, M.V. 2003. A ratio controlling height of vegetation and amount of carbon sequestered in wood? To be submitted to Bioscience
7. Mills, A.J., Donaldson, J.S., Todd, S., Fey, M. Soil crusting and plant distribution on the Bokkeveld Plateau.
8. Mills, A.J., Donaldson, J.S., Todd, S., Fey, M. Soil crusting and plant distribution in the Nama Karoo, South Africa.
9. Mills, A.J., Kgope, B., Fey, M. & Donaldson, J.S. Can soil respiration be used as an early warning of impaired ecosystem functioning: investigations in karoo, thicket and grassland biomes of South Africa
10. O'Farrell, P. & Donaldson, J.S. Effects of landscape heterogeneity and farm management on ecosystem services in a semi arid environment.
11. O'Farrell, P., Donaldson, J.S. & MacGregor, M.N. The effect of vegetation transformation on soil health in a semi-arid environment
12. O'Farrell, P., Donaldson, J.S. Using landscape function analysis and rainfall simulation to determine resource loss under three different grazing systems in the Nama Karoo
13. O'Connor T.G., Kruger, S. Synchronous decline of small antelope populations in an 'island' reserve in the southern Drakensberg. Intended for the South African Journal of Wildlife Research.
14. Oettlé N.M. and Koelle, B.R.I. 2003. New directions for extension in democratic South Africa
15. Perrot, N. & Donaldson, J.S. Effects of soils, land use and moisture availability on the dispersal and establishment of *Brunsvigia bosmanae* in a variegated landscape.
16. Short, A.D., O'Connor, T.G., Hurt, C.R. Medium term changes in grass composition and diversity of Highland Sourveld grassland in the southern Drakensberg in response to fire and grazing management. Submitted to the African Journal of Range and Forage Science.
17. Theron L-J., Donaldson, J. Vegetation types in relation to soil and climatic variables in the central Nama-Karoo

18. Theron, L-J. & Donaldson, J.S. The conservation benefits of structured grazing systems in the Nama Karoo.
19. Todd, S & Donaldson, J.S. Plant communities of the van Rhynsdorp shale Renosterveld vegetation in relation to substrate on the Bokkeveld Plateau
20. Todd, S. Plant species richness and cover in relation to livestock watering points
21. Todd, S. The piosphere as a fingerprint of land use pattern. The impact of livestock watering points on plant cover and species richness on four ranches in the central lower Karoo, South Africa.
22. Todd, S Plant species diversity and growth form richness in relation to substrate and landform. Landscape-diversity relations in the Central Lower Karoo, a semi arid region in South Africa.
23. Todd, S. & Donaldson, J.S. Current and potential future levels of vegetation transformation around Nieuwoudtville on the Bokkeveld Plateau, a hotspot of plant diversity and endemism.
24. Todd, S. & Donaldson, J.S. Species richness, endemism and growth form composition of Renosterveld vegetation in relation to substrate on the Bokkeveld Plateau
25. Wildy, E.J. Effect of different land use practices on invertebrate diversity in Underberg, KwaZulu-Natal, South Africa.

Technical Reports

1. Beukes, P. 2002. Soil Biotic Activities in Nama Karoo Soils under Different Grazing Systems.
2. Ellis F. Report on a soil investigation of selected trial areas in the Nieuwoudtville region of the Northern Cape Province
3. Kerley, G, Lechmere-Oertel, R, Sigwela, A. Conservation Farming Project. Final report for the Albany Centre.
4. Kerley, G, Final project report: The effect of transformation on forage availability for indigenous (kudu, bushbuck, duiker) and introduced herbivores (goats) in subtropical Thicket.
5. Koelle, B., Oettle, N., Thobela, M. & Arendse, A. 2003. Learning in partnership to conserve biodiversity: findings of the social research team of the Conservation Farming Project.
6. Kotze, D.C. Land-use impacts on wetlands in the southern Drakensberg. July 2002
7. Krug, R. Model for the restoration of indigenous plant communities and plant biodiversity on old lands in the Nieuwoudtville district.
8. Mouton, P.le. & Alblas, A. Reptile diversity in the Nieuwoudtville area. Report for the Conservation Farming Project. October 2002.
9. O'Connor, T. Final report for the Conservation Farming Project, Southern Drakensberg. June 2003
10. O'Connor, T. Distribution and abundance of two alien invasive plant species in the southern drakensberg. May 2003
11. O'Connor, T. Clovelly: State of soils and vegetation. 11 March 2003.
12. O'Farrell, P. Ecosystem services and benefits to farmers. Conservation Farming Project final report .
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Annex B.
Comments by Africa Region GEF Team

The project successfully achieved its goal of evaluating conservation farming practices in regions that have significant levels of biodiversity, in order to apply such practices more widely as part of a conservation strategy. The project successfully met four out of five objectives. The project was able to:

a) Compile an ecological model for all four target sites.
b) Synthesize information on conservation farming, resulting in a database posted on the project website.
c) Successfully transfer information to key stakeholders involved in the project steering committee and throughout the project's implementation.
d) Contribute project data to broader assessments of carbon sequestration across southern Africa.

There is an increased awareness and knowledge base regarding the impacts of farming practices on biodiversity. Through this project, it was evident that local farmers generally care about the environment and are willing to accommodate biodiversity in their farming practices.

Because it was a targeted research project, a replication plan may not have been included in the design. However, the outcome of the project builds up to support conservation actions in other projects. The project also provided objective criteria for the assessments of a variety of farming practices. The newly established South African National Biodiversity Institute can continue the project outcome.

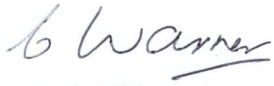
The lessons learned from this project confirm the complexity of land use decisions influenced by variety of needs and satisfiers, and the need for further research on sustainable land use practices, including cost and benefits of sustainable land use practices.

Richard Scobey

Acting Sector Director AFTSD

Chris Warner

Senior Environment Specialist, AFTS1



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