

WOCAT
(World Overview of Conservation Approaches and Technologies)
IN SOUTH AFRICA



DEPARTMENT OF AGRICULTURE
Directorate Land Use and Soil Management



&

AGRICULTURAL RESEARCH COUNCIL
Institute for Soil, Climate and Water



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CONTENTS

1	INTRODUCTION	i
2	SOIL EROSION IN SOUTH AFRICA	i
3	LAND USE POLICY AND PRACTICES	ii
4	INSTITUTIONAL ARRANGEMENTS	iii
5	INTERNATIONAL OBLIGATIONS	iv
6	WOCAT	iv
7	THIS PUBLICATION	vi
8	THE FUTURE	vi
9	REFERENCES	vii
10	CONTRIBUTORS LIST	viii
11	SOIL AND WATER CONSERVATION TECHNOLOGIES	1
11.1	<i>PHYSICAL STRUCTURES</i>	2
	Traditional Stone Terrace Walls RSA03	3
	Stonelines RSA53	4
	Gully control (gabions) at Maandagshoek RSA31	5
	Gabions: stone packed with wire/logs with branches RSA29	6
	Gabion Structures RSA15	7
	Gravity Type Inverted Tyre Structures RSA14	8
	Old Motor Tyre Contours RSA01	9
11.2	<i>COMBINATIONS WITH VEGETATION</i>	10
	Terraces, Waterways/Cut-off Drains and Vetiver Grass RSA60	11
	Vetiver Vegetative Hedges RSA05	12
	Vetiver Grass Soil Conservation System RSA04	13
	Agronomic and Vegetative Rehabilitation RSA33	14
	Grass Strips RSA35	15
	Agronomic Mulching, Intercropping RSA51	16
	Organic Block RSA06	17
11.3	<i>MANAGEMENT MEASURES</i>	18
	Rip-ploughing, Oversowing RSA07	19
	Bush Packing RSA19	20
	Smallholders Intercropping Planting Technology RSA58	21
	Rangeland Management RSA38	22
	Rangeland Rehabilitation RSA32	23
	Veld Reclamation RSA12	24
	Revegetation and Re-seeding RSA37	25
	Management of Grazing Practices RSA25	26
	Communal Grazing Management RSA41	27
	Economic Grazing Capacity RSA17	28
	Restoration Ecology RSA49	29
11.4	<i>BUSH ENCROACHMENT</i>	30
	Control of Bush Encroachment RSA39	31
	Chemical Bush Control RSA16	32
	Eradication of Invasive Species RSA42	33
	Combating of Invader Plants & Bush Packing RSA09	34
	Eradication of Declared Weed RSA22	35
	Stem Burning of <i>Acacia Mellifera</i> RSA13	36
11.5	<i>LAND MANAGEMENT</i>	37
	Land Use Management Systems RSA57	38
	Conservation Agriculture RSA43	39

	Minimum Tillage RSA24	40
	Minimum Tillage RSA18	41
	No-till/Minimum Tillage RSA56	42
	Restoration of a Degraded Farm RSA40	43
	Restoration on Degraded Duplex Soils RSA30	44
	Controlling of Soil Erosion During Crop Production RSA52	45
	Ripping of Sheet Erosion RSA21	46
11.6	WATER MANAGEMENT	47
	Water Run-off Control Plan RSA20	48
	Water Run-off Control Plan on Cultivated Land RSA11	49
	Run-off Control RSA54	50
	Improvement of Rainwater Storage RSA48	51
	Water Harvesting and Basin Tillage RSA45	52
	In-field Water Harvesting RSA50	53
	Earth Dam for Stockwater RSA23	54
	Wetland Rehabilitation RSA27	55
	Sub-surface Drainage on Irrigated Lands RSA10	56
11.7	MINING REHABILITATION	57
	Strip-mine Rehabilitation RSA46	58
	Strip-mine Rehabilitation by Plant Translocation RSA47	59
	Chemical Amelioration of Gold Slimes RSA62	60
12	SOIL AND WATER CONSERVATION APPROACHES	61
12.1	PRESCRIPTIVE	62
	All Participants – Law Enforcement RSA11	63
	Advisory RSA22	64
	Pilot Government Incentive RSA05	65
	Governmental Conservation RSA20	66
	Government Funded Demonstrations RSA37	67
	Governmental Projects RSA38	68
	Inter Departmental Approach RSA34	69
	Deliver Service on Demand RSA10	70
	Extension Officer Approached by Commercial Farmers RSA21	71
	Commercial Farmer Requiring Soil Conservation Technical Support RSA08	72
12.2	COMMUNITY INVOLVEMENT	73
	On Farm Research with Community Involvement RSA32	74
	Land User Participation with Research RSA33	75
	Restoration with the Help of Extension Workers RSA07	76
	Assistance to Community RSA01	77
	Technical and Scientific Support & Job Creation in Community Sector (Poorest of the Poor) RSA09	78
	Demonstration Restoration RSA40	79
	Demonstration for Communities in Rural Areas RSA15	80
	Awareness Raising RSA19	81
	Land User and Research Co-operation RSA52	82
	Participatory Rural Approach RSA39	83
	Communal Stakeholders RSA41	84
	Spontaneous Adoption RSA12	85
	Traditional (Institutionalised in Community) RSA03	86
	Interactive Community Approach, Biodiversity Increase RSA31	87

	Farmers Involved in Own Development RSA43	88
	Know-how/All Participants/Inputs and Means/Different Levels of Intervention RSA44	89
	Self-teaching RSA04	90
	Community-driven Protection of the Molatedi Dam Catchment Area RSA14	91
	All Participants, with the Emphasis of getting Know-how to the Farmer RSA56	92
	All Participants RSA57	93
12.3	<i>CONSERVATION APPROACHES</i>	94
	Conservation Committees RSA25	95
	Minimum Tillage RSA24	96
	Minimum Tillage on Commercial Farm RSA18	97
	Rehabilitation Techniques in Southern Kalahari – Vegetative and Management RSA55	98
12.4	<i>WATER RELATED ASPECTS</i>	99
	Water Harvesting and Basin Tillage (WHB) through Demonstrations RSA45	100
	Working for Water RSA42	101
	Working for Water Wetland Rehabilitation RSA27	102

1. INTRODUCTION

The Global Programme of Action on Sustainable Development, Agenda 21, as adopted by the United Nations Plenary in Rio de Janeiro in 1992, was a major shift of global policies toward sustainable development. In its introduction to Chapter 14, Agenda 21 states that: "By the year 2025, 83 per cent of the expected global population of 8.5 billion will be living in developing countries. Yet, the capacity of available resources and technologies to satisfy the demands of this growing population for food and other agricultural commodities remains uncertain. Agriculture has to meet this challenge, mainly by increasing production on land already in use and by avoiding further encroachment on land that is only marginally suitable for cultivation." It further states that major adjustments are needed in agricultural, environmental and macro-economic policy, at both national and international levels, in developed as well as developing countries, to create the conditions for sustainable agriculture and rural development (SARD) whose major objective is to increase food production in a sustainable way, enhance food security and combat poverty.

2. SOIL EROSION IN SOUTH AFRICA

South Africa is characterized by a wide biodiversity and distribution of the natural resources soil, climate, water and vegetation. Its surface area is 122 million ha, of which almost 86% is used for agriculture, 74% being natural veld and 14.6% arable land. Roughly 1.2 million ha is under irrigation and this accounts for 30% of total crop production (Van der Merwe & De Villiers, 1997). This is a potentially stabilizing component and helps greatly in allowing the country to currently meet its own food requirements and even to export in some cases. Nearly 91% of the country is arid, semi-arid and dry sub-humid, falling within the United Nations Convention to Combat Desertification (UNCCD) category of affected drylands. This shows that the country is generally very dry, which has important impacts on natural vegetation and agricultural potential (Hoffman, Todd, Ntshona & Turner, 1999).

Reference has been made to the problems of soil erosion in South Africa over many years. A government select committee, investigating drought severity as far back as 1914, blamed overgrazing and poor land management on soil losing its water holding capacity. J. Tromp, in the Handbook for Farmers in South Africa (1937), pointed out that research was being conducted into problems such as proper veld management, veld burning, pasture establishment, veld conservation, protection of catchment areas and, generally, the causes of damage to the vegetal covering of the veld. Attempts were being made to "acquire a better knowledge of the causes of erosion by studying scientifically the characteristics of soils which are easily eroded and comparing them with those of soils which are not susceptible to erosion". In 1939 the South African government recorded that a quarter of the cropland had been wrecked by erosion.

The Forest and Veld Conservation Act, Act 13 of 1941, was the first substantial legislation for the control of soil erosion and related problems. It was replaced by the Soil Conservation Act, Act 45 of 1946, which made it mandatory for farms to be planned with regard to soil erosion and water storage measures. The principles of conservation farming were introduced, soil conservation boards established, soil conservation districts and areas proclaimed and soil conservation measures (largely biological) and works (largely mechanical) implemented. Implementation was largely in the hands of the farmers themselves.

Because of the complexity of the soil degradation problem, new legislation was passed in 1983 in the form of the Conservation of Agricultural Resources Act, No 43 of 1983, which combined existing legislation to control soil erosion, noxious weeds and undesirable invader plants. The provisions of the act are ably spelt out by Adler (1985). This act has also experienced problems in manpower for its enactment being limited and is soon to be replaced.

3. LAND USE POLICY AND PRACTICES

The allocation of land in the country in the past has led to distorted demography and settlement patterns. The land-use policy in the commercial agricultural areas was conducive to conservation practices and enhanced sustainability, while the opposite was true for the communal areas. Agriculture was combined with migrant labour, both largely on a subsistence basis. Survival strategies resulted in increased animal numbers and biomass offtake, especially firewood. Excessive stocking rates are a significant cause of veld degradation in communal areas, resulting in overgrazing and erosion (Turner & Ntshona, 1999).

Commercial areas were not without problems, however, and excessive use of agrochemicals and the decline in soil organic matter under monoculture cultivation have had negative effects on soil, including acidification, structural decline and erosion.

The increased access to land that has occurred after the democratic elections of 1994, with 22 laws and amendments having been enacted to provide a framework for land reform and more than 50 000 families already having gained access to 6 500 000 ha of land by 1999 (GCIS Document, 1999), mainly on state land that will now be more intensively cultivated, makes it imperative to ensure its sustainable utilization and management (Barnard & Newby, 1999).

Unfortunately there are not many reliable indicators (measurable or available temporally and spatially) for assessing the condition of, or changes in, the state of the soil or land. In addressing this constraint, Hoffman *et al.* (1999) adopted a consultative process involving stakeholders' perceptions of condition and changes, in their "consensus map" approach to degradation of soil, veld and their combination. Thirty-four workshops were held throughout the country between June 1997 and February 1998, in which 453 people, largely agricultural extension officers and resource conservation technicians,

participated. A very comprehensive literature survey and several field trips contributed to the findings. From this study the relative extent of degradation (mainly erosion), as an index related to standard deviation, for soil and veld separately, and for their combination, was mapped. The conclusion was that deterioration is continuing, though not always in preconceived areas. Areas with steep slopes, low rainfall and high temperatures are significantly more degraded, especially in communal as opposed to commercial areas. Limpopo, KwaZulu-Natal and the Eastern Cape are the provinces with the highest incidence of degradation.

For many reasons it is unacceptable to allow soil degradation to proceed unabated. Sustainable utilization of soil is imperative from the agricultural, ecological, cultural, social and economic perspective.

Few persons would wilfully cause soil degradation. Ignorance, compounded by economic, social and political pressures that force farmers and other land users to use the land in the way they do are probably largely responsible. Whatever the reasons, and whatever the causal mechanisms, the end result tends to be just as catastrophic (Barnard, Van der Merwe & De Villiers, 1998).

4. INSTITUTIONAL ARRANGEMENTS

In the 1950s and 1960s, the Department of Agriculture (DoA) was organized on an agro-ecological basis, with the integration of faculties of agriculture at universities. The latter became fully-fledged university faculties in the 1970s, while the Agricultural Research Council (ARC) was established in 1992.

With the democratic elections of 1994, nine Provincial Departments of Agriculture (PDAs) were established, and the DoA restructured.

Currently, the Chief Directorate Sustainable Resource Management and Use of the DoA is, through the Directorate of Land Use and Resource Management and the Directorate of Water Use and Irrigation Development, in co-operation with the Departments of Agriculture in the nine provinces, responsible for the conservation of all agricultural and rural land in the RSA. In carrying out its mandate, the DoA liaises with international and regional institutions, national and provincial government departments, semi-state organizations, NGOs, private sector organizations and land users. The agenda and policy of the DoA, especially regarding sustainability, are discussed by Molope (1997). The DoA is currently reviewing its policies, and is drawing up a draft policy document on Agriculture in Sustainable Development.

The government is committed to achieving sustainable, equitable and efficient agricultural development. As regards protection of endangered plant and animal species and ecosystems, the emphasis will be on meeting internationally agreed standards and commitments.

The policy relating to land is to design measures which will contribute to the sustainable use of agricultural natural resources, while recognizing that the responsibility for such use lies with farmers and their communities.

5. INTERNATIONAL OBLIGATIONS

The DoA also has obligations on International Treaties and Conventions:

- State of Environment Reporting
- Convention on Biodiversity (UNCBD)
- Convention to Combat Desertification (UNCCD)
- Agenda 21: Global Programme of Action on Sustainable Development with special reference to an integrated approach to the planning and management of land resources; promoting sustainable agriculture and rural development.
- Land Degradation Assessment in Drylands (LADA). LADA will generate up-to-date ecological, social, and economic and technical information, including a combination of traditional knowledge and modern science, to guide integrated and cross-sectoral planning and management in drylands. LADA responds to the need to strengthen support to land degradation assessment at international and national levels. The project is funded by various international organisations. It also responds to the needs of the joint work programme between the Convention of Biodiversity (CBD) and the Convention to Combat Desertification (CCD) on Dry and Sub-humid Lands and was fully endorsed by the fourth session of the Conference of the Parties (COP4) of the CCD in Bonn, Germany on 11-22 December 2000. LADA will develop - with country participation - a framework for land degradation assessment at global and national levels through a consensus building process for which the long-term purpose is to identify socio-economic environmental benefits accruing from addressing land degradation in drylands in terms of conservation of biodiversity and international waters, and sequestration of carbon.
- Supporting the New Partnership for Africa's Development (NEPAD) for agricultural development in Africa.
- Ensuring the success of the World Summit on Sustainable Development held in Johannesburg from 26 August to 4 September 2002
- Implementing the Joburg Plan of Implementation.

6. WOCAT

WOCAT (World Overview of Conservation Approaches and Technologies) was launched by the World Association of Soil and Water Conservation (WASWC) in 1992, organised as a consortium of International Institutions. It was accepted as a global programme by the 9th International Soil Conservation Organisation (ISCO) Conference in 1996, and is currently co-ordinated by the Centre for Development and Environment (CDE) at the University of Berne, Switzerland.

The Agricultural Research Council-Institute for Soil, Climate and Water was contracted by the Directorate of Agricultural Land and Resource Management of the Department of Agriculture to initiate the WOCAT programme in South Africa.

The goal of WOCAT is to contribute to the sustainable use of soil and water through collection, analysis and presentation of Soil and Water Conservation (SWC) approaches and technologies worldwide, to promote improved decision making and land management.

A South African WOCAT Workshop was held in March 1999, followed by a Map Questionnaire Workshop in 2000. The objective of these work sessions was to identify all the role players in SWC who can assist with, and contribute to, WOCAT, to co-ordinate data collection, data entry and quality control and to evaluate the use of the SOTER data and existing land degradation data (compiled by Tim Hoffmann) in preparing the WOCAT Map database for South Africa.

To date some 55 Approach and 59 Technology questionnaires have been completed and included in the South African database. From these, 10 questionnaires on each have been included in the International CD-ROM Version II. For the International CD-ROM Version III (being released at the end of 2003), more than 30 questionnaires of each will be included. This also includes more than 400 photos/figures in the Image database.

The advantages of the WOCAT concept are that experiences of persons involved in Soil and Water Conservation approaches and technologies can be captured, albeit qualitatively, and recorded for posterity in a systematic, comparable and useful manner.

These perceptions are virtually impossible to quantify, but they often represent a lifetime of work and experience that desperately needs to be captured. One can learn so much from both the successes and failures of the past, to ensure a better future for all.

The project team has attempted to identify such valuable sources of information residing in government officials, farmers, researchers and others, and approached them for their inputs. These efforts have been rewarded with the acquisition of much valuable information that has been documented as reliably as possible.

By the very nature of this approach, however, some people will have been excluded and their contributions need to be obtained. May we appeal to the reader to identify such omissions and bring them to our attention, so that the WOCAT database can be as comprehensive and encompassing as possible.

7. THIS PUBLICATION

In order to publicise WOCAT as widely and effectively as possible, it was decided to prepare the material in a user-friendly manner as “one pagers” for the different contributions. In doing so information will probably be lost and even distorted. Again this is certainly not intentional and the reader is requested to bring such problems to our attention.

8. THE FUTURE

The success of a system such as WOCAT depends on its usefulness at various levels. It is sincerely hoped that it will become the database, and preferred method of reporting on, soil and water conservation in South Africa and, indeed, internationally. To achieve this, all funders and users of soil and water conservation projects and information should require this of programmes that they support.

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11. SOIL AND WATER CONSERVATION TECHNOLOGIES

11.1 PHYSICAL STRUCTURES

WOCAT

SWC Technology

Traditional Stone Terrace Walls

Traditional stone terrace walls built on sloping fields for cultivation

GENERAL INFORMATION

Description: Stone terrace walls are built when clearing new land of stone to bring it into cultivation. These walls are added to each year from further loose stone which is uncovered. The dimension of the walls and the spacing between depends on various factors including the amount of stone in the field. The walls may be up to 1.25 metres high, about 1.5 m maximum base widths and from 20 to 50 metres in length. Spacing is from 3 – 10 metres apart and depends on the slope of the land: stone terracing is generally confined to slopes between 12° and 26°. Between 7° and 12° contour grass strips are generally used: below 7° land is not terraced. Design varies. Some terrace walls are very neatly built; others are merely piles of stone across the slope. The purpose, apart from clearing the land, is to guard against erosion and help keep soil fertility in place, on sloping cropland in a sub-humid area – where rainfall is around 1,000 mm per annum. Maize is the most common crop, but various other annuals and perennials are also grown.

SWC-Categories: Structural measures

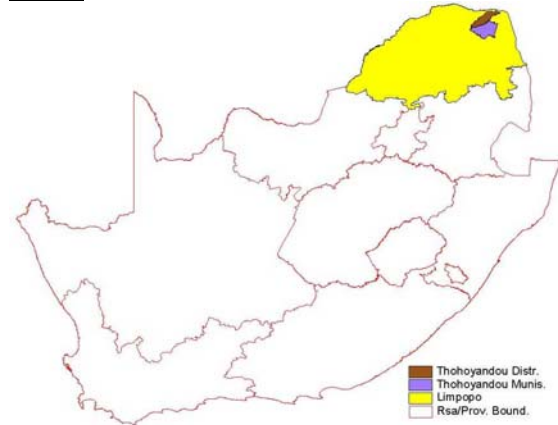
Land use type: Annual cropping and Tree/shrub cropping

Land ownership: Individual, not titled

Location: Thohoyandou district

Area covered: 8 km²

Map:



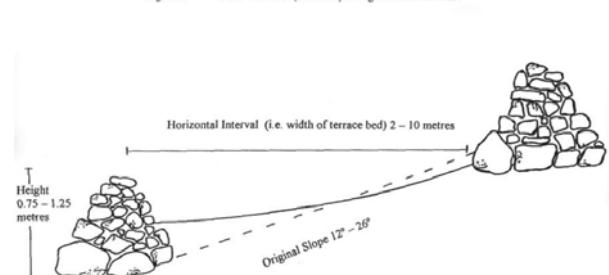
Author: Critchley William, University of the North, Vrije Universiteit, Amsterdam, The Netherlands

Illustration:



Stone terrace walls

Figure 3 Stone Terraces (*Mitsheto*): Ranges in Dimensions



Stone terraces: ranges in dimensions

Stonelines

GENERAL INFORMATION

Description: A stoneline is made of boulders that are lined together to form a contour or water barrier across the slope.

The purpose thereof is to reduce flow speed of run-off water and to trap eroded leaves and silt, hence preventing soil loss.

Additional stones are added after a defined period or when the old line seems to be sinking.

The area is on hill slopes on cultivated lands.

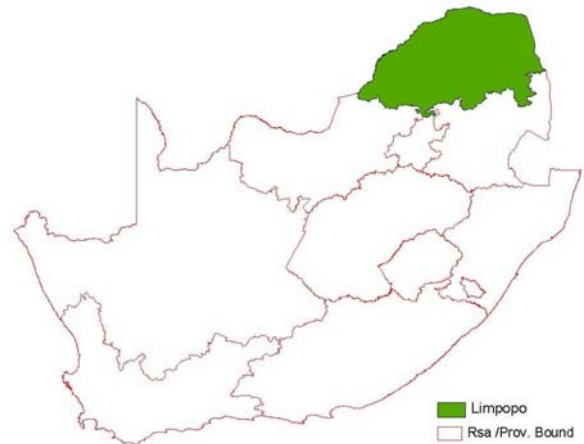
SWC-Categories: Structural, Vegetative, Management & Agronomic

Land use type: Annual cropping

Land ownership: Communal/Village

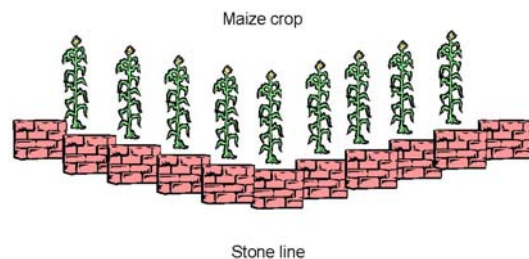
Location: Limpopo

Map:



Author: Lutendo Nethononda, Madzivhandila College of Agriculture, P/Bag X5024, Thohoyandou, 0950

Illustration:



Stonelines packed to form a contour

WOCAT

SWC Technology

Gully control (gabions) at Maandagshoek

Stone walls and re-vegetation (planting of indigenous trees) = Rehabilitation

GENERAL INFORMATION

Description: For the pilot project loose stones and sometimes concrete walls that work well were used. It is not more expensive than gabions, because a trucker is needed for gabions and it is labour intensive. Wire is also often stolen off the gabions.

The following steps were followed in this technology:

The areas are fenced, barricades (gabion like structure) erected, and planting done. Rehabilitation and environmental education was the overall purpose. Severe erosion dongas can be improved and used for controlled grazing.

The request came from the Communities, they would like to make money and make land available for Nature reserves (it is seen as a status symbol). Hunting by professional hunters and meat for biltong. The excess game goes to hunting (local) and the meat is sold to the community at a lower price. Very little poaching or damage to the fences occurs.

Looking after the fences, roads, gabions and water points (infrastructure) are all part of the maintenance. The Nature reserves are actually surrounded by villages, but there are no problems of people going into the Reserves.

The areas are classified as Nature Reserve - Savannah woodlands (Acock's veld type: 19), Nebo – transitional zone between 61 and 18 (Acock's veld type 61) and Sekhukuhne as mixed bushveld (Acock's 19).

SWC-Categories: Management, Structural & Vegetative measures

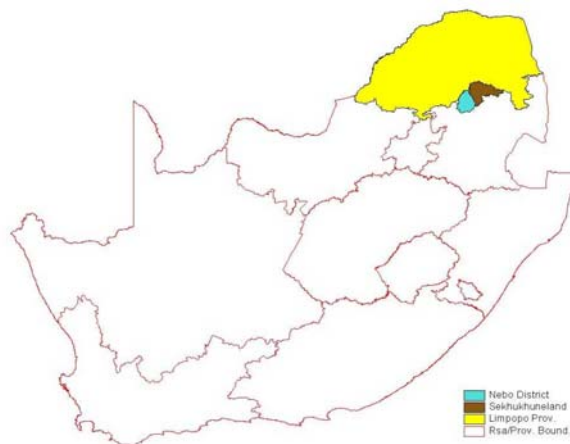
Land use type: Extensive grazing

Land ownership: Communal/Village

Location: Nebo District - Sekhukhuneland

Area covered: 29.01 km²

Map:



Author: Igmé Terblanche, Action Green Heritage (NGO), 105 Diemeer Street, Pietersburg, 0699

WOCAT

SWC Technology

Gabions: stone packed with wire/logs with branches

Construction of run-off diversion barriers and stone gabions to control and stabilise gully erosion

GENERAL INFORMATION

Description: Gully erosion: stone gabions with wire to curb erosion and trap sediment and entrap vegetation. No maintenance except if erosion goes around the gabion - make gabion bigger (usually a problem in acidic soils). The gullies are usually caused by human influence, and mainly on roads. Gabions are erected to protect buildings and roads (prevention of damage to infrastructure).
Erosion from roads: To curb erosion from roads, and to provide proper drainage.

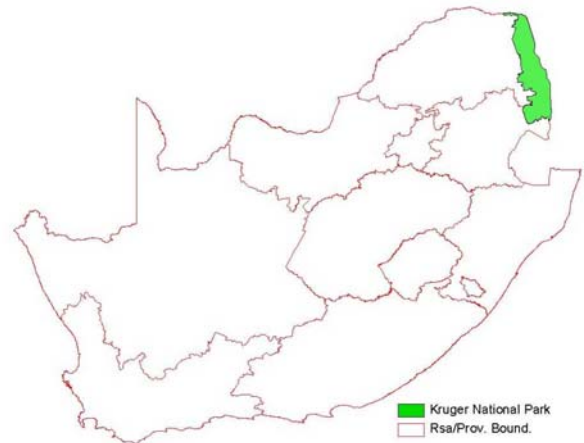
SWC-Categories: Structural & Management measures

Land use type: Natural forest and Extensive grazing

Land ownership: State

Location: Kruger National Park

Map:



Author: Freek Venter, National Parks Board, Kruger National Park, P/Bag X1021, Phalaborwa, 1390

WOCAT

SWC Technology

Gabion Structures

Structural, using gabions, contours, and strip pastures

GENERAL INFORMATION

Description: Gabion structures in dongas supported by contours and pasture establishment and silt traps in the form of dams were erected.

The purpose was to contain the present state of degradation by trapping topsoil loss.

Departmental visits and inspection are the most important maintenance.

It is a semi-arid, overstocked (livestock) area, with no planned villages (former Bophuthatswana).

SWC-Categories: Structural measures

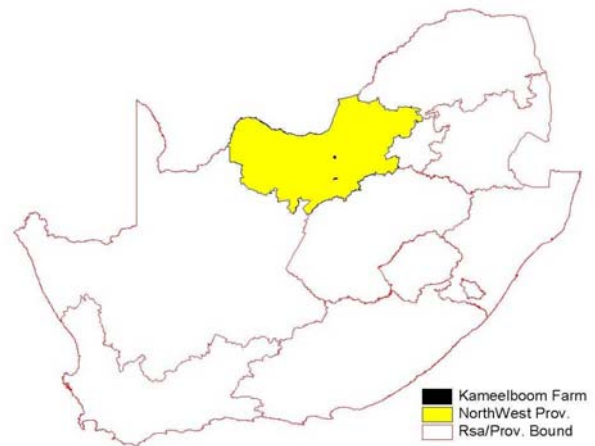
Land use type: Settlements,
Extensive grazing and Annual cropping

Land ownership: Communal/Village &
State

Location: North West

Area covered: 128 km²

Map:



Author: Cornelius Last, Department of
Agriculture, P/Bag X1005, Mogwase,
0314

WOCAT

SWC Technology

Gravity Type Inverted Tyre Structure

Stabilising of gully erosion by means of gravity type inverted tyre structures filled with stones

GENERAL INFORMATION

Description: Gravity type inverted tyre structure is bound together with wire and filled with stone.

The valley floor gully head drop is protected to prevent further erosion. Survey planning and design are important for the construction of the structure.

Maintenance includes prevention of leakage alongside the structure. The walls to prevent the erosion of soil are filled in. Ensure that the top layer stones are not washed away.

The structure is situated in a semi-arid area which is highly degraded through overgrazing.

Due to the location of the structure, further erosion was stopped that would have endangered some of the homesteads.

SWC-Categories: Structural measures

Land use type: Extensive grazing

Land ownership: Communal/Village

Location: Marico District

Area covered: 12 km²

Map:



Author: Boeta Du Toit, Marico Bushveld Soil Conservation Committee, PO Box 151, Zeerust, 2865

Illustration:



Tyre structures



Tyre structures bound with wire and filled with stones

Old Motor Tyre Contours

Old motor tyres and/or vegetation along contours

GENERAL INFORMATION

Description: The site of Geen Einde is typical of many areas in Lebowa: a large gully approximately 200 m wide and 10 m deep in places with semi-eroded pedestals remaining. Flood waters from the mountain meanders causes further gouging of the sides of the pedestals. Tributary gullies have formed in the highly erodible soil (high clay content) adjacent to the main gully. Signs of old contour bunds indicate that the land was cultivated in the past.

1. An earth silt dam was mechanically constructed across the main erosion gully.
 2. Several gabion structures were constructed in the minor gullies.
 3. Vetiver grass was planted in the silt to act as nursery material for future planting.
 4. Old motor tyres were laid on a level contour above the minor gullies to harvest water.
 5. Several species of indigenous trees were planted in the gullies and along the rows of tyres.
 6. Two Agave species, local aloes and vetiver grass were planted along level contours.
 7. Agave was planted along the edges of the gullies.
 8. Shallow gullies were stabilised with old tyres and Agave.
 9. Couch grass (*Cynodon dactylon*) was planted at a few places in the gullies and along the rows of tyres.
- The main reason for these actions was to reduce the water velocity.

SWC-Categories: Structural & Vegetative measures

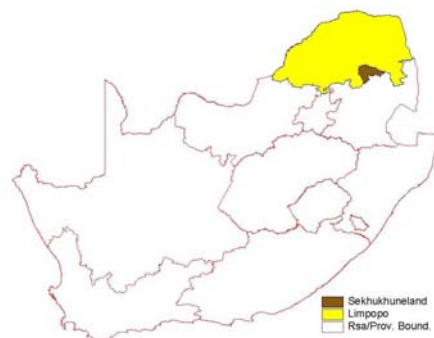
Land use type: Plantations, Extensive grazing and Tree/shrub cropping

Land ownership: Communal/Village

Location: Sekhukhuneland

Area covered: 0.1km²

Map:

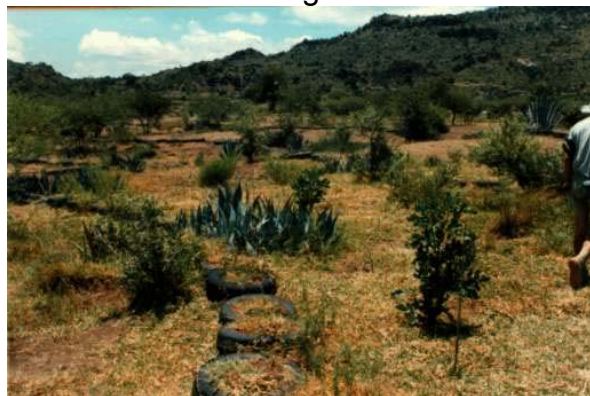


Author: Christo Spies, P/Bag X01, Chueniespoort, Potgietersrus, 0600

Illustration:



Gabion structures in gullies



Old motor tyres on contours

11.2 COMBINATIONS WITH VEGETATION

Terraces, Waterways/Cut-off Drains and Vetiver Grass

Mainly structural but also the use of vegetative (using vetiver is on the increase) measures

GENERAL INFORMATION

Description: Terraces are surveyed, correct spacing of terraces is determined and the slope of the terraces is graded. The terraces are then constructed by the farmers on private land (subsidy used to be offered by the government, Act 43 of 83).

The main purpose of the terraces is to reduce speed of the runoff, and also direct the runoff to the waterways (for graded terraces).

In the drier regions, level terraces are used to allow infiltration into the soil. Grass is planted on terrace banks for protection from sheet erosion.

For maintenance, terraces are desilted, grass streamed and broken banks repaired. For gullies (dongas), gabion structures are mainly used to reclaim the land.

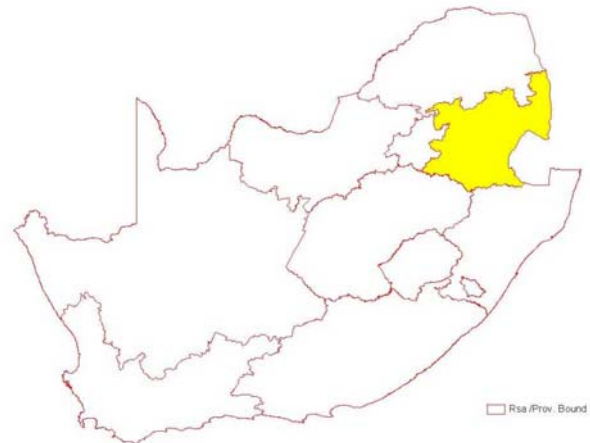
The gabions are designed and installed with the supervision of a technician from the Department of Agriculture.

SWC-Categories: Structural & Vegetative

Land use type: Intensive grazing, Perennial (non-woody) cropland and Annual cropping

Location: Mpumalanga

Map:



Author: Eric Masereka, Department of Agriculture (Soil and Water Conservation), P/Bag X11318, Nelspruit, 1200

Vetiver Vegetative Hedges

Contour planting of vetiver lines to counter soil erosion on steep slopes

GENERAL INFORMATION

Description: Contour planting of vetiver grass on the boundaries and within the annual subsistence farming fields.

The purpose was to prevent erosion and conserve moisture demarcation of contours and land.

The establishment was as follows: surveying the contour line, 3 strikes per planting station, 10-20 cm spacing, planting depth 5-20 cm (manually); planting in 1 row. The horizontal spacing depends on slope and soil (with a maximum of 10 m).

The filling of gaps is the only maintenance necessary.

Non-invasive. It is imperative that plants be watered at least once a week for first 4 weeks to ensure growth.

SWC-Categories: Vegetative & Agronomic measures

Land use type: Annual cropping

Land ownership: State & Communal/village

Location: KwaZulu/Natal - Midlands

Area covered: 4 km²

Map:



Author: Stuart Armour, Department of Agriculture, P/Bag X9059, Pietermaritzburg, 3200

Illustration:

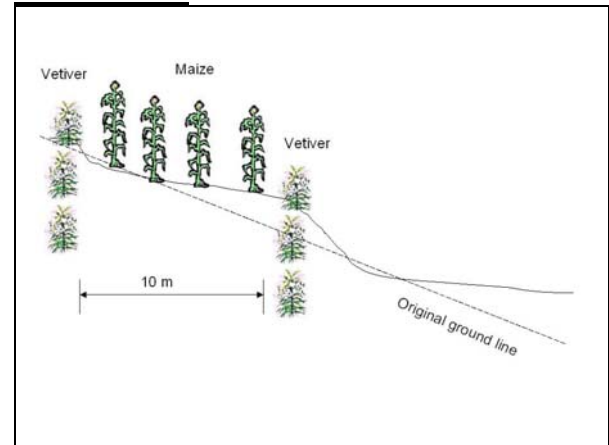
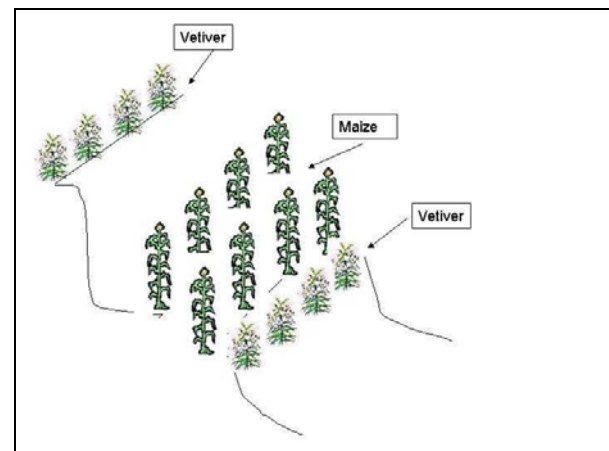


Diagram of vetiver on slopes



Vetiver between maize plants

Vetiver Grass Soil Conservation System

Contour lines of vetiver grass planted within fields of sugarcane at 5 m vertical intervals

GENERAL INFORMATION

Description: Vetiver grass (*Vetiveria zizanioides*) is planted on the contour and also in other situations (along stream banks and minor farm roads) to form a vegetative barrier and protect the land from surface erosion. This is the case study of a single large-scale commercial farm in KwaZulu/Natal, South Africa, where vetiver grass, which had been growing naturally on the farm for years in clumps, has been split and used in lines to protect the land, following instructions from a booklet. The process was initiated in 1989. Although sugar cane in itself protects the soil quite well, on the slopes and erodible soils of the north coast of KwaZulu/Natal, extra protection is required. The vetiver system can therefore supplement other soil conservation measures such as strip cropping and terraces. It also helps by permanently marking the contour line. Vetiver clumps are dug up and separated into splits, which are planted along the contour (or by stream banks, or by the roadside) just before the rains to ensure good establishment. This is started at the top of the slope, working downwards. The grass hedges are sited at 5m vertical intervals down slopes of more than 10%, in lines of about 200m long. This is in combination with mulching and minimum tillage. Maintenance is very important, as vetiver often requires 'gapping up' to keep the barrier dense, and it also needs to be cut down before the dry season to prevent it from burning.

SWC-Categories: Vegetative,
Agronomic & Management measures

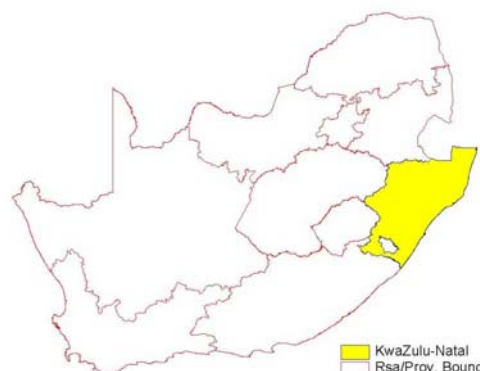
Land use type: Perennial cropping

Land ownership: Individual, titled

Location: Lower Tugela district

Area covered: 8 km²

Map:



Author: Maxime Robert, PO Box 56,
Haenertsburg, 0730

Illustration:



Vetiver on contours



Vetiver on contours

Agronomic and Vegetative Rehabilitation

Combinations; cultivation and vegetative

GENERAL INFORMATION

Description: The purpose of the rehabilitation includes an increase in production potential, vegetative cover and density, biodiversity, fodder for grazing and palatable grass species.

To establish this technology, cultivation of the denuded areas was done by dyker plough. Oversowing with a grass-seed mixture followed. The seeds (indigenous) were purchased from a seed-company. If woody encroachment species are available, place the branches on the cultivated area. No maintenance is necessary; the area is left as it is for 3 years with no grazing if possible (no grazing for cattle, but for game some grazing-areas are partly covered by branches no grazing).

SWC-Categories: Management, Agronomic, Vegetative & Structural measures

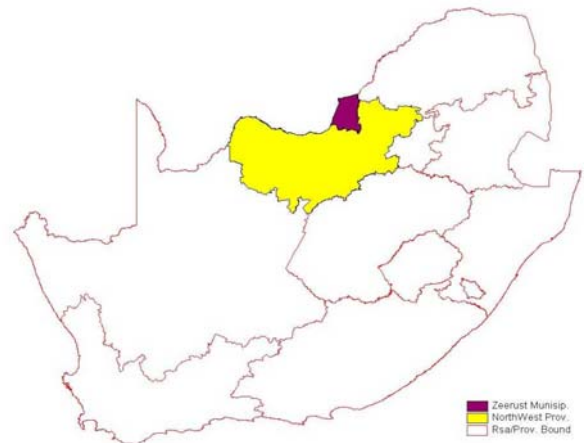
Land use type: Intensive grazing

Land ownership: Individual (titled)

Location: Zeerust

Area covered: 20 km²

Map:



Author: Klaus Kellner, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Plough

Grass Strips

Combination of field demarcation and erosion protection by grass strips

GENERAL INFORMATION

Description: Grass strips are left uncultivated to demarcate field boundaries. The width of the grass strips varies widely depending on the availability of land (distance from the village). No establishment is required. The group of fields is fenced off with wire fences (in close vicinity to town) or natural fencing using aloes and dead branches from thorn trees (for gap filling). The fence protects the crops and grass strip during summer. In winter the fields and grass strips are grazed.

SWC-Categories: Vegetative, Management & Agronomic measures

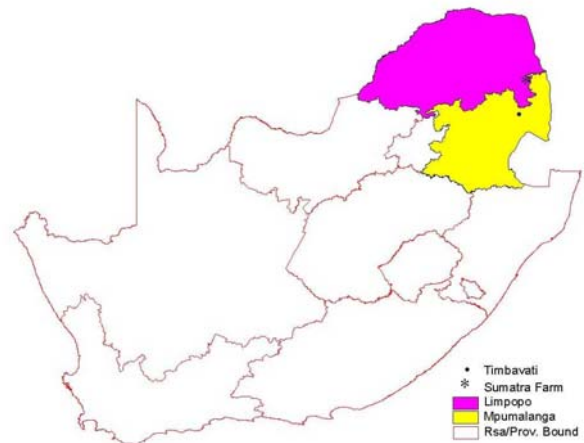
Land use type: Extensive grazing

Land ownership: Communal/Village

Location: Nebo district

Area covered: 0.3 km²

Map:



Author: Andrei Rozanov, University of Stellenbosch, P/Bag X1, Matieland, 7602

WOCAT

SWC Technology

Agronomic Mulching, Intercropping

GENERAL INFORMATION

Description: Cover soil surface with foreign matter. Apply straw, manure, grass cuttings and leaf mulch. Plant two agronomic crops in the same field during the same season.

Author: Sue Walker, University of the Free State, PO Box 339, Bloemfontein, 9300

Illustration:

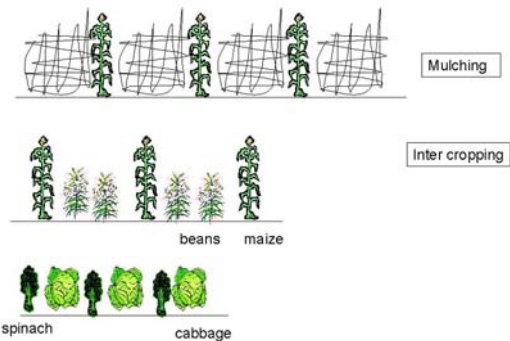
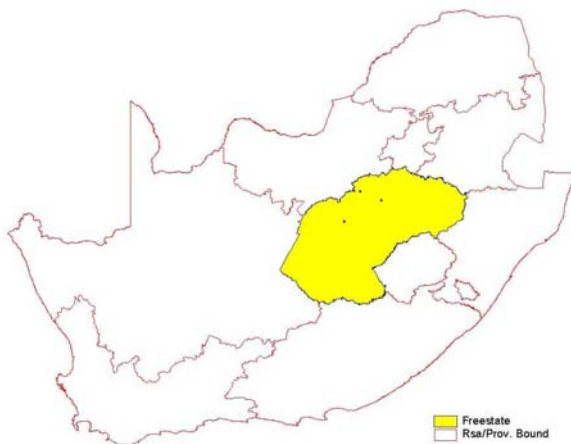
SWC-Categories: Agronomic

Land use type: Annual cropping

Land ownership: Individual (not titled)

Location: Former Gazankulu - Old Lebowa

Map:



Intercropping with mulching

Organic Block

GENERAL INFORMATION

Description: The organic block is a block, 10 x 10 x 3 cm, made of a mixture of organic material, namely cattle dung, fertiliser and a seed mixture and is used as a restoration technique in degraded areas especially where no implements are available.

The seed mixture consists of *Antheophora pubescens*, *Cenchrus ciliaris*, *Cloris gayana*, *Panicum maximum* and *Digitaria eriantha*. The block is moulded and left for 3 days to dry. It was then placed on a 1 ha degraded area at Brits.

300 blocks were placed out on an area that was loosened to approximately 10 cm depth; 300 blocks were placed out on an area that was loosened approximately to 5 cm and afterwards covered with branches, and another 300 blocks were placed out on an area that was not loosened.

A fence surrounds the site.

The soil was loosened by making a hole for each block (5 – 10 cm deep).

SWC-Categories: Vegetative & Management measures

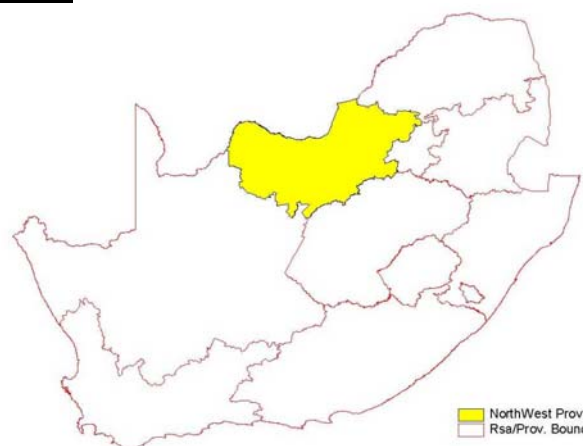
Land use type: Intensive grazing

Land ownership: Communal/village

Location: Brits

Area covered: 0.01km²

Map:



Author: Louisa Buys, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Placing the organic block in the soil

11.3 MANAGEMENT MEASURES

WOCAT

SWC Technology

Rip-ploughing, Oversowing

Rip-ploughing and oversowing (sod-sowing) of extensive grazing land in order to improve productivity of a semi-arid rangeland

GENERAL INFORMATION

Description: A pasture characterised by the unpalatable *Cymbopogon plurinoides* grass species was rip-ploughed to a depth of 20, 15, or 7 cm to uproot the unfavourable grass species.

Coated and uncoated seeds of more palatable grass species were hand sown into the furrows and the soil kicked over the seeds.

Grazing has been excluded for the past four years, giving the sown-in grass species the opportunity to establish and credit the soil seed bank.

The purpose of the technology was threefold: First, the success of rip-ploughing as a restoration technology was researched. Secondly, the suitability of coated or uncoated seeds was established. Thirdly, the suitability of the technology for restoration purposes was researched. This was done in the summer of 1995/96. The frequency and density was measured in the following years up to 1999. The density was measured with a 1 x 1 square meter; and tillers, vegetative and reproductive plants were distinguished.

The purpose of the frequency measurement is to establish the percentage a grass species contributes to the grass community. The density measurement gives the amount of rooted plants in a square meter. Distinction between the life stages indicates the self-sustainability of a population. Seed bank analyses are also added.

SWC-Categories: Vegetative & Management measures

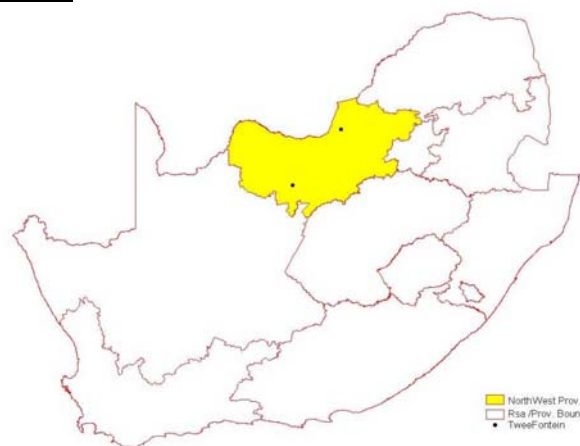
Land use type: Extensive grazing

Land ownership: Communal/Village & Individual (titled)

Location: Koster, Madikwe & Potchefstroom basins

Area covered: 0.1 km²

Map:



Author: Saroné De Wet, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

WOCAT

SWC Technology

Bush Packing

Bush packing on degraded rangelands & rehabilitation

GENERAL INFORMATION

Description: Identification of degraded area is done in order to rehabilitate the veld. By using branches, the bare (overgrazed) area will be rehabilitated by means of reseedling or naturally by succession.

SWC-Categories: Management & Vegetative measures

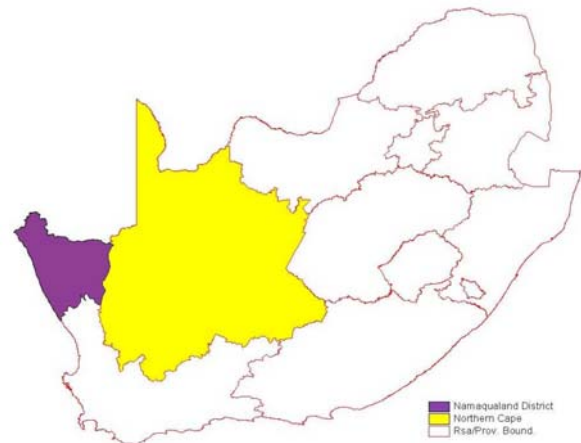
Land use type: Extensive grazing

Land ownership: Communal/Village & Group

Location: Namaqualand

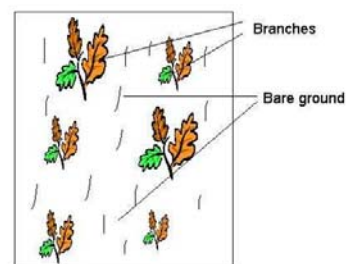
Area covered: 2 km²

Map:



Author: Belly Malatji, Agricultural land and Resource Management, PO Box 2303, Kimberley, 8300

Illustration:



Packing of branches on bare soil

WOCAT

SWC Technology

Small-holders Intercropping Planting Technology

Single furrow intercropping ploughing technology including the simultaneous application of a fertiliser cocktail

GENERAL INFORMATION

Description: The technology is an agronomic measure which results in intercropping management of maize, beans and pumpkins in rows. The planter is an animal-drawn implement with two hoppers. The fertiliser hopper is filled with a mixture of crushed kraal manure, chemical fertiliser mixture, commercially available chicken manure (Gromor) and the seed of beans and pumpkins.

The technology is used in home gardens and fields of small-holders. Access to the tool is by means of sharing through the formation of clubs.

The technology was developed by farmers themselves and has long been utilised by research and extension.

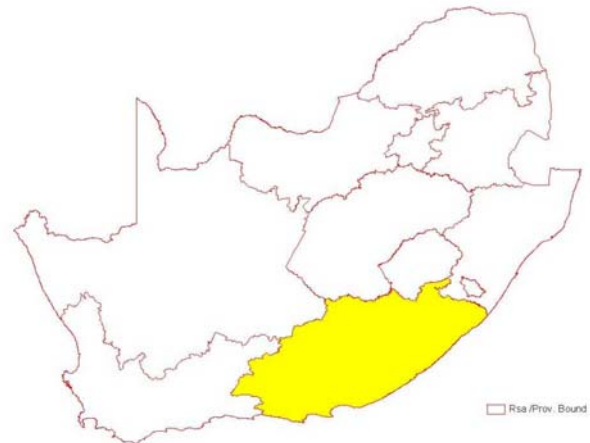
SWC-Categories: Agronomic

Land use type: Extensive grazing and Annual cropping

Land ownership: State, Communal/Village & Individual (not titled)

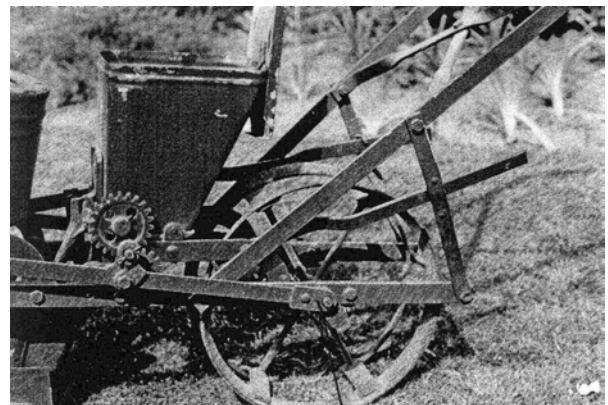
Location: Transkei

Map:



Author: Wim Van Averbek, Technikon Pretoria (Department Agricultural Management), P/Bag X680, Pretoria, 0001

Illustration:



Planter

WOCAT

SWC Technology

Rangeland Management

Range management of communal grazing areas to improve grazing by applying rotational grazing and establishing benchmarks

GENERAL INFORMATION

Description: Benchmarks were identified and then monitored to indicate how the production and species composition of the veld would change after rotational grazing is applied. Benchmarks will only be grazed during the winter months. Benchmarks will also serve to indicate how the veld will improve under the correct grazing system. The production and species composition surveys are taken both inside and outside the benchmarks to determine the changes in production and species composition after the correct grazing system has been applied. This will indicate how the veld and grazing has improved by monitoring the benchmarks over the years.

SWC-Categories: Management measures

Land use type: Extensive grazing

Land ownership: Communal/Village

Location: Ganyesa

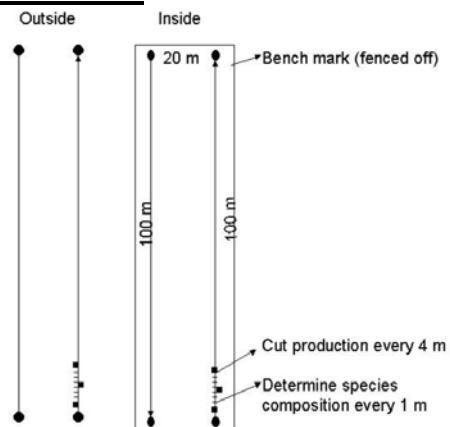
Map:

N THE NORTH WEST PROVINCE

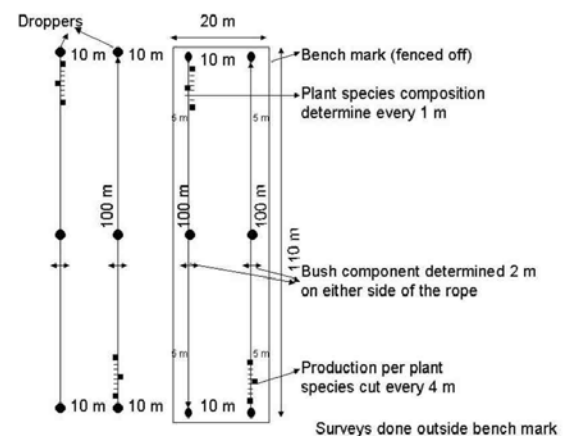


Author: Marina Van Heerden, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Schematic layout of technology



Schematic layout of technology

Rangeland Rehabilitation

Rangeland rehabilitation where perennial grasses are used to rehabilitate the footslopes in a semi-arid region on a clay loam soil

GENERAL INFORMATION

Description: Different techniques (mechanical: e.g. ripper, dyker plough) as well as biological (stone dams, loose dams) are used to rehabilitate a totally degraded area. Different combinations are also used: e.g., ripper with seed and ripper without seed, to see if there is a natural seed bank left. The research is being done in a semi-arid area and on a footslope (medium depth and clay loam soil). The purpose is to get palatable vegetation back in the area for animal consumption. In the process, erosion is stopped and water run-off decreased. At the same time, the community is also trained and educated regarding management, grazing capacity, etc.

Researchers and technicians of the Provincial Department of Agriculture planted the experiment. The community is always present when any treatment is applied. The area is fenced off and maintained by the Department. The community will take full responsibility of the trial at a later stage. They are very eager to take over and their participation is very good.

SWC-Categories: Vegetative measures

Land use type: Extensive grazing

Land ownership: Communal/Village

Location: Lehurutshe

Area covered: 0.4 km²

Map:



Author: Franci Jordaan, Department of Agriculture, P/Bag X804, Potchefstroom, 2520

Illustration:

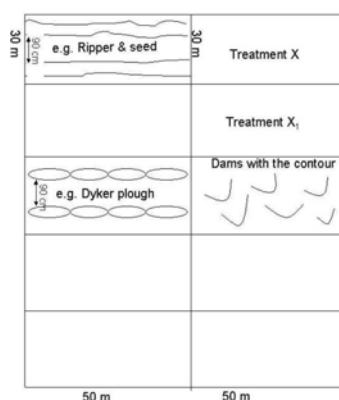
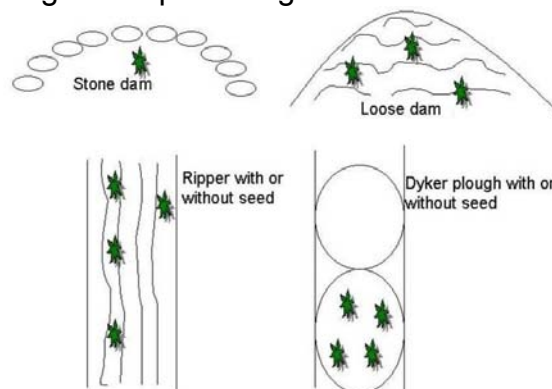


Diagram of plot design



Different techniques applied

Veld Reclamation

Barren area re-vegetated with *Atriplex nummularia* (Old Man Salt Bush)

GENERAL INFORMATION

Description: A barren area was re-vegetated with *Atriplex nummularia* over the duration of 3 years by means of the following: A double furrow with a one-share plough, 2 m apart. Small *Atriplex* plants were bought and planted in wet soil and irrigated with flood irrigation. Plants were spaced 1 m apart in the furrow. The purpose of this technology is veld reclamation. The whole area was fenced and sheep were brought in after the camp system rested. Close to this area is a big dam, so irrigation was no problem. Irrigation occurs mainly in the establishment phase.

SWC-Categories: Management & Vegetative measures

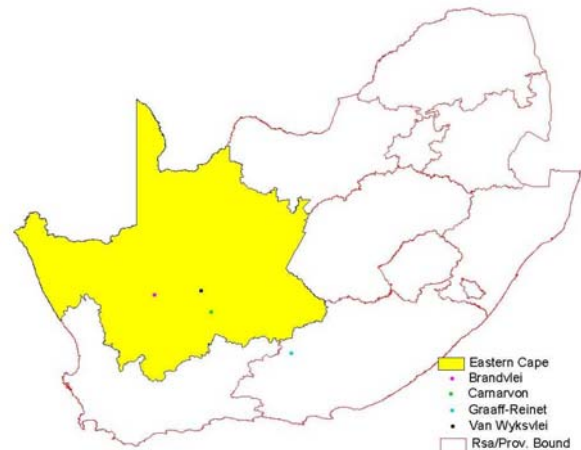
Land use type: Extensive grazing

Land ownership: Individual (titled)

Location: Middelpos

Area covered: 3.5 km²

Map:



Author: Gert Barnard, Department of Agriculture, Grootfontein Agriculture Institute, P/Bag X529, Middelburg, 5900

Revegetation and Re-seeding

Revegetation of old, degraded land. Restoring area to increase grazing capacity and production

GENERAL INFORMATION

Description: Vegetative (revegetation/re-seeding) improvement for an increase in grass production and to increase the grazing capacity of the area.

The rural community identified an old degraded land - the area was fenced to exclude grazing by large herbivores. The woody species that encroached the area were debushed. Area was ploughed and re-seeded with palatable, climax, big tufted, perennial grass species. Some plots were covered with twigs (bush packing). The area was protected from grazing. Monitoring of vegetation was done at the end of the growing season.

SWC-Categories: Vegetative measures

Land use type: Extensive grazing

Land ownership: Communal/Village

Location: Pietersburg

Area covered: 1 km²

Map:

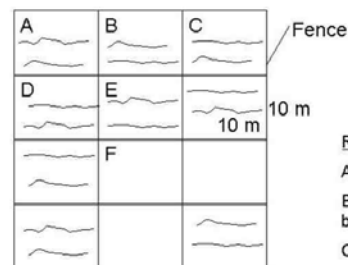


Northern Province:



Author: Klaus Kellner, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

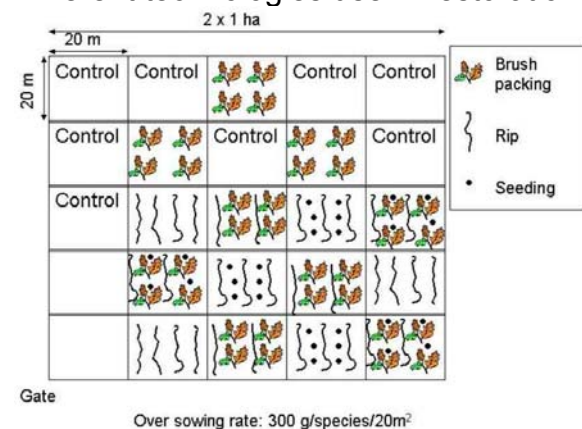
Illustration:



Restoration Technologies:

- A: Re-seeding + cultivation
 - B: Re-seeding + cultivation + brush packing
 - C: No seed + only cultivation
 - D: Only Brush packing
 - E: Cultivation + Brush packing
 - F: Control
- 3 replicates of each technology

Different technologies use in restoration



Layout of research plots

WOCAT

SWC Technology

Management of Grazing Practices

Control of livestock numbers; plant management; knowledge and control of plants and essential rest periods

GENERAL INFORMATION

Description: Management of grazing practices. Technical management for rest periods of natural pasture is essential so that seed production and the establishment of seedlings can take place. This leads to an increased grazing capacity and an increase in a more palatable and permanent component of the given vegetative make-up.

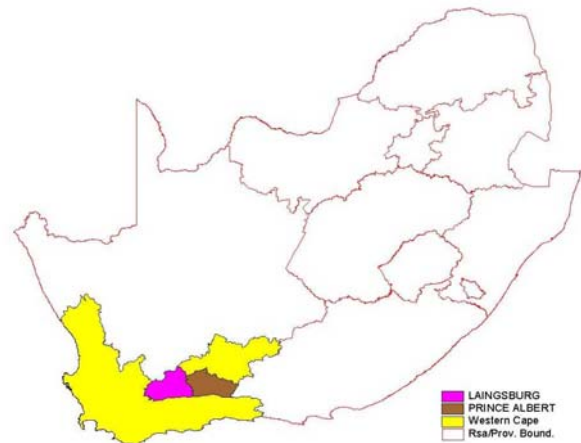
SWC-Categories: Management, Agronomic, Structural & Vegetative measures

Land use type: Annual cropping

Location: Karoo

Area covered: 450000 km²

Map:



Author: Charl Du Plessis, Department of Agriculture, PO Box 6, Laingsburg, 6900

WOCAT

SWC Technology

Communal Grazing Management

Rangeland management of communal grazing land, to improve grazing capacity by applying rotation

GENERAL INFORMATION

Description: Benchmarks were identified and monitored to see how the production and vegetation would change if proper management was applied to a specific area. The benchmarks will only be grazed in the winter and rested in summer. The benchmarks were constructed with goat-proof fencing. Benchmarks will illustrate how grazing land can improve with the right management system. Monitoring of vegetation is done twice a year.

SWC-Categories: Management measures

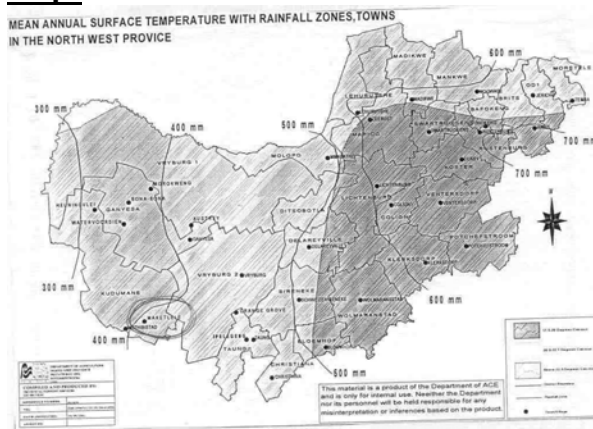
Land use type: Extensive grazing

Land ownership: Communal/Villages

Location: Kudumane

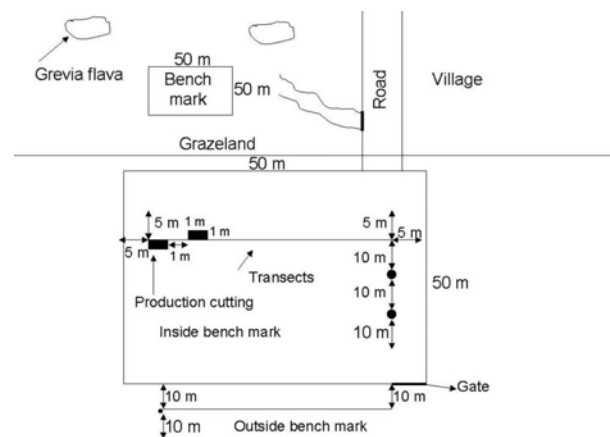
Area covered: 1 km²

Map:

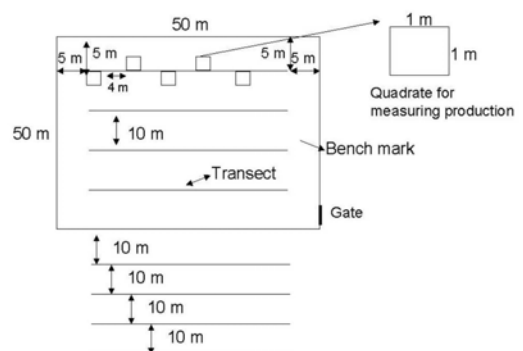


Author: Anja Jansen van Vuuren, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Schematic layout of technology



Schematic layout of technology

WOCAT

SWC Technology

Economical Grazing Capacity

Management of natural veld according to the grazing capacity for long-term high grass margins. Determining of optimal economical grazing capacity with animals

GENERAL INFORMATION

Description: Four camp rotational grazing systems with three stocking rates (high, moderate and light).

Animals used were sheep and cattle grazing simultaneously in the same camp for three weeks.

The following surveys were done:

Weighing the animals every 3 weeks, determining available biomass of plants every season (3 month period), botanical composition every year at the end of the growing season, basal cover determination every second year, cutting the wool of the sheep at the end of the year, and slaughtering animals, weighing and grading them for meat income.

Experimental research for the correct grazing capacity of the veld was done. When the trial started the existing grazing capacity was based on practical knowledge of the farmers. This knowledge was applied for different computer models. The purpose of these experiments was to get the optimum grazing capacity from the economic side.

SWC-Categories: Management measures

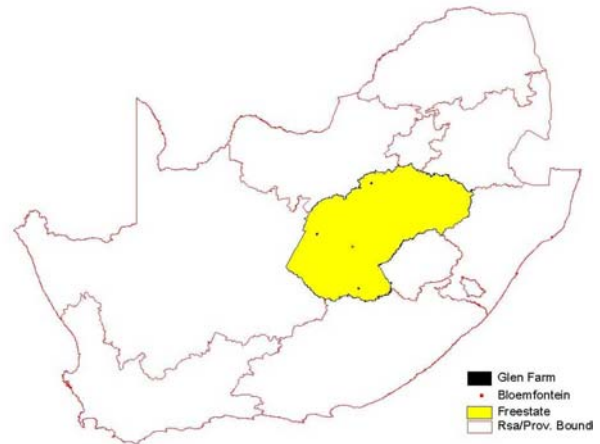
Land use type: Extensive grazing

Land ownership: Individual (titled)

Location: Bloemfontein

Area covered: 4 km²

Map:



Author: Izak Venter, Department of Agriculture, PO Box 502, Bloemfontein, 9300

WOCAT

SWC Technology

Restoration Ecology

The restoration of a degraded area back to a fully functional ecosystem

GENERAL INFORMATION

Description: The objective is to restore a degraded area back to a fully functional ecosystem.

For the establishment, different treatments were used, including loosening of the soil, breaking the soil crust, oversowing, addition of organic material and brushpacking to increase vegetation cover and reduce erosion possibility.

Repeated surveys to determine the success of the treatments and to determine the most successful one.

SWC-Categories: Vegetative & Management measures

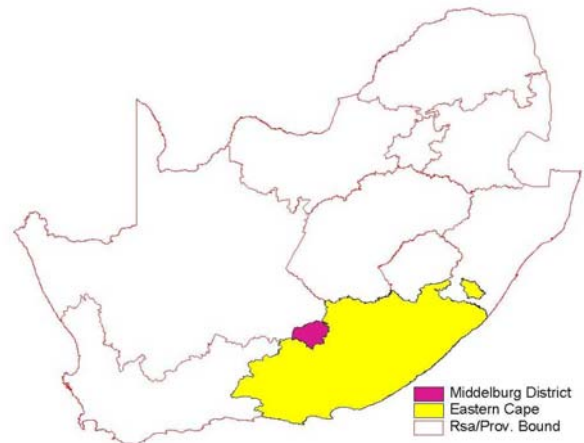
Land use type: Extensive grazing

Land ownership: Individual (titled)

Location: Middelburg - Eastern Cape

Area covered: 0.01 km²

Map:



Author: Loraine Van den Berg, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

11.4 BUSH ENCROACHMENT

Control of Bush Encroachment

Control of bush encroachment and soil erosion

GENERAL INFORMATION

Description: Problem areas were identified and the extent of bush encroachment determined. Plots (25 x 25 m) were chosen in the problem areas and the density of the woody components as well as the canopy cover at different heights determined. Different control measurements for bush encroachment were discussed.

The second part of the project involved determining the indigenous knowledge of the community regarding degradation, specifically soil erosion and bush encroachment and the influence that land use has on these degradation types.

The community was involved to improve their participation and awareness of degradation. The project is still in the initial phase and therefore recommendations are not yet given.

SWC-Categories: Management & Structural measures

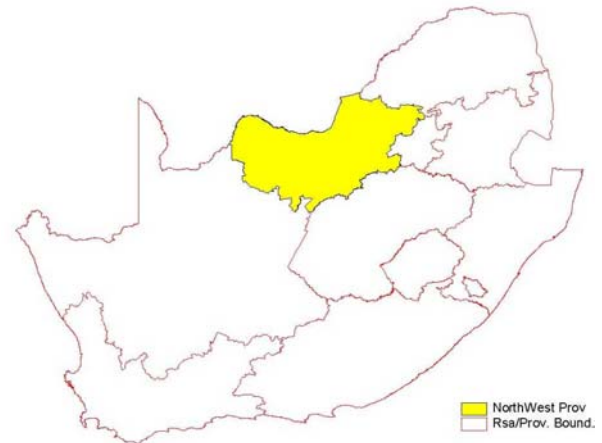
Land use type: Extensive grazing and Annual cropping

Land ownership: State, Communal/Village & Individual (not titled)

Location: Lehurutshe district

Area covered: 35 km²

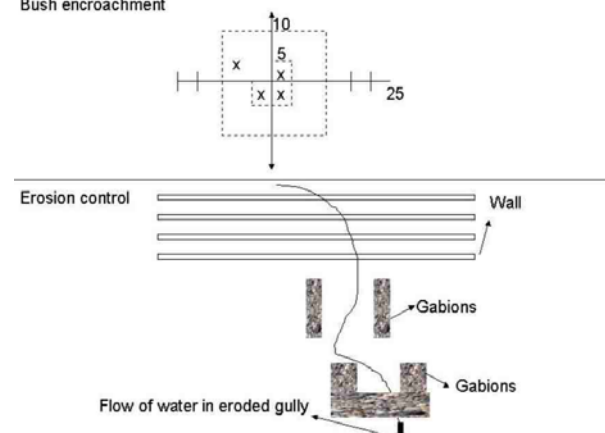
Map:



Author: Sarone De Wet, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

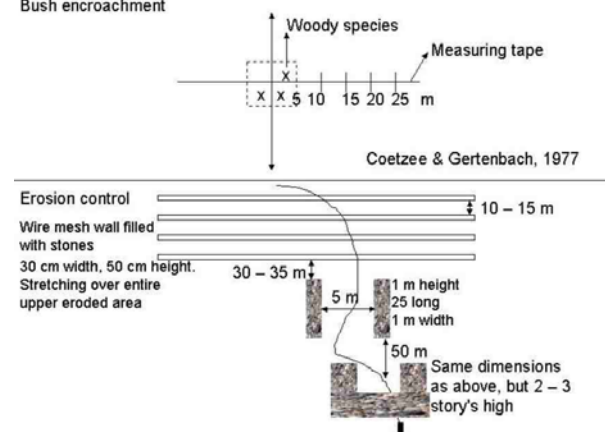
Illustration:

Bush encroachment



Schematic layout of technology

Bush encroachment



Schematic layout of technology

Chemical Bush Control

To either clear or thin bush (trees) in encroached areas by chemical means

GENERAL INFORMATION

Description: In some areas, the bushes are so dense (more than 2000 plants/ha) that access to the area is not possible and therefore the aerial application of chemicals is the only solution. All the plants in this area get treated this way, but no selective treatment is possible (this is still a problem to overcome). This aerial application can be selective to some extent because some bushes survive the treatment. If that is the case, selected thinning with chemical bush control can be done on bushes (but not on palatable/usable species).

The purpose was to characterise and control bush encroachment; to define and quantify grass-bush interactions in mixed savannahs, by chemical bush control; to be able to make recommendations for larger application chemical bush control like by aerial application. There was a lack of a technique for economic comparison between the potential loss of income due to bush encroachment and the cost of controlling bush.

Aftercare is very important and is an on-going process. After the first application of the chemicals, it is possible to let in goats. Browsers are better than game, because they browse the small bushes and prevent the area from further bush encroachment. The application of fire is also possible. In this area it should only be done every 7th -10th year (depending on the rainfall and grass production). There is very little communal land in this large area (5 million ha).

SWC-Categories: Vegetative measures

Land use type: Extensive grazing

Land ownership: Individual (not titled) & Communal/Village

Location: Griekwastad, Mafekeng and Vryburg districts

Area covered: 1.4 km²

Map:



Author: Chris Richter, Department of Agriculture, P/Bag X01, Glen, 9360

Illustration:



Bush encroachment



Area after treatment

Eradication of Invasive Species

Revegetation of degraded lands and eradication of invasive species

GENERAL INFORMATION

Description: An area was identified in which a high percentage of invasion by alien species (*Acacia mearnsii* - black wattle) had occurred. In this area, there was no sign of grasses (due to competition from *A. mearnsii* trees), only a few patches of *Cynodon dactylon* were conspicuous here (probably due to degradation and overgrazing).

The area was not fenced off, thus was open to further grazing on a few tufts of grass, by cattle and goats. Trampling by these animals was clearly visible and compaction occurred.

The alien species were eradicated by manual removal of trees and then applying chemicals to stunt regrowth. The soil was ripped with a hand implement, then lime and a grass seed mixture (palatable species) was applied and covered with soil by means of a rake. Different treatments were applied (5 different treatment) with three replicates of each treatment.

The treatments included oversowing with seed, application of lime, organic material and brushpacking.

SWC-Categories: Vegetative measures

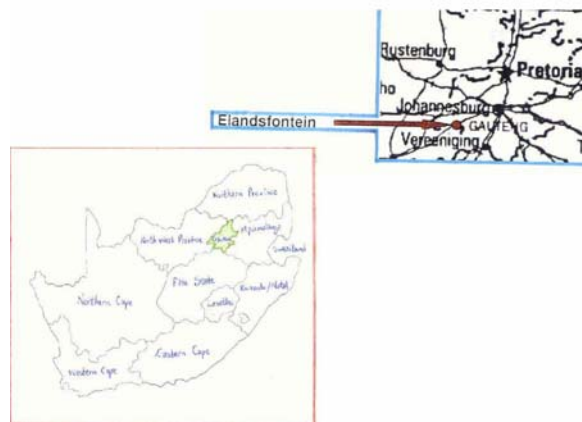
Land use type: Extensive grazing

Land ownership: State

Location: Johannesburg

Area covered: 1 km²

Map:



Author: Anuschka Barac, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Removal of trees and stunting of regrowth



Replanting of grasses

WOCAT

SWC Technology

Combating of Invader Plants & Bush Packing

Combating of Invaders to preserve water resources and rehabilitation of bare ground by means of brush packing to prevent soil erosion

GENERAL INFORMATION

Description: The technology is applied in areas under the 'Working for Water' projects that are run by the National Department of Water Affairs in South Africa, in the fight to combat invaders exhausting our valuable water resources. Catchment areas are fields that are infected by invader species on riverbanks, and catchment areas that extract enormous amounts of water out of the system. The trees (Black wattle - *Acacia meansii*) are cut or ring barked. After the trees are felled, large areas of bare ground are exposed. In order to prevent soil erosion until the natural succession processes are completed and the area is in equilibrium with the rest of the environment, soil needs to be stabilised and sometimes also rehabilitated.

These exposed areas must first be treated with a follow-up to prevent the coppice, re-growth and seedlings from growing again. Sometimes in agricultural grazing areas, the bare areas are re-seeded with natural climax grasses, and in urban areas left to be stabilised by successional species, or pioneers and avelands etc. The small branches of the felled trees are packed on bare areas, after the re-seeding to stop the topsoil from eroding. This reduces the off-flow and flow speed of the rainwater, lowering the raindrop impact, increasing the moist regime and preventing wind erosion. The thick stumps are either used for firewood or for the charcoal industry, as well as packed in windrows horizontal with stream flow.

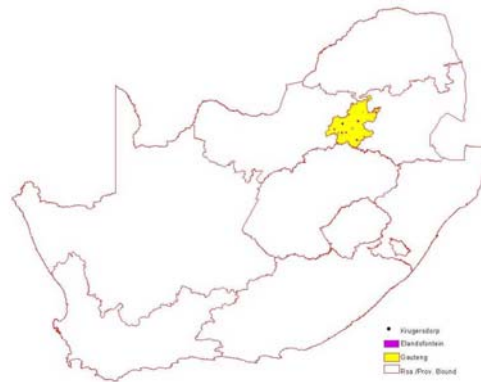
SWC-Categories: Vegetative & Management measures

Land use type: Extensive grazing

Location: Krugersdorp and Elandsfontein

Area covered: 2 km²

Map:



Author: Schalk Meyer, Department of Agriculture (Conservation and Environment), PO Box 8769, Johannesburg, 2000

Illustration:



Bush packing

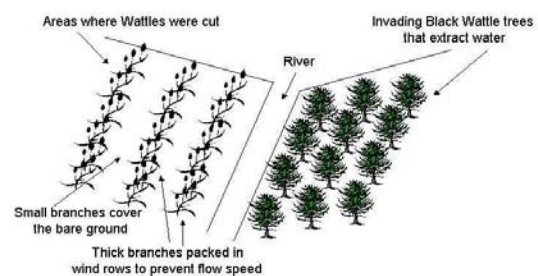


Diagram of windrows

Eradication of Declared Weed

Biological control/eradication of alien plant: *Opuntia imbricata*

GENERAL INFORMATION

Description: The distribution of Cotcheniel on *Opuntia imbricata* cactus is a biological way to control/eradicate imbricate cactus.

The cotcheniel grows on the plant and infected parts of the imbricate plant are used to distribute cotcheniel to other plants to help the process move faster.

The infected joint of the imbricate cactus is placed on the southern side of the imbricate plant on a joint. The cotcheniel will move from the infected joint to the healthy plant. Larvae can then be distributed by means of the wind, where they will attach themselves to the imbricate plants and start breeding and attacking the plant.

SWC-Categories: Vegetative measures

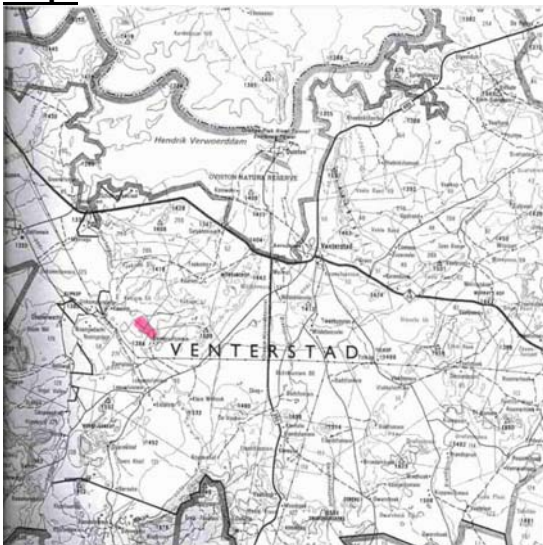
Land use type: Extensive cropping

Land ownership: Individual (titled)

Location: Venterstad

Area covered: 5 km²

Map:



Author: Cobus Barnard, Department of Agriculture (Resource Conservation), P/Bag X3917, Port Elizabeth, 6056

Illustration:



Cotcheniel on cactus



Cotcheniel on cactus

Stem Burning of *Acacia Mellifera*

Stacking of dry twigs and wood against stem of *Acacia Mellifera* - set alight - burn bark of stem

GENERAL INFORMATION

Description: Stack dry twigs and wood against the stem of the trees (*Acacia mellifera*). Set the wood alight.

The bark of tree is damaged to such an extent that tree dies.

Transpiration of water by the tree stops (is terminated) and water is therefore available for grass development and growth.

The dead trees provide cover for grass seed germination and growth.

The organic material from the dead trees is re-circulated into the system.

SWC-Categories: Vegetative measures

Land use type: Extensive grazing

Location: Marico District

Area covered: 20 km²

Map:



Author: Boeta Du Toit, Marico Bushveld Soil Conservation Committee, PO Box 151, Zeerust, 2865

Illustration:



Stem burning



Stem burning

11.5 LAND MANAGEMENT

WOCAT

SWC Technology

Land Use Management Systems

Agronomic and Vegetative: Perma-culture technology for sustaining soil conservation and protecting bio-diversity through land use management systems

GENERAL INFORMATION

Description: The land carries the natural resources that provide for people and wildlife livelihoods. The water, forests, soils, mountains, etc. need to be conserved and improved to keep the ecosystems in balance.

Man is the biggest threats to the environment and therefore it is crucial that all technologies developed should be people-centred. It is therefore important that land use management technologies should enhance participatory methodologies.

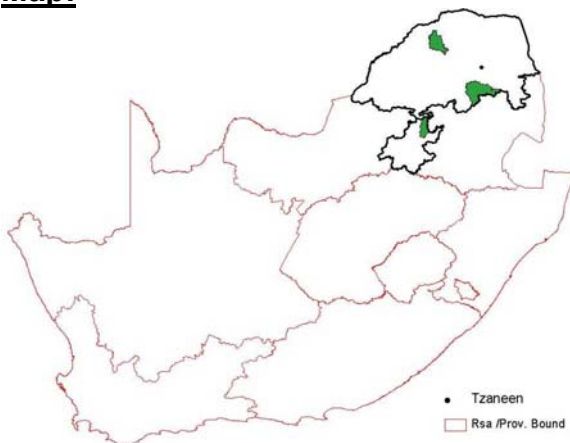
SWC-Categories: Management, Structural, Vegetative & Agronomic

Land use type: Natural forest, Extensive grazing, Intensive gazing, Tree/shrub cropping, Perennial (non-woody) cropping and Annual cropping

Land ownership: Communal/Village & Individual (titled)

Location: Gauteng and Limpopo

Map:



Author: Tshepo Khumbane, PO Box 327, Wadrift, Cullinan, 1002

Illustration:



Water harvesting



Chicken farming

Conservation Agriculture

Conservation agriculture included aspects such as crop rotation, mulching and no-tillage

GENERAL INFORMATION

Description: The goal of conservation agriculture is to maintain and improve crop yields and at the same time protect and stimulate the biological binding functioning of the soil. The essential features of conservation agriculture are no-tillage, maintenance of cover (live or dead vegetal material) and crop rotation. Crops are planted through the cover with special equipment or (in the case of Mlondozi) by making holes in the ground with a hand hoe.

Soil cover inhibits erosion and the germination of weed seeds; it improves soil and water retention and reduces compaction.

Crop-seeds are planted without prior ploughing. If a plough sole exists, soil has to be ripped, if not, crop seeds can be planted. It is advisable to move gradually from tillage to no-tillage over a period of 4-5 years, starting with a crop that produces enough organic material (2-3 ton dry material annually).

SWC-Categories: Management, Vegetative, Agronomic & Structural measures

Land use type: Annual cropping

Land ownership: Individual (not titled)

Location: Mlondozi

Area covered: 5.2 km²

Map:



Author: Hester Jansen van Rensburg, ARC - Institute for Soil, Climate and Water, P/Bag X79, Pretoria, 0001

Illustration:



Mulching

Minimum Tillage

Minimum tillage by plough and plant in one operation

GENERAL INFORMATION

Description: A three furrow mouldboard plough with a mounted fertiliser bin, dropping fertiliser on unploughed ground in line with a single row planter which is mounted on the back of the plough.

The purpose is to plough, fertilise and plant in one operation while there is still moisture in the soil for seed germination. In this area, it is important to plant crops as early as possible, to avoid late seasonal droughts.

Doing only one operation saves a considerable amount of fuel and time.

The system also reduces compaction of the soil.

SWC-Categories: Agronomic measures

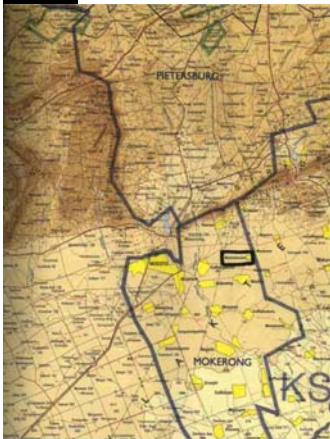
Land use type: Annual cropping

Land ownership: Communal/Village & Individual (not titled)

Location: Zebediela (Mokerong)

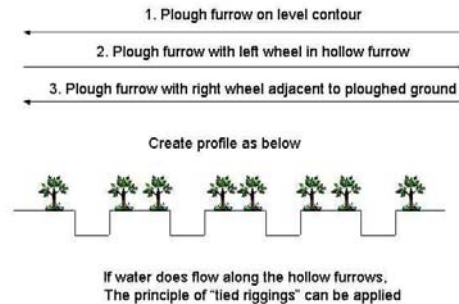
Area covered: 1 km²

Map:

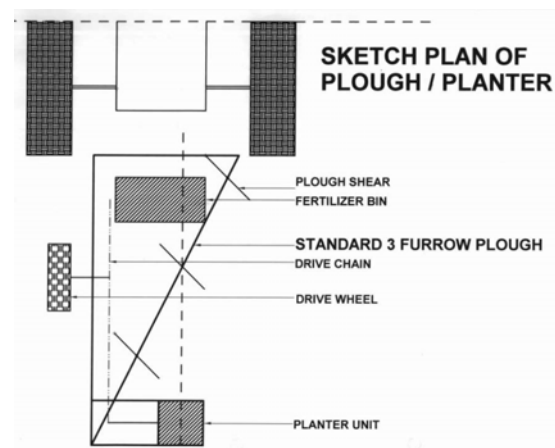


Author: Christo Spies, P/Bag X01, Chueniespoort, Potgietersrus, 0600

Illustration:



4 steps to minimum tillage



Sketch plan of the plough/planter

WOCAT

SWC Technology

Minimum Tillage

Tillage as little and shallow as possible

GENERAL INFORMATION

Description: One only goes over an area with an implement once, with as little disturbance of the soil as possible. Some implements are being used to put the seed in, without disturbing the soil structure too much. A crop rotation system with medics is being used.

SWC-Categories: Management & Agronomic measures

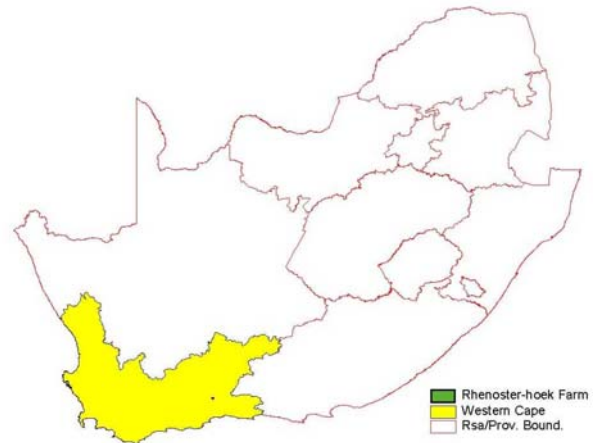
Land use type: Intensive grazing, Perennial (non-woody) and Annual cropping

Land ownership: Individual (titled)

Location: Eendekuil

Area covered: 10 km²

Map:



Author: Willem Engelbrecht, Groenkol Boerdery, PO Box 61, Eendekuil, 7335

Illustration:



Farmer in land

WOCAT

SWC Technology

No-till/Minimum Tillage

No mechanical soil inversion with organic matter maintained on the soil surface (mulch) and in the soil (roots)

GENERAL INFORMATION

Description: No soil inversion. The compaction layers in the soil are broken with a ripper. After the first rain, weed growth occurred and the area was treated with Roundup. Certified seed was planted and fertiliser applied. Pre-emerge weeds were treated with herbicides.

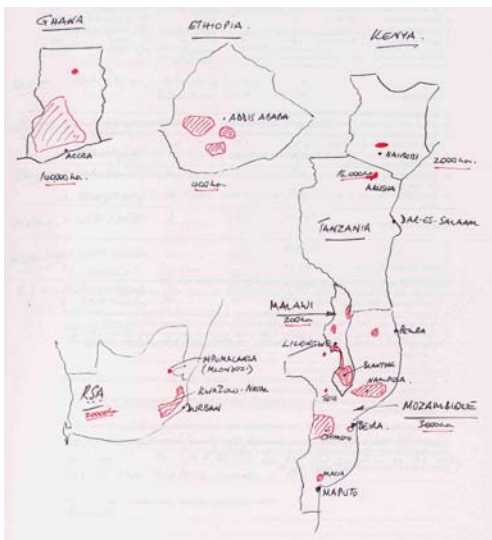
No livestock grazing and no burning are prescribed to keep the maximum percentage soil cover with leaves and stalks.

SWC-Categories: Agronomic, Structural & Vegetative

Land use type: Annual cropping

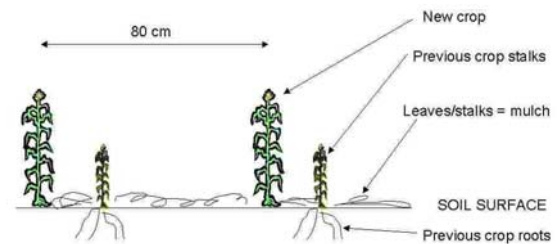
Location: KwaZulu/Natal

Map:



Author: Jim Findlay, Agriculture Resource Consultant, PO Box 3474, Parklands, 2121

Illustration:



- Rows on contours
- Single crop (NO intercropping = "bad news")
- Weed control - herbicides
 - mulch
 - canopy
 - hand weeding
 - stop seeding on headlands

Minimum tillage

Restoration of a Degraded Farm

Restoration and revegetation was done on degraded areas/bare patches to recover area to prior farm condition

GENERAL INFORMATION

Description: Local farmers identified a degraded area. The soil crust (soil compaction) was broken by use of a tractor and ripper. The farmers did re-seeding of a grass-seed mixture, adapted for the specific area. The area was fenced to exclude large herbivores. Different restoration technologies were applied in the area to act as demonstration for the land users in the area to be used on a larger scale. Monitoring of vegetation was done after the growing season to determine the best technology.

SWC-Categories: Vegetative measures

Land use type: Extensive grazing

Land ownership: Individual (titled)

Location: Pontdrift Borderpost

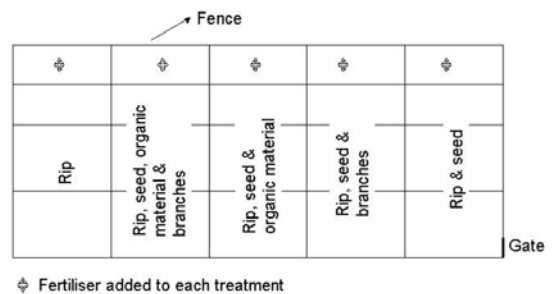
Area covered: 1 km²

Map:

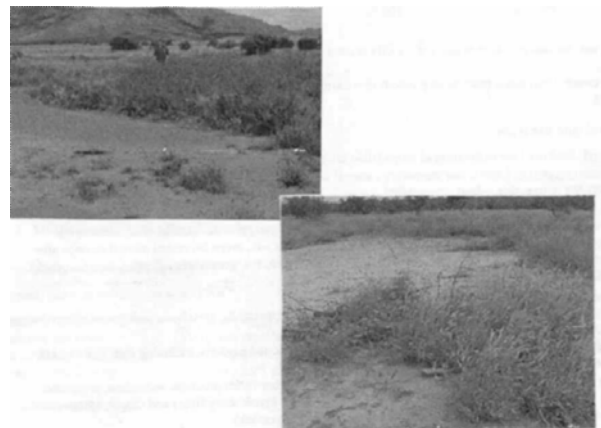


Author: Loraine Van den Berg, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Schematic layout of research plot



Area under restoration

Restoration on Degraded Duplex Soils

Restoration of degraded grazing land

GENERAL INFORMATION

Description: Investigation of veld to assess situation and extent of problem, evaluating causes and making recommendations to minimise the problem.

For a large area: Take soil samples and send for analysis to determine the type of grass seeds present and to assess the chemical composition of soil.

Recommend required treatment of soil, chemical as well as mechanical and what quantitative inputs are needed.

For duplex soils the addition of gypsum (communities use manure for organic matter) is recommended. The preparation phase of the soil is very important. Add necessary components (dung, etc.) and plant the seeds. Add some rocks on top of the soil for entrapment of nutrients (nutrients and water flow are enhanced).

It is important to take the grasses from the immediate area, because it might be found that grass from another area is not adapted for the specific area.

Dactyloctenium egyptium, *Sporobolus nites*, *Enteropogon monostachyus* and *Cynodon dactylon* will be suitable for duplex soils. *Digitaria eriantha* will be better after the soil has improved a bit.

For branch packing (preparation of site), the branches of encroached bushes (Ghurrie bush, *Acacia exofialus*, *nelotica*) are used.

The area should be fenced off.

SWC-Categories: Management, Agronomic & Vegetative measures

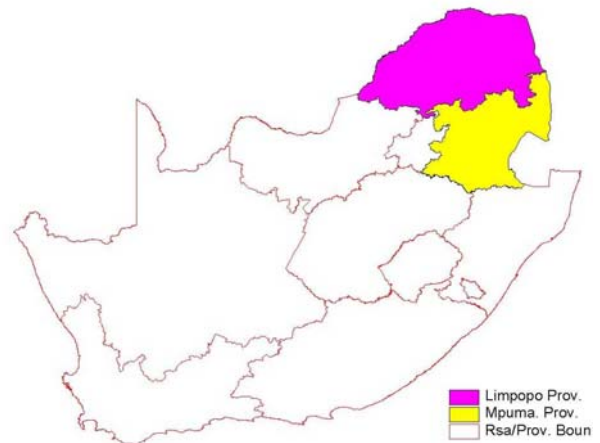
Land use type: Extensive grazing

Land ownership: Communal Village & Individual (titled)

Location: Limpopo and Mpumalanga

Area covered: 0.03 km²

Map:



Author: Francois De Wet, Enviropulse, PO Box 2757, White River, 1240

Controlling of Soil Erosion during Crop Production

The technology that applies contouring, mulching and intercropping in SWC

GENERAL INFORMATION

Description: Agronomic technology is used to control soil erosion during the crop production period, i.e. method that is employed to improve soil fertility, conserve water and protect from soil erosion while the land is under crop production.

The purpose is to keep the fertility of the soil stable by protecting the soil from soil erosion and water loss.

The establishment is either done by planting strong root crops in between cultivated areas, or leaving the soil uncultivated, with a mulch cover on the soil surface. This will be maintained by keeping the intercrop strong and healthy while using zero or minimum tillage without removal of left over material on the soil surface.

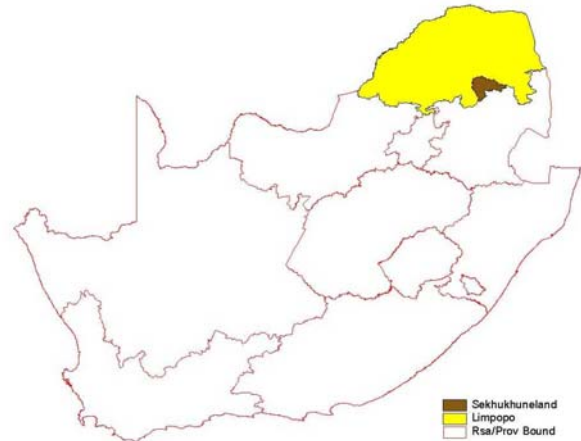
SWC-Categories: Agronomic

Land use type: Annual cropping

Location: Sekhukuneland

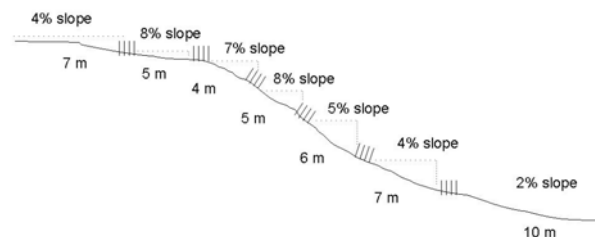
Area covered: 10 km²

Map:



Author: Mokgwakgwe Mashatola,
University of the North, P/Bag X1106,
Sovenga, 0727

Illustration:



Distances between strips comparing with the slope

WOCAT

SWC Technology

Ripping of Sheet Erosion

To rip soil deep and wide enough with large tractor to allow water penetration and retention

GENERAL INFORMATION

Description: By experimenting it was established that the most successful results were obtained by ripping to a depth of 450 mm on the contour, then opening these ripper marks with a double mouldboard plough to open a furrow to stop water flow.

The ripped area was seeded with Rhodes and Smuts finger grass after the second rain. Immediate seeding resulted in the seed being buried too deep because of the clod structure of the soil and led to poor germination.

It is most important to fence these areas and to leave them for at least 2 years, after which they can be grazed only in the winter months until sufficient cover is obtained to prevent run-off.

Droughts are fairly frequent; one in five years severe and one in 10 years very severe.

SWC-Categories: Structural,
Agronomic & Vegetative measures

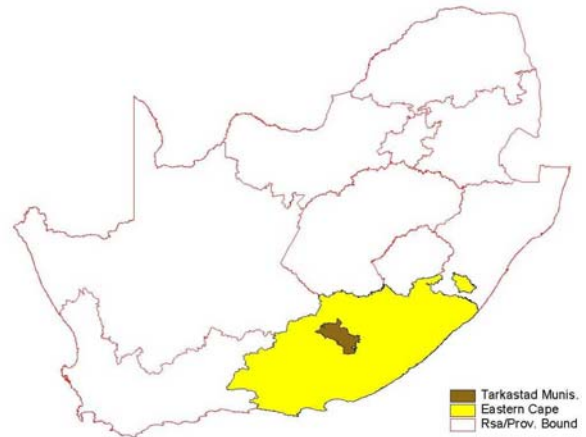
Land use type: Extensive cropping

Land ownership: Individual (titled)

Location: Tarkastad

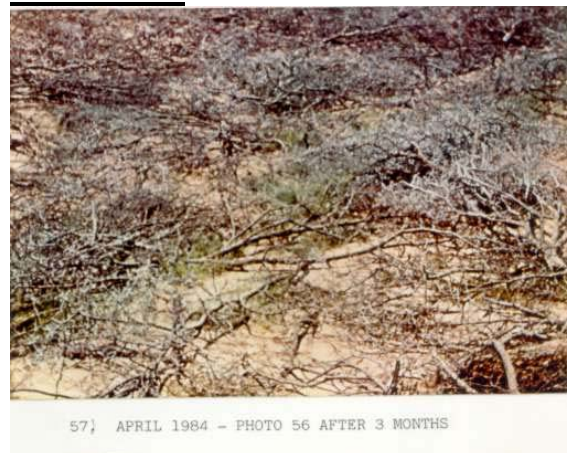
Area covered: 0.7 km²

Map:



Author: John Phillips, Carrickmoor Farm, PO Box 24, Tarkastad, 5370

Illustration:



Area after 3 months



Area after 60 months

11.6 WATER MANAGEMENT

WOCAT

SWC Technology

Water Run-off Control Plan

Design waterways and contours according to water run-off, slopes, water velocity, area, coverage

GENERAL INFORMATION

Description: Plan water run-off control on 1:10 000 orthophotos according to set norms and standards. Surveying the slope of the waterways and determining the area it has to serve and the water run-off thereof using the follow equation:

$Q = CIA/360$ where

C = the catchment coverage,

I = penetration of rain mm/h, and

A = area.

Design the width depth of the waterways by using water velocity according to the soil type.

Construct the waterway with graders/tractors according to the specifications.

Establish slopes with suitable grasses.

Discharge contours into the waterway (with a maximum length of between 600 - 750 m; maximum 60 m apart and slope 1:150 - 1:200

SWC-Categories: Structural & Agronomic measures

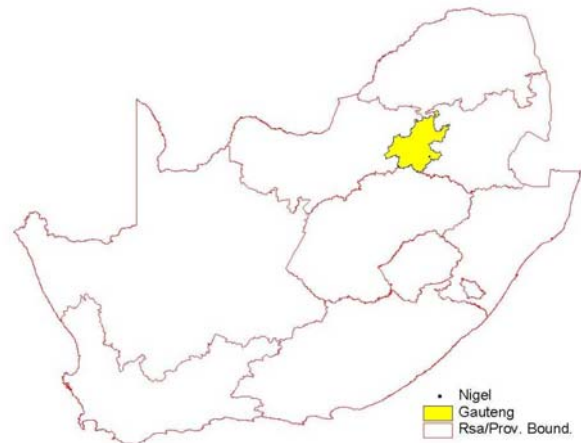
Land use type: Annual cropping

Land ownership: Company & Individual (not titled)

Location: Nigel

Area covered: 9.66 km²

Map:



Author: Harmen Den Dulk, Department of Agriculture (Resource Conservation and Development), PO Box 8769, Johannesburg, 2000

Water Run-off Control Plan on Cultivated Land

Artificially built watercourses with contour banks with a specific gradient

GENERAL INFORMATION

Description: Watercourse: According to the topography, one or two watercourses are needed to drain any excess run-off water during high rainfall intensities. A watercourse is built directly downhill. A perennial grass adapted to the specific environment is established in the watercourses. Maintenance requires that the grass must be fertilised according to the climate of the area. Regular (once or twice a year) cutting of the grass is very important to maintain a good grass cover, through which soil erosion in the watercourse can be prevented.

Contour banks: These are built with a gradient to spill the excess water into the watercourse. The purpose of contour banks is to shorten the slope so as to reduce the speed of the water and prevent soil erosion. The maintenance requires keeping the canal in good shape and maintaining the height of the banks.

SWC-Categories: Structural & Agronomic measures

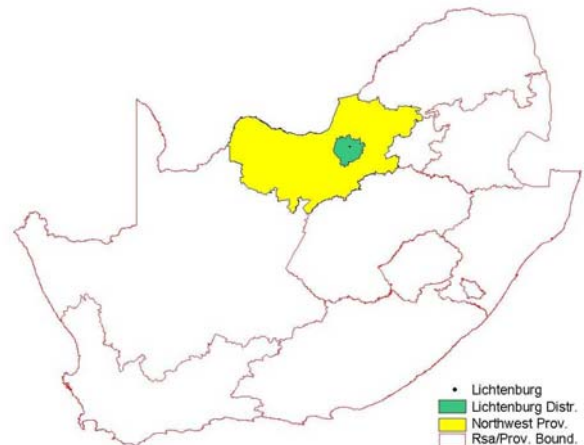
Land use type: Annual cropping

Land ownership: Individual (titled)

Location: Lichtenburg

Area covered: 3 km²

Map:



Author: Pieter Theron, National Department of Agriculture (DLRM), PO Box 2557, Potchefstroom, 2520

Illustration:

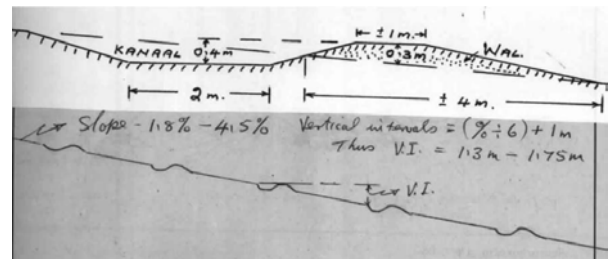


Diagram of watercourse and contour banks

WOCAT

SWC Technology

Run-off Control

The conservation of agricultural natural resources for sustainable utilisation

GENERAL INFORMATION

Description: Contours and waterways for run-off control and gabions for gully erosion control.

Vetiver grass is planted to control gully erosion on grazing land. The sub-surface drainage on irrigation land is managing and storm water drains are erected for run-off control.

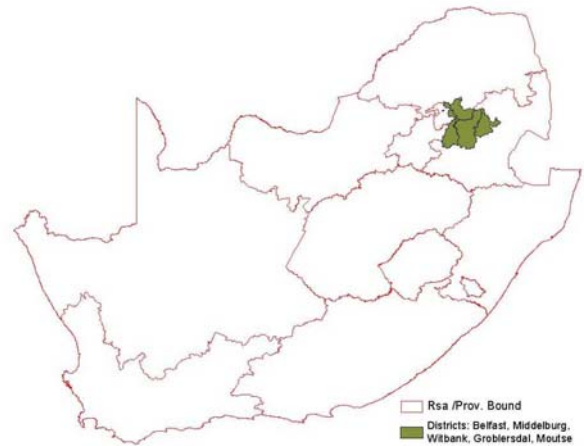
SWC-Categories: Structural & Agronomic

Land use type: Extensive grazing and Annual cropping

Land ownership: Individual (titled), State & Company

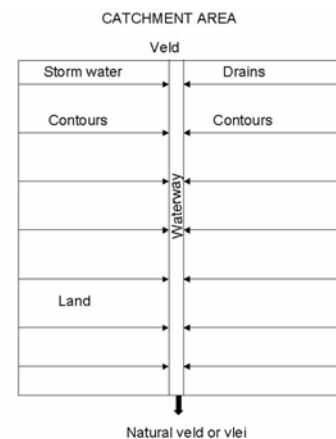
Location: Mpumalanga

Map:



Author: Gert Pool, Department of Agriculture (Conservation and Environment), PO Box 62, Middelburg, 1050

Illustration:



Sketch of technology layout

WOCAT

SWC Technology

Improvement of Rainwater Storage

A combination of deep ripping, traffic control and crop residue mulching practices combined with fallowing to improve rain efficiency

GENERAL INFORMATION

Description: A combination of different technologies to improve rain use efficiency.

Deep ripping: A tillage operation whereby the soil is loosened to a depth of 400 - 500 mm below the crop rows, using a sub-soiler to break up subsoil compaction.

Traffic control: A practice where the movement of tractor and implement wheels is restricted to permanent parallel traffic lanes to control the re-compaction of the soil. Used in combination with deep ripping. The crop rows are planted between the traffic lanes and on top of the ripper lanes.

Crop residue mulching: The residues of the previous crop are left on the surface to protect the soil against wind erosion.

Fallowing: A crop rotational system is used to ensure 10 to 12 months between successive crops to allow more time for water (rain) storage in the soil, to decrease the risk of drought damage to crops.

SWC-Categories: Management & Agronomic measures

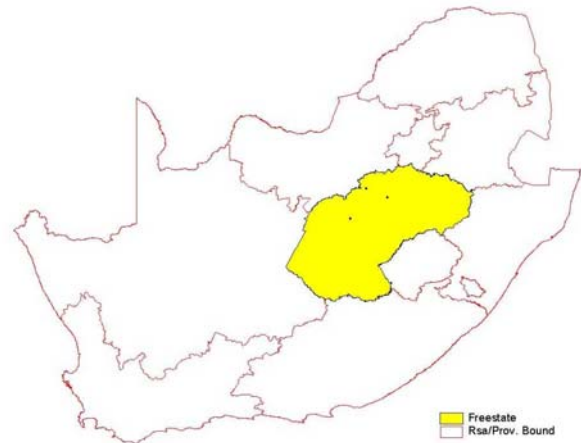
Land use type: Intensive grazing and annual cropping

Land ownership: Individual (titled)

Location: Free State

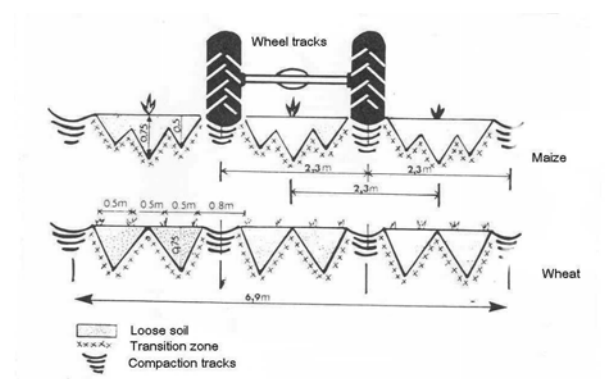
Area covered: 15000 km²

Map:

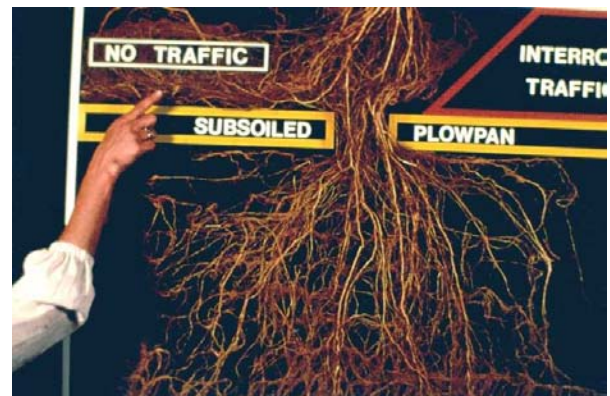


Author: Alan Bennie, University of the Free State, PO Box 339, Bloemfontein, 9300

Illustration:



Planting of crops



Root restriction by plough pan

Water Harvesting and Basin tillage

In-field water harvesting technique

GENERAL INFORMATION

Description: The technique consists of the construction of a 1 m wide basin with a 2 m wide runoff area. They are mulched with either straw or stones and, for the sake of comparison, the runoff area should be left bare. The soil is not tilled to encourage development of a crust, over which water runs off into the basin.

The basins collect the maximum amount of water during rain and because it accumulates in the basin, it is allowed more infiltration time. Mulch minimises evaporation and the efficiency varies with the type of mulch used.

The construction of basin and runoff areas and mulching maintenance involves keeping basins open and mulch intact.

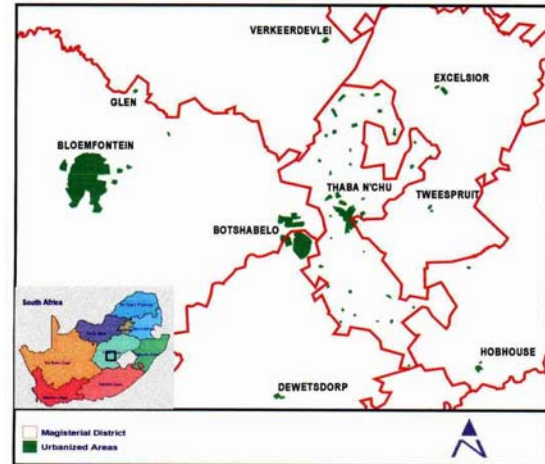
This technique is used under semi-arid conditions on soils with very high clay contents. The depth of the profile must be greater or equal to 900 mm and the A-horizon must also be 250 mm or more.

SWC-Categories: Agronomic measures

Land use type: Annual cropping

Location: Bloemfontein, Botshabelo, De Wetsdorp, Thaba Nchu

Map:



Author: Cobus Botha, ARC - Institute for Soil, Climate and Water, P/Bag X01, Glen, 9360

Illustration:



Basins in the land, catching and storing water



Mulching on run-off strips

In-field Water harvesting

A combination of a no-till type of mini-catchment runoff technique together with basin tillage to collect the runoff and with mulch in the basins to reduce evaporation

GENERAL INFORMATION

Description: The no-till 2 m section between rows soon develops a crust resulting in a high percentage of runoff which collects in the basins (made on the contour). This water then percolates deep into the soil where it can be stored in the root zone below the evaporation zone. Weeds are dealt with by using herbicides. The mulch in the basins helps to reduce evaporation loss, and improves infiltration.

The purpose of the technique is to improve precipitation use efficiency (PUE) and therefore improve crop yields in this marginal cropping area east of Bloemfontein.

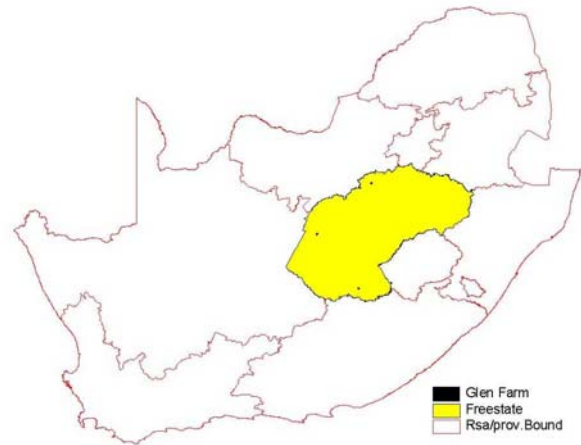
Establishment was done on the experimental plots by using basin tillage plough in a land which had been ploughed and disced to a depth of about 200 mm. The basins were on the contour with cross walls at about 3 m intervals. Final forming of the basins was done by hand with spades. The run-off strip was levelled - and soon became compacted by the first rainstorm, and formed a crust. Maintenance involves killing weeds by herbicides, replacing the mulch after a few seasons and maintaining the shape of the basins where necessary by hand labour.

SWC-Categories: Structural & Agronomic measures

Land use type: Annual cropping and Intensive grazing

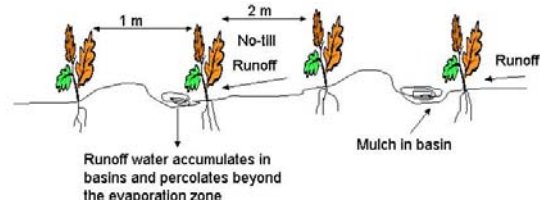
Location: Free State

Map:



Author: Malcolm Hensley, University of the Free State, PO Box 339, Bloemfontein, 9300

Illustration:



Concept of in-field water harvesting

WOCAT

SWC Technology

Earth Dam for Stockwater

Construction of earth dams to provide stock water

GENERAL INFORMATION

Description: Bulldozers were used to build earth dams and to move the soil to construct bankments and spillways in a river or natural run-off (water course of some kind). No concrete or rock is used, only soil up to a certain slope of sides or crests. The main concern is to provide water to seep through the spillway large enough to discharge the excess water from the catchment whenever the dam is full. Normally the spillway is constructed so that the water doesn't cause erosion in the spillway itself.

The purpose was to catch water to provide stock water for animals in the rural areas (de-silt earth dam in 5-10 years time close to the village, dams far away in the veld silt up in a longer time).

Maintenance is done in winter when rain is not expected. All the dams are seasonal, water is only available for 2 months after the rainy season (June – September). Evaporation is very high, and cleaning up and fixing-up are necessary.

SWC-Categories: Structural measures

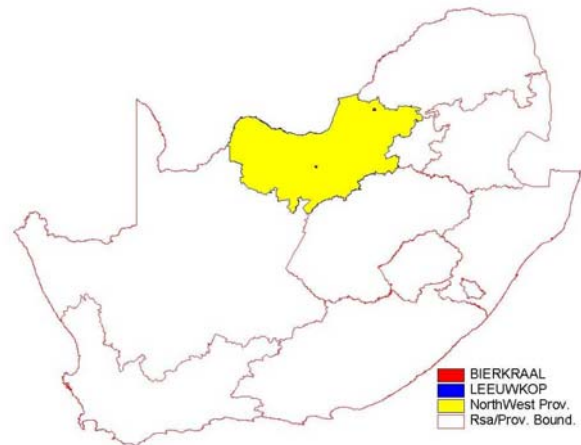
Land use type: Extensive grazing

Land ownership: Communal/Village

Location: North West

Area covered: 184 km²

Map:



Author: Jannie Nel, Department of Agriculture (Division Soil Conservation), PO Box 24, Rustenburg, 0300

WOCAT

SWC Technology

Wetland Rehabilitation

To rehabilitate/stabilise distorted wetlands as close as possible to their original condition

GENERAL INFORMATION

Description: Two wetland rehabilitation sites that are part of a large wetland area (15 and 10ha).

The purpose of the rehabilitation work was to stabilise, landscape and re-vegetate distorted areas to again fulfil their original function in the catchment.

Maintenance included follow-up on re-seeding distorted areas and alien plant control (cut down plants and treads strips with roundup). Structure maintenance (such as gabions, roads) is also done. Fire management to protect and manage the area of rehabilitation until such time as it has proved to be stabilised. Leave for \pm 3 years before considering burning.

SWC-Categories: Management, Structural & Vegetative measures

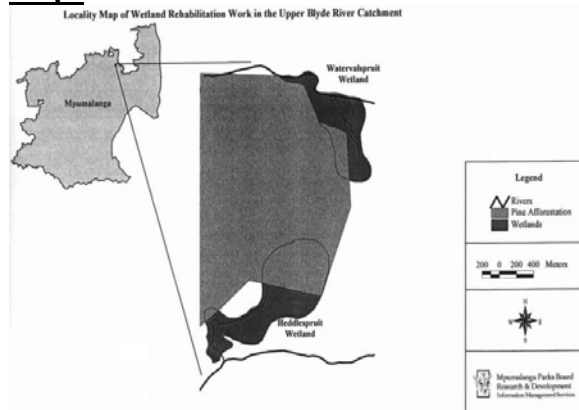
Land use type: Wetland

Land ownership: State & Company

Location: Blyde River Catchment

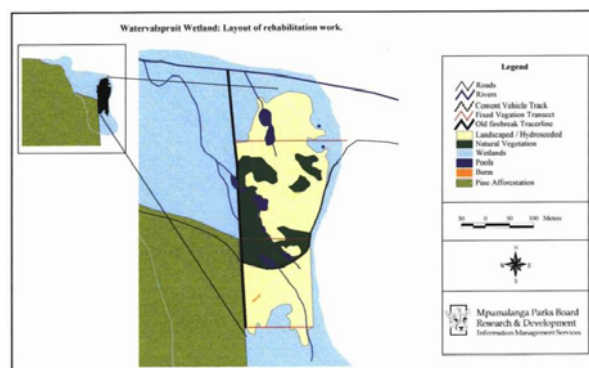
Area covered: 0.3 km²

Map:



Author: Frik Bronkhorst, Mpumalanga Parks Board, PO Box 1990, Nelspruit, 1200

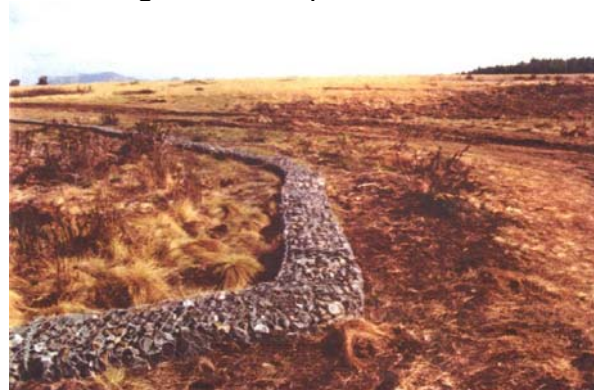
Illustration:



Layout of rehabilitation work



Stabilising of landscape



Gabion structures

Sub-surface Drainage on Irrigated Lands

Drainage of saturated and salinised soils by means of sub-soil drainage pipes

GENERAL INFORMATION

Description: There is a lot of soil, wind and water erosion in this area. River erosion, not related to this SWC, is a problem over the whole area (on average 20 t/ha/y). Sheet and gully erosion occurs on commercial land. The whole area along the rivers varies up to 50 km.

In some places drainage is inadequate and water-logging occurs. A system of sub-soil perforated pipes with surrounding filters was installed. Pipes laid at spacing determined according to the site conditions.

The overall purpose was to limit the level of the water table in the soil profile and remove salts, to provide an adequately aerated zone in the soil for a crops' root system.

The system must be planned by a suitably trained person and constructed by an expert.

Drainage pipes must be flushed at least annually and roots removed whenever present.

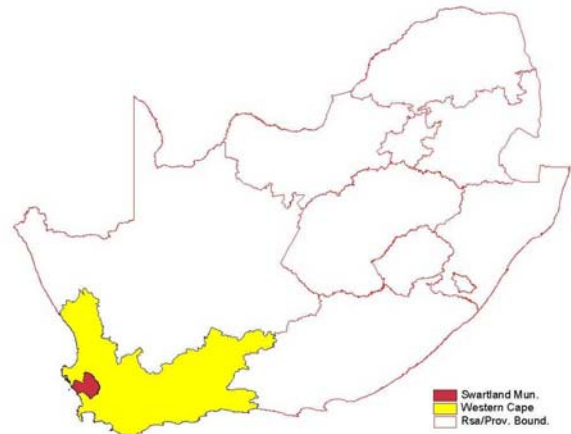
SWC-Categories: Structural measures

Land use type: Tree/shrub cropping

Location: Boland, Swartland and Southern Cape

Area covered: 240 km²

Map:



Author: Hans King, Department of Agriculture, P/Bag X1, Elsenburg, 7607

Illustration:



Area before drainage



Drainage pipes

11.7 MINING REHABILITATION

WOCAT

SWC Technology

Strip-mine Rehabilitation

The area is strip-mined for gypsum and different rehabilitation techniques are investigated to revegetate the area

GENERAL INFORMATION

Description: The objectives include an increase in the following: biodiversity by seeding and transplanting, ground cover and primary productivity, soil fertility and a decrease of water and soil loss. It also involves conservation of endemic and indigenous species. The Mining Company's public image is improved by these activities. The establishment and maintenance cost is low. The area is strip-mined for gypsum and trials are being conducted on different rehabilitation techniques. These techniques involve the transplanting of indigenous succulent plants from the pre-mining area to the post-mining area. It also involves the sowing of indigenous seeds within rock mulch and in micro-catchments and under shrubs.

SWC-Categories: Vegetative measures

Land use type: Extensive grazing

Land ownership: Individual (titled) & Company

Location: Vanrhynsdorp

Area covered: 100 km²

Map:



Author: Anel Schmidt, University of Stellenbosch (Conservation Ecology), P/Bag X1, Matieland, 7602

Illustration:

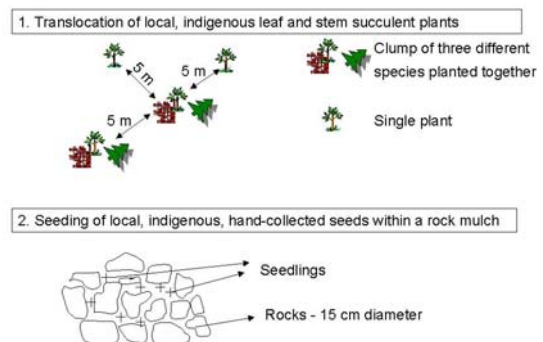


Diagram of technology

Strip-mine Rehabilitation by Plant Translocation

Rehabilitation of strip-mine areas by translocation of indigenous plants in arid areas of the Namaqualand coast

GENERAL INFORMATION

Description: Increase in ground cover and biodiversity leading to a reduction in wind erosion. This also helps in conserving endemic and indigenous plant species.

The establishment and maintenance costs are low and are carried by the mining company. Land productivity is increased and the mining company improves its public image.

The area is strip-mined for heavy minerals. Transplantation is conducted with different rehabilitation techniques, taking different substrate compositions into account. Only indigenous plants are used in these transplantation trials.

The strip mine is in an arid area of the Namaqualand coast of South Africa, with winter rainfall.

SWC-Categories: Vegetative & Structural measures

Land use type: Extensive grazing

Land ownership: Individual (titled)

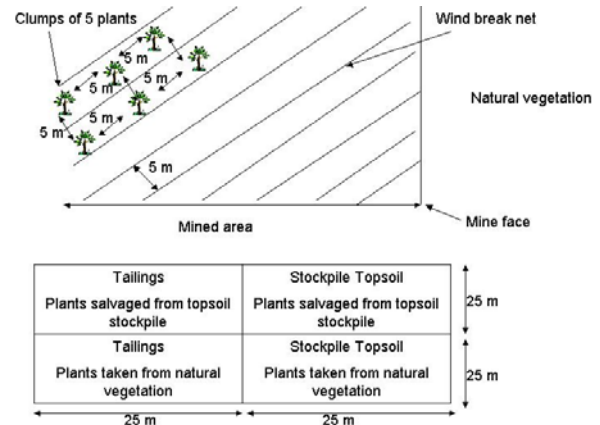
Location: Western Cape

Map:



Author: Kirsten Mahood, University of Stellenbosch (Conservation Ecology), P/Bag X1, Matieland, 7602

Illustration:



Schematic layout of technology

Chemical Amelioration of Gold slimes

Greening the world's waste and tailings, especially gold mine slime dams

GENERAL INFORMATION

Description: Mine tailings are converted to wilderness (to fit in within the natural area). The rehabilitation approach adopted, involved bringing fugitive tailings back onto gold mine waste dams, in-filling erosion gullies and dozing down all outer slopes to an angle of 1 in 5, where possible. The surface of the dam has been paddocked with primary paddock walls dressed in rock to provide additional resistance against water and wind erosion. Water will thus be retained on the dam surface and slope runoff water will be held in toe paddocks. All tailing materials are very acid and were ameliorated prior to seeding. Re-acidification was taken into account, thus enabling the perpetuation of a self-sustaining vegetation community. Other ameliorants in the form of fertiliser, composted material and sewage sludge have been worked into the surface tailings layer to improve both the physical and chemical status of the tails as a plant growth-sustaining medium.

SWC-Categories: Management, Structural, Vegetative & Agronomic

Land use type: Natural forest

Land ownership: Company

Location: Free State and North West

Area covered: 1.58 km²

Map:



Author: Johan Hattingh, Envirogreen, PO Box 20813, Noordbrug, 2522

Illustration:



Area at beginning of restoration



Area after 2 years treatment

12. SOIL AND WATER CONSERVATION APPROACHES

12.1 PRESCRIPTIVE

All Participants - Law Enforcement

Ordering a land user through the act to implement the SWC

GENERAL INFORMATION

Description: The overall purpose of this approach was (and still is) to make the land user aware of SWC, as it was obvious that he does not intend to solve the problem of soil erosion by himself. The objective was to convince the land user to implement the technology (water run-off control planning) by building the necessary soil conservation works (via watercourses and contours and explaining in detail to him what this technology comprises:

The stages of implementation were: first to make the necessary surveys from which the watercourses could be designed, then to construct the watercourse. Thirdly the watercourses must be established with a perennial grass and lastly the land user must see to it that the necessary contours are surveyed and constructed and maintained. It was also explained to the land user (farmer) that the Provincial Department of Agriculture Technical division could provide him with services regarding the planning surveying and design of the soil conservation works. The major objective was to convince the farmer that if he did not comply with the directive, legal steps could be taken against him. Fortunately, he was convinced and put in an application for a water run-off control plan after he harvested his crop in 1992. Due to a shortage in personnel, surveying only started in November 1993.

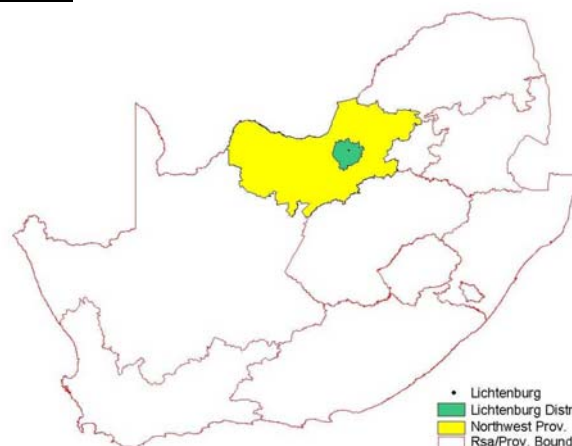
Target groups: Only one farmer

Location: Lichtenburg

Area covered: 3 km²

Area defined by: Watershed/catchment

Map:



Author: Pieter Theron, National Department of Agriculture (DLRM), PO Box 2557, Potchefstroom, 2520

Illustration:



Aerial photo of farm

WOCAT

Summary of SWC Approach

Advisory

To inform and advise the land user on what to do and how to do it

GENERAL INFORMATION

Description: The farmer was approached by an Agricultural inspector to inform him that it was against the law to have alien plants on his farm and not control them. Different eradication approaches were discussed. The inspector decided on biological control because it's cheap and does not need a lot of labour. It was discussed with the farmer and the farmer accepted the idea.

Target groups: Land Users

Location: Venterstad basin

Area covered: 5 km²

Area defined by: Administrative unit

Map:



Author: Cobus Barnard Department of Agriculture (Resource Conservation), P/Bag X3917, Port Elizabeth, 6056

Illustration:



Alien plant

Pilot Government Incentive

GENERAL INFORMATION

Description: The overall purpose was to control erosion and to uplift the community on prime agricultural land.

A group of 14 volunteer farmers was identified and discussion sessions were held with community. Field staff from the Department of Agriculture surveyed the fields.

Seedlings were provided with starter fertilisers and farmers were compensated for labour contribution. The farmers provided water for two weeks after planting. Water tanks were supplied by the government for irrigation.

Any maintenance was the responsibility of the farmers. The government gave advice, training and provided the materials.

Target groups: Land Users

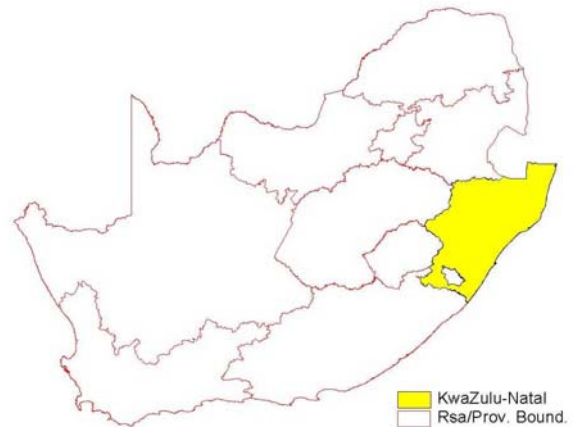
Location: KwaZulu/Natal-Midlands

Area covered: 54 km²

Area defined by:

Socio-economic/cultural unit
People interested

Map:



Author: Stuart Armour, Department of Agriculture,
P/Bag X9059,
Pietermaritzburg, 3200

WOCAT

Summary of SWC Approach

Governmental Conservation

Water run-off control planning on arable land

GENERAL INFORMATION

Description: Plan water run-off on a 1:10000 orthophoto and control in field according to set norms and standards. Survey of slope of waterways needed. Determine area it has to serve. Determine water run-off. Design width, depth, and length. Construct with grader/tractor, plough. Establish with grass. Survey contours to discharge in waterway.

Target groups:

Politicians/Decision makers
Planners
SWC specialists/Extension workers
Land Users

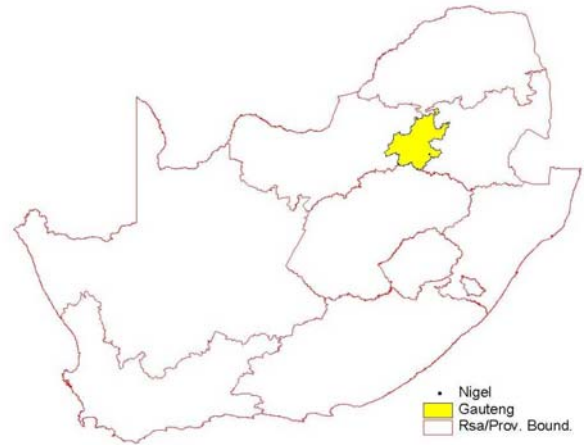
Location: Nigel

Area covered: 10 km²

Area defined by:

Watershed/catchment unit
Administrative unit

Map:



Author: Harmen Den Dulk, Department of Agriculture (Resource Conservation and Development), PO Box 8769, Johannesburg, 2000

WOCAT

Summary of SWC Approach

Government Funded Demonstrations

Government funded restoration demonstration site to restore degraded land - by community participation. Community becoming the key stake holders - capacity building

GENERAL INFORMATION

Description: Awareness raising and community participation. Capacity building, to teach the aim and type of technologies to the communities with the help of extension workers, scientists and academic staff, including postgraduate students. The main aim is to improve the condition of the land for high grazing capacity and production potential.

Target groups:

SWC specialists/Extension workers
Land Users
Teachers/School children/Students
Politicians/Decision makers
Planners

Location: Pietersburg

Area covered: 1 km²

Area defined by:

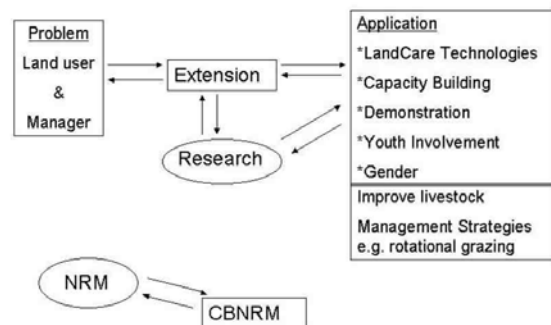
Ecological unit
Socio-economic/cultural unit
Administrative unit

Map:



Author: Klaus Kellner, School of Environmental Science and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Organigram showing the stakeholders

WOCAT

Summary of SWC Approach

Governmental Projects

Range Management of degraded communal grazing areas to enhance NRM practices by applying rotational grazing and establishing benchmarks. The government funds the project

GENERAL INFORMATION

Description: The community chose the area in which the project was initiated. Experts then approached the community and landowners to identify the extension workers and ADC managers and to train them to apply the SWC technology successfully. Benchmarks were then identified in collaboration with the landowners and extension workers.

Surveys were conducted with the help of the landowners, community, extension workers and ADC managers. The landowners are also encouraged to reduce their cattle and to maintain the management of the project. Further surveys will also be conducted in collaboration with the extension workers and landowners.

Target groups:

SWC specialists/Extension workers
Land Users
Teachers/School children/Students
Politicians/Decision makers

Location: Ganyesa

Area covered: 100 km²

Area defined by:

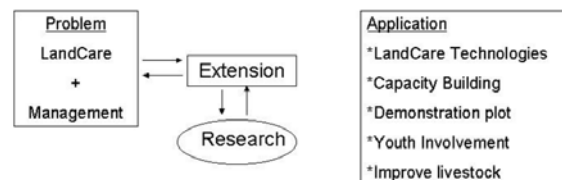
Ecological unit
Socio-economic/cultural unit
Administrative unit

Map:



Author: Marina Van Heerden, School for Environmental Studies and Development, P/Bag X6001, Potchefstroom, 2520

Illustration:



Organigram showing the stakeholders

Inter-Departmental Approach

Eradication of invasive alien plants to enhance water sustainability by increasing run-off into dams and rivers

GENERAL INFORMATION

Description: Programme started in October 1995, employing previously disadvantaged unemployed people to clear invading trees in catchments and along rivers. This has been going on for approximately 4 years. The leading department is the Department of Water Affairs and Forestry but they have been in partnerships with a number of other departments e.g. Land Affairs, Agriculture, South African National Parks, Welfare etc. Labour intensive methods are used to clear trees and apply herbicides to prevent regrowth. Where in sensitive areas, rehabilitation techniques are employed e.g. sowing grass seeds and re-establishing indigenous plants. There are also some wetland rehabilitation projects across the country where engineering techniques are used to rehabilitate wetlands.

The Inter-departmental approach is unique in the country, but very important as objectives span all departments. The work is done on farmland, community land, private company land and governmental land. New laws will force landowners to clear large stands of alien trees in future and this programme offers landowners a way of clearing their land before the law is enforced. The approach is to use labour intensive clearing techniques to provide jobs and also tackle an ecological problem. In so doing, the programme tackles socio-economic issues and environmental issues. The major objective is to create sustainable water supplies in a drought prone country; hence "Working for Water" (providing work to unemployed and increasing water availability).

Target groups:

Politicians/Decision makers
Planners

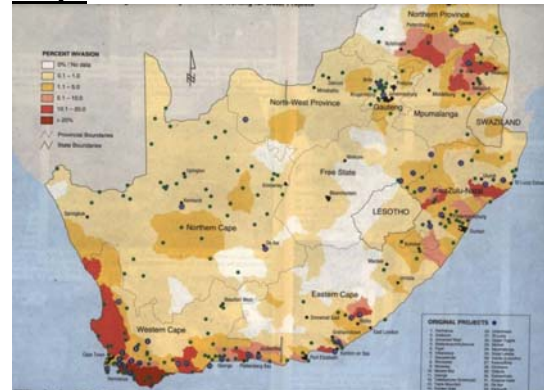
SWC specialists/Extension workers
Land Users
Teachers/School children/Students

Location: Whole of South Africa

Area defined by:

Watershed/catchment unit
Socio-economic/cultural unit
Ecological unit
Administrative unit

Map:



Author: Jacqui Coetzee, Working for Water Programme, P/Bag X6001, Potchefstroom, 2520

Illustration:



Eradication of alien plants by community members

Deliver Service on Demand

Provide service once applicant reaches top of waiting list

GENERAL INFORMATION

Description: It is well known that the Department of Agriculture doesn't currently promote this service. This service has existed at least for 20 – 30 years. Farmers see the benefits of the technology from other farmers in the area. The technician does any planning necessary. The farmer has to get a contractor or do the work himself. If the work is done by following the plans, the farmer will get subsidies, if already promised.

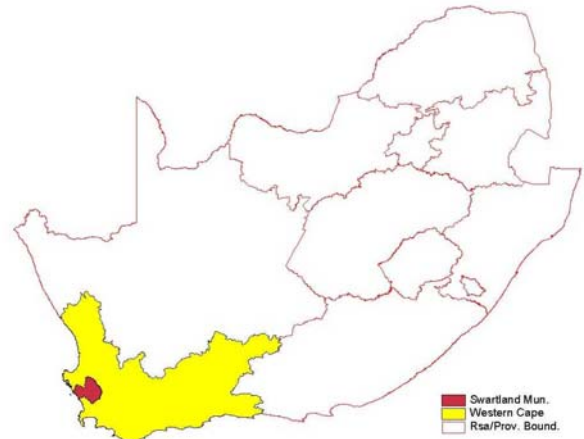
The Department doesn't have the budget to pay everybody subsidies. Subsidies are divided by regions; the region can decide itself who is getting the subsidies (in each region there is a technician who is part of the Department).

Target groups: Land Users

Location: Western Cape

Area defined by: Land User

Map:



Author: Hans King, Department of Agriculture, P/Bag X1, Elsenburg, 7607

WOCAT

Summary of SWC Approach

Extension Officer Approached by Commercial Farmers

Farmer approached extension officer (acquire free service) for technical advice and subsidy

GENERAL INFORMATION

Description: The farmer was faced with serious sheet erosion on his farm. The farmer had good results where there had been treatment of this problem on a small scale. Having grown up with parents who were keen soil conservationists it was his duty to do something about this serious problem. The farmer then approached the local extension officer for technical advice and also subsidy. Work of this volume is a long-term project and needs support in the form of subsidies as no farmer can afford these expenses, due to the low returns of livestock farming today and the lack of capital. As far back as 1960, ripping of sheet erosion was being done successfully without a subsidy. This was on a small scale, bit by bit each year as our finances dictated.

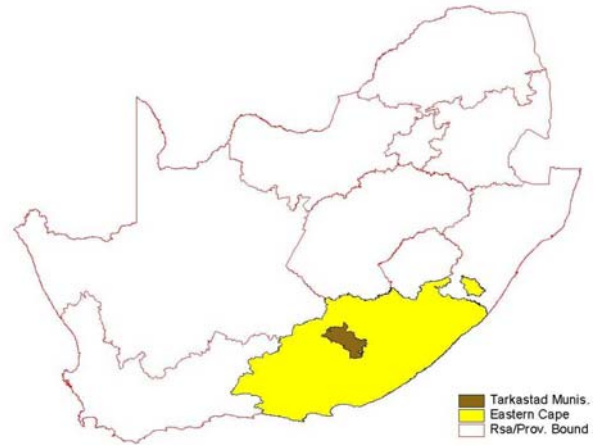
Target groups: Land Users

Location: Tarkastad

Area covered: 1 km²

Area defined by: Socio-economic / Cultural unit

Map:



Author: John Phillips, Carrickmoor Farm, PO Box 24, Tarkastad, 5370

Illustration:



69) MAY 1988 - WEIR AFTER 5 YEARS 9 MONTHS

Inspection of structure after almost 6 years

WOCAT

Summary of SWC Approach

Commercial Farmer Requiring Soil Conservation Technical Support

The soil conservation technician's reaction to the application of a farmer to participate in the subsidised soil conservation scheme of the Department of Agriculture

GENERAL INFORMATION

Description: The farmer approached the Department of Agriculture to participate in an existing Soil Conservation Scheme. The local soil conservation technician handles all the documentation, provides a farm plan, surveys the contours and waterways and supplies the farmer with plans and specifications for the work, in order to combat erosion on his cultivated maize lands. In turn, the farmer got a private contractor to construct the conservation works.

After the completion of this, the Soil Conservation Technician did a final inspection and arranged for payment of the subsidy to the farmer, who in turn pays the contractor.

Map:



Author: Dampies Wessels, Department of Agriculture (Soil Conservation), PO Box 35, Lichtenburg, 2740

Target groups: Land Users

Location: Lichtenburg district

Area covered: 6 km²

Area defined by: Farm ownership

12.2 COMMUNITY INVOLVEMENT

WOCAT

Summary of SWC Approach

On Farm Research with Community Involvement

On farm research with community involvement to rehabilitate rangeland by using perennial grasses on footslopes in a semi-arid region on a clay loam soil

GENERAL INFORMATION

Description: Researchers and technicians of the Provincial Department of Agriculture planted the experiment. The community is always present when any treatment is applied. The area is fenced off and maintained by the Department. The community will take full responsibility of the trial when the next growing season (September) starts. They are very eager to take over and their participation at this moment is very good.

The purpose is to get palatable vegetation back in the area for animal consumption. In the process, erosion will be stopped and water run-off lessened. At the same time, the community is trained and educated regarding management, grazing capacity etc.

Target groups:

SWC specialists/Extension workers
Land Users

Location: Lehurutshe

Area covered: 0.4 km²

Area defined by:

Ecological unit
Socio-economic/cultural unit

Map:



Author: Franci Jordaan, Department of Agriculture, P/Bag X804, Potchefstroom, 2520

Illustration:



Perennial grasses on footslope

Land User Participation with Research

Land user participation with researchers to improve existing and develop new technologies

GENERAL INFORMATION

Description: Land users implemented the technology but the success was never evaluated. Contacted researcher who quantitatively assessed the technology.

The pros and cons of the technology were discussed with the land user and other farmers in the area. All gave comments and shared experiences of how these technologies can be improved. Adjustments were made and on an experimental and demonstrative way, the adjustments were implemented and evaluated.

Target groups:

SWC specialists/Extension workers

Land Users

Teachers/School children/Students

Location: Zeerust/Marico

Area covered: 20 km²

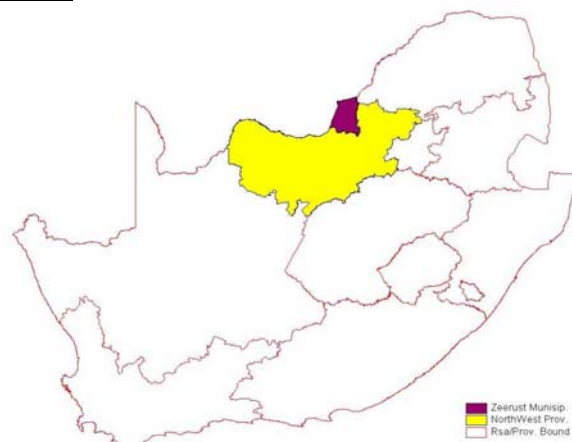
Area defined by:

Socio-economic/cultural unit

Administrative unit

Ecological unit

Map:



Author: Klaus Kellner, School of Environmental Science and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Restoration with the Help of Extension Workers

Researchers, extension workers and land users used financial input provided by national government to implement scientific technologies on both individual (commercial) and communal farms

GENERAL INFORMATION

Description: The overall purpose was to aid the government in a project, funded by government, where they do not have the manpower to do so themselves.

Legislation was taken into account and thus community participation became a priority; to improve the livelihoods of the people of South Africa.

Identify commercial and communal land users with the help of extension officers. The latter introduces the researchers to the land users; from where two approaches may follow -

- 1) Commercial land users and researchers work together without extension officer as go between.
- 2) The extension officer becomes the translator between researchers and land users. It is suggested that contact be kept with the land users and the extension officers (at least every 3 months).

Stages of implementation were as follows: finding a suitable extension officer; explanation of the project to him/her; identifying of suitable land users by the extension officer and make appointments; decision on technology, implements, seeds, etc needed; explaining technology to the land user and together apply technology; explanations of the maintenance strategies and keep contact for monitoring purposes.

Researchers were responsible for the teaching and co-implementation; the extension officers for motivation and translation; and the land users for co-implementation, maintenance, learning and grasping of the project.

Target groups:

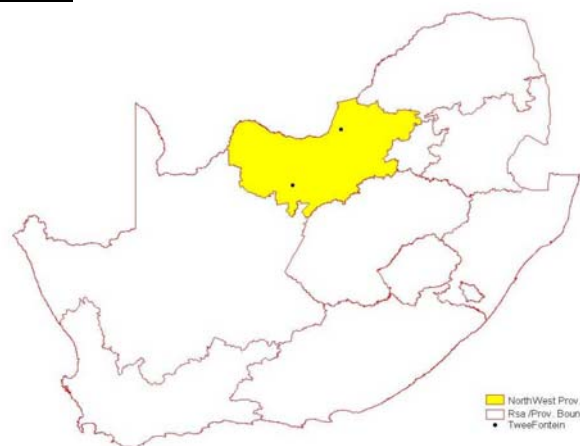
Politicians/Decision makers
SWC specialists/Extension workers
Land Users

Location: Koster, Madikwe and Potchefstroom

Area covered: 0.1 km²

Area defined by: Ecological unit

Map:



Author: Saroné De Wet, School for Environmental Studies and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Assistance to Community

Community requested assistance to combat soil erosion, only possible when "Drought Relief Funds" became available

GENERAL INFORMATION

Description: During the national drought of 1992, the Government made funds available for job creation to temporarily alleviate poverty in the rural areas. This community, with a population of approximately 4000, applied for funds, and suggested that the funds be used to combat soil erosion within their communal area of 3800 ha.

The area was inspected by technicians from the then Lebowa Government: Directorate Agricultural Engineering, and a project site was identified where both proven high technology methods, as well as novel and unproven low technology biological methods, which can easily be adopted by relatively unskilled workers from the community, could be tried. Work started in 1992 with sufficient funds for six months. Fortunately, for the project, the national drought continued and funds were made available again during the subsequent three years for six monthly periods. No work has been done on the project since 1996 because of a lack of funds.

In view of the visible improvement of the environment, the community is keen to expand the project to include more techniques to make the project more viable. The project has proved to be highly educational, not only to the local community, but also to all other communities who have visited the project. A prime example is that of the two communities from the Western Region who have adopted and adapted similar techniques at their own projects.

Target groups:

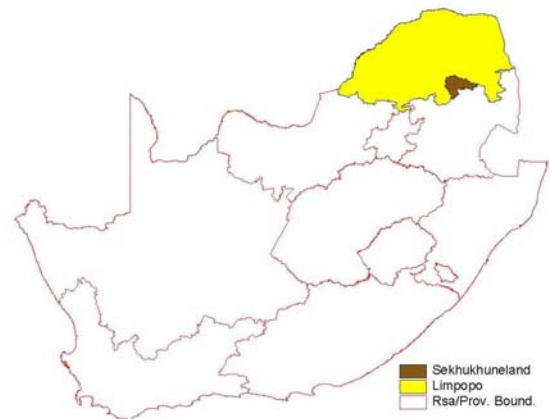
Politicians/decision makers;
Technicians/SWC specialists;
Teachers & Planners

Location: Sekhukhuneland

Area covered: 0.1 km²

Area defined by: Ecological unit

Map:



Author: Christo Spies, P/Bag X01, Chueniespoort, Potgietersrus, 0600

Illustration:



Community involvement



Community involvement

WOCAT

Summary of SWC Approach

Technical and Scientific Support and Job Creation in Community Sector (Poorest of the Poor)

To make the community aware of precious resources like water and the preservation of it, the control of alien encroachment, creation of job opportunities and the training of undeveloped communities

GENERAL INFORMATION

Description: The approach objective is to get communities involved in a national project to eradicate alien invaders to conserve the water resource in the main river catchment areas. The objectives of such a project are to make use of labour (job creation) under the poorest of the poor of the rural communities. A group of 25 people was trained in the use of chemicals; cutting down and eradication of trees and alien invaders in an effective manner, as well as different opportunities for entrepreneurs to utilise the wood, for example fire wood and charcoal. The Government is the implementing agent, facilitates and manages the project as well as providing technical advice.

Target groups:

Politicians/Decision makers
SWC specialists/Extension workers
Land Users

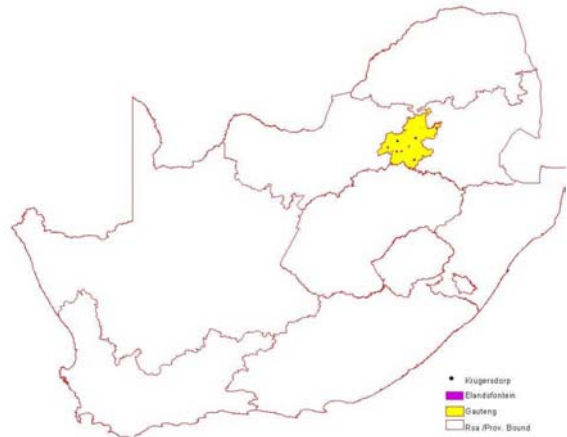
Location: Elandsfontein and Krugersdorp

Area covered: 20 km²

Area defined by:

Socio-economic/cultural unit
Watershed/catchment unit
Ecological unit

Map:



Author: Schalk Meyer, Department of Agriculture (Conservation and Environment), PO Box 769, Johannesburg, 2000

Illustration:



Farmers from the community helping with implementation of project

WOCAT

Summary of SWC Approach

Demonstration Restoration

Demonstration restoration site erected by local farmers to determine optimal treatments for restoring degraded areas to prior condition

GENERAL INFORMATION

Description: Local farmers were consulted to identify degraded areas on their farms. Their opinion of restoration was included in the project proposal. Community participation was promoted by farmer days. The farmer's knowledge on the success of technologies already applied was used to conduct new experiments.

Target groups:

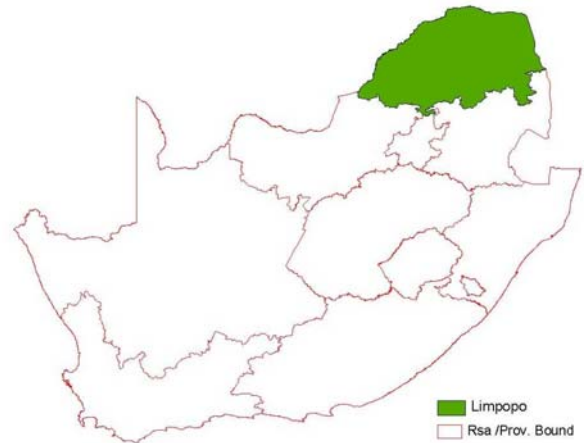
SWC specialists/Extension workers
Land Users
Teachers/School children/Students

Location: Pontdrift Borderpost

Area covered: 1 km²

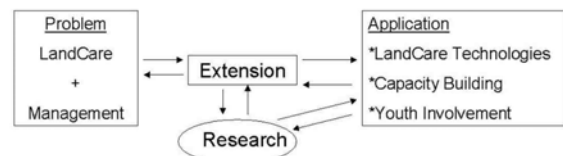
Area defined by: Ecological unit

Map:



Author: Loraine van den Berg, School of Environmental Science and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Organigram showing stakeholders

Demonstration for Communities in Rural Areas

Community driven approach supported and facilitated by extension officers in the Department of Agriculture

GENERAL INFORMATION

Description: Farmers and the tribal authorities discussed their problems with water and the rate of donga development and the Provincial Department was called in to assist in addressing this problem.

Plans, unemployed people, skills audit, etc. were investigated to devise a business plan to get funds, as well as training in managing the project and collection of time sheets were done by the communities.

The problem did not stem from a concern about land degradation but rather out of concern that their dam silted up and they had no water for their cattle.

Methods of introductions were done by visits to other sites explorations, and videos from soil conservation.

From the problem-identification to the implementation took about 12-18 months before the budget was approved and the community acceptance was in place.

This is, as mentioned, a demonstration and trial, and greater acceptance and understanding of the problems has been achieved.

Communities were asked (after a time) to draw their own situation analysis (geographic) and present their ideas on how to address these problems. These were forwarded to a soil engineer who had to prioritise possible works and discard others.

Target groups:

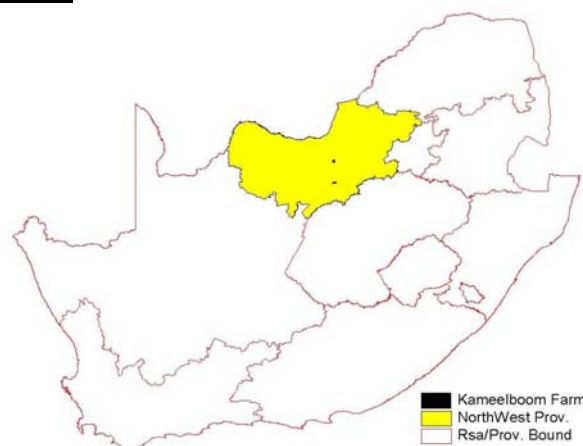
SWC specialist/Extension workers
Land Users

Location: North West

Area covered: 128 km²

Area defined by: Socio-economic / cultural unit

Map:



Author: Cornelius Last, Department of Agriculture, P/Bag X1005, Mogwase, 0314

Awareness Raising

To make the people aware of veld degradation, rehabilitation and participation of the people

GENERAL INFORMATION

Description: Improve standard of living of community members by making handcrafts and selling wood. It is an approach where the community is fully involved (a demand driven project). Training of the people to do packing and cutting of branches.

Target groups:

Teachers/School children/Students
SWC specialists/Extension workers
Land Users

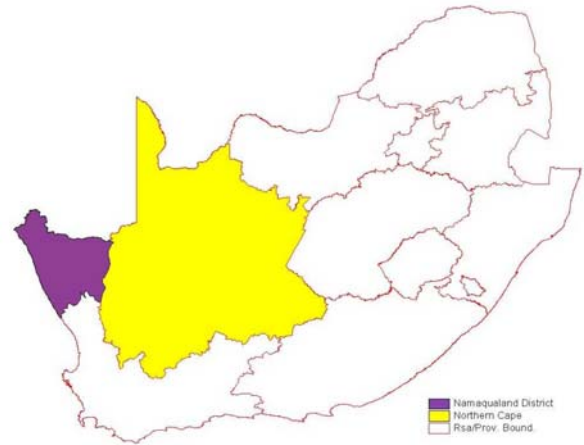
Location: Namakwaland

Area covered: 0.2 km²

Area defined by:

Ecological unit
Socio-economic/cultural unit

Map:



Author: Belly Malatji, Agricultural Land and Resources Management, PO Box 2303, Kimberley, 8300

WOCAT

Summary of SWC Approach

Land User and Research Co-operation

The approach (SWC) was based on protecting soil from eroding as result of run-off

GENERAL INFORMATION

Description: Soil / water erosion control.
The use of grass-strips/contours to slow down run-off and increase the infiltration rate of water.

Meeting with the land users to explain the establishment of contours/grass-strips, use and benefits and then the erection of contour banks.

Maintain the banks (contour) and grass-strips without breaking them.

Target groups:

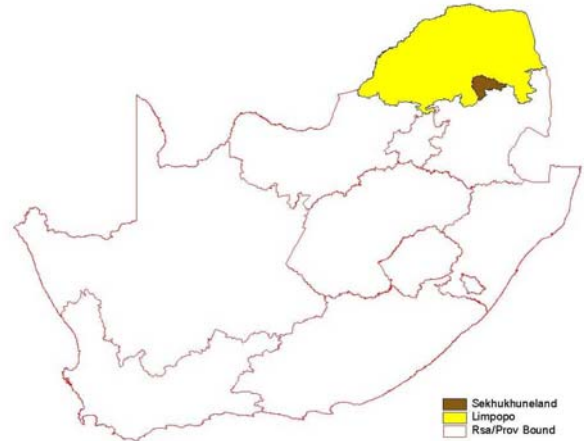
SWC specialists/Extension workers

Location: Limpopo

Area covered: 15 km²

Area defined by: Watershed/catchment

Map:



Author: Mokgwakgwe Mashatola,
University of the North, P/Bag X1106,
Sovenga, 0727

Participatory Rural Approach

Participatory Rural Approach including a partly holistic approach; between social and environmental sciences

GENERAL INFORMATION

Description: Developing sustainable management of land and other natural resources in rural communities. Assess the historical process, causes, nature and extent of desertification and its human impact. An empirical study of the attitudes, perceptions and knowledge of the local population with regard to land use. Develop policy guidelines for integrated rural development focussing on spatial planning, settlement models, land use control measures, ecological restoration and sustainable farming practices. Pilot interviews with the extension officers were followed by interviews with members of the communities themselves. Plant surveys were conducted at the study areas.

There were 5 stages of implementation included in the pilot interviews, the main interviews and the plant surveys.

Task 1: Preliminary negotiations with officials, authorities and local communities, including a literature and methodological review.

Task 2: Data collection includes satellite data and aerial photographs, ground truth (site visits, meetings, surveys, interviews and questionnaires – a PRA approach).

Task 3: Analysis and interpretation include archival research, image processing and interpretation and analysis of surveys and questionnaires.

Task 4: Validation and cross referencing by accuracy testing of remotely sensed results, historical cross referencing, comparison to Botswana results, comparison of results (communal land vs. commercial land).

Task 5: Reporting.

Target groups:

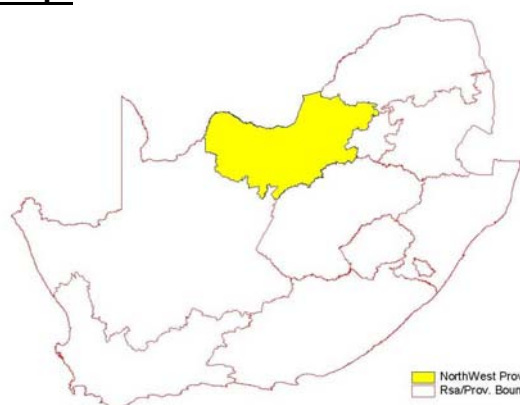
SWC specialists/Extension workers
Land Users
Politicians/Decision makers

Location: Lehurutshe District

Area covered: 35 km²

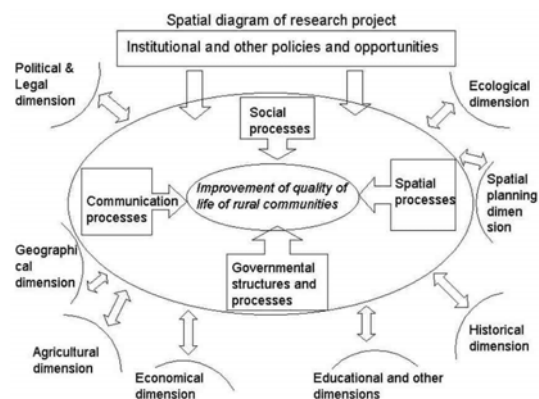
Area defined by:
Socio-economic/cultural unit
Ecological unit

Map:



Author: Saroné De Wet, School of Environmental Science and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Spatial diagram of the research project

WOCAT

Summary of SWC Approach

Communal Stakeholders

Government funded project aimed at rangeland management to enhance natural resource management, the community being the key stakeholders

GENERAL INFORMATION

Description: The community was approached to show where the benchmarks should be erected. The whole community was informed about the project and how they would benefit from it. Benchmarks were erected by the community, thus creating jobs. Initial surveys were conducted so that later comparison in production and species composition could be made after further surveys. The rotational approach was introduced in a communal system.

Target groups:

SWC specialists/Extension workers
Land Users
Teachers/School children/Students
Politicians/Decision makers

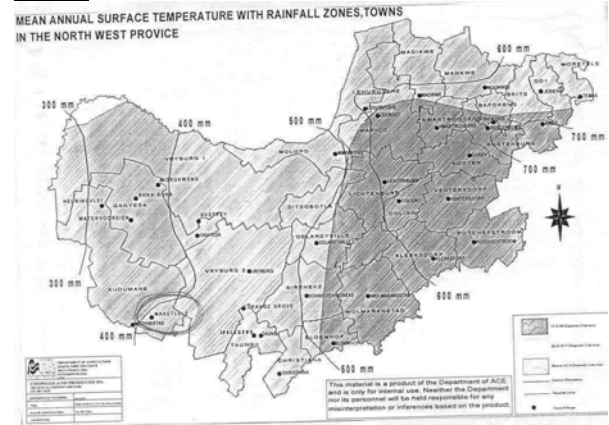
Location: Kudumane

Area covered: 1 km²

Area defined by:

Ecological unit
Administrative unit
Socio-economic/cultural unit

Map:



Author: Anja Jansen van Vuuren,
School of Environmental Science and
Development, PU for CHE, P/Bag X6001,
Potchefstroom, 2520

Illustration:



Benchmarks in field

Spontaneous Adoption

The farmer made a request to the extension office to advise him on how to rehabilitate a barren area on his farm

GENERAL INFORMATION

Description: A farmer contacted the extension office, which investigated and then recommended establishing and planting of *Atriplex Nummularia* as a fodder crop and ground cover on the barren area. The farmer was given the necessary information on how to proceed.

There is no waiting list. This place was the first one in South Africa where this method was used in the field. The research and adaptations were done at Grootfontein.

Target groups:

SWC specialists / Extension workers
Land Users

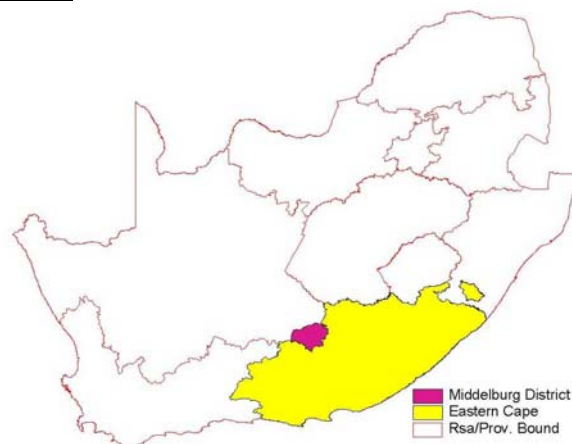
Location: Middelpas basin
(Middelburg district)

Area covered: 4 km²

Area defined by:

Watershed/catchment unit
Ecological unit

Map:



Author: Gert Barnard, Department of Agriculture, Grootfontein Agriculture Institute, P/Bag X529, Middelburg, 5900

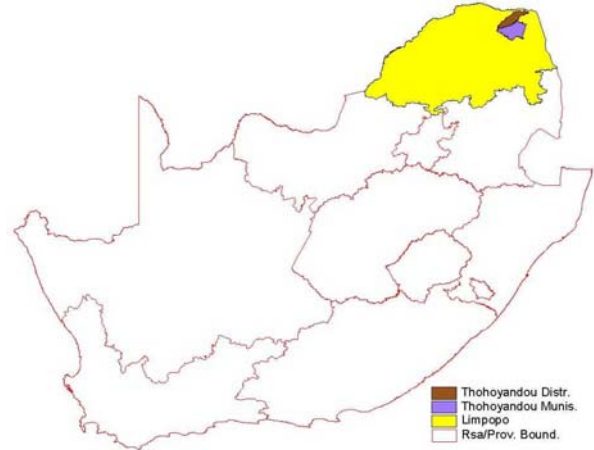
Traditional (Institutionalised in Community)

Inherited tradition – passed down through the generations

GENERAL INFORMATION

Description: When new land is cleared for cultivation, stone terrace walls are built with stone. These walls are added to each year from further loose stone which is uncovered. The dimension of the walls and the spacing between them depends on various factors including the amount of stone in the field. The walls may be up to 1.25 m high, about 1.5 m maximum base widths and from 20 to 50 m in length. Spacing is from 3 – 10 m apart and depends on the slope of the land: stone terracing is generally confined to slopes between 12° and 26°. Between 7° and 12°, contour grass-strips are generally used: below 7°, land is not terraced. The design varies. Some terrace walls are very neatly built, others are merely piles of stone across the slope. The purpose, apart from clearing the land, is to guard against erosion and help keep soil fertility in place, on sloping cropland in a sub-humid area – where rainfall is around 1,000 mm per annum. Maize is the most common crop, but various other annuals and perennials are grown also.

Map:



Author: Will Critchley, Vrije Universiteit, Amsterdam, The Netherlands

Location: Thohoyandou District

Area covered: 8 km²

Area defined by: Administrative unit

Interactive Community Approach, Biodiversity Increase

Community involvement

GENERAL INFORMATION

Description: Community involvement in SWC and environmental conservation. SWC project for erosion control, reduction of siltation, water conservation, biodiversity increase, and environmental education.

An interactive method in some cases combined the approach of the Department or Action Green Heritage, who worked through the tribal chief (traditional authority), the relevant government representatives (extension), and the Transitional Local Council (TLC - Government elected body e.g. municipality).

The SWC projects are still in the on-going phase, having passed the implementation stage. The Nature reserves are also on going (the development phase has been finalised).

The SWC programmes of NGO and government extension officer, environmental education officer and community are interlinked with the NGO for funding, the Government provides technical background and the TLC ensures broad involvement.

Target groups:

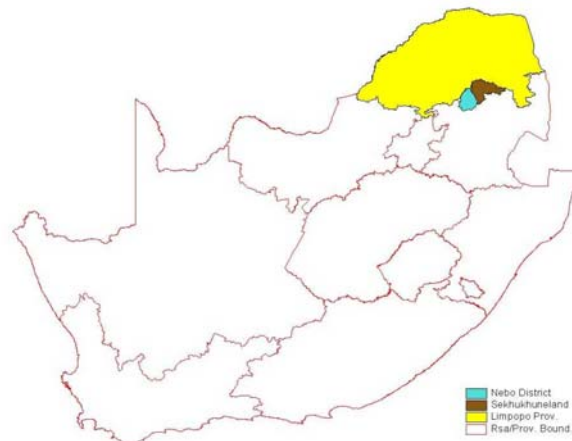
Land Users
Teachers/School children/Students
Politicians/Decision makers

Location: Limpopo

Area covered: 0.4 km²

Area defined by: Administrative unit

Map:



Author: Igmé Terblanche, Action Green Heritage (NGO), 105 Diemeer Street, Pietersburg, 0699

WOCAT

Summary of SWC Approach

Farmers Involved in Own Development

Planting without ploughing in a crop rotation system to improve moisture management, reduce erosion and increase crop yield

GENERAL INFORMATION

Description: Farmers deal with major problems such as shortages and bad implements, soil erosion and high input costs. The purpose of the project is to involve farmers in their own development, by demonstrating and training in Conservation Agriculture technologies. The methods of doing this include on-farm demonstrations (farm-led) and training courses (discovery-learning courses). The project is in the final stage; the exit plan is already implemented. The participants are both land owners and managers of the project.

Target groups:

Land Users

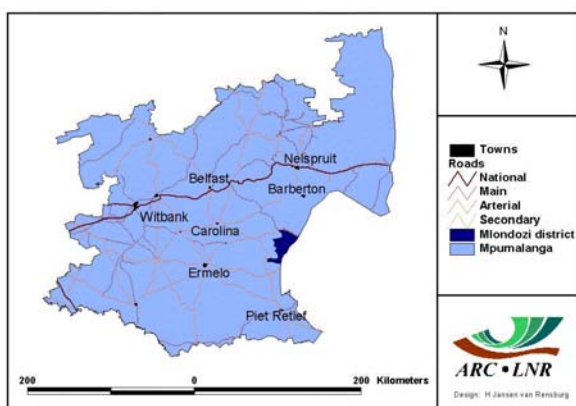
SWC specialists/Extension workers

Location: Mlondozi district

Area covered: 5.2 km²

Area defined by: Administrative unit

Map:



Author: Hester Jansen van Rensburg, ARC - Institute for Soil, Climate and Water, P/Bag X79, Pretoria, 0001

Illustration:



Farmers attending an information day



Training for farmers

WOCAT

Summary of SWC Approach

Know-how/All Participants/Inputs and Means/Different Levels of Intervention

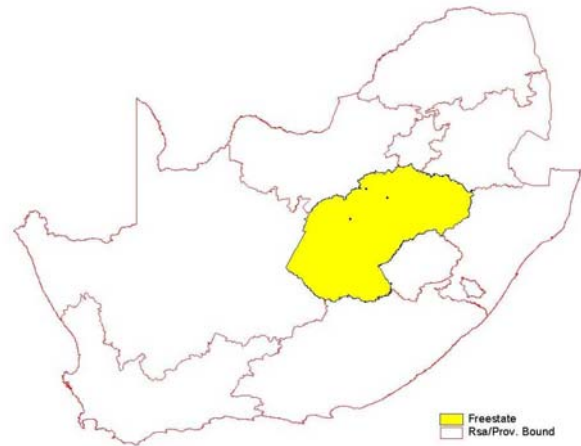
Use rainfall in the most efficient way in semi-arid grassland areas

GENERAL INFORMATION

Description: The purpose is to evaluate the influence of grassland degradation on the soil-water balance in a semi-arid climate.

The objectives include: the evaluation of different management strategies on grassland on the sustainable utilisation of the grassland ecosystem. What is the influence of veld degradation on the water-use efficiency in a semi-arid climate where water is the limiting environmental factor, and also on the soil characteristics (organic matter content, soil temperature, soil-water content, soil compaction)?

Hypothesis: Soil-water management is most important for sustainable annual production in a semi-arid climate.

Map:

Author: Hendrik Snyman, University of the Free State, PO Box 339, Bloemfontein, 9300

Target groups:

Land Users

Teachers/School children/Students

Location: Free State

Area defined by: Ecological unit

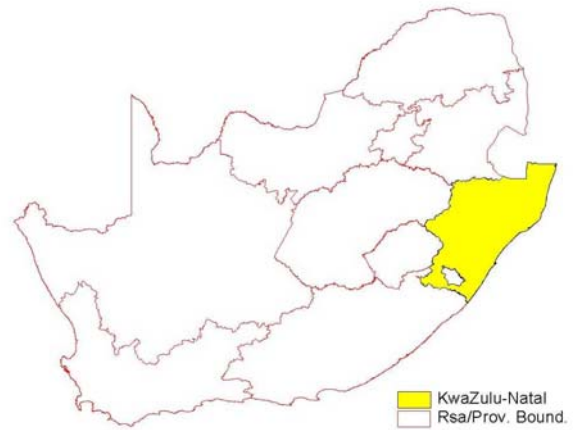
Self-teaching

Ideas gained from booklet and hands-on, practical experience

GENERAL INFORMATION

Description: The manager of the farm was given a book and video on vetiver grass by the Mazda group from UK. There had been some vetiver plants on the farm for 40 years, and it held the soil in place where it grew. This vetiver grew into huge clumps comprising many splits (tillers). The book demonstrated how vetiver could be dug up, split and planted in a continuous barrier hedge for soil and water conservation. In other words, the book offered the possibility of improving on what was already there. The approach therefore was to take ideas from a book, test those ideas and see how they worked in practice. This comprised self-teaching as an individual initiative.

Map:



Author: Maxime Robert, PO Box 56, Haenertsburg, 0730

Target groups: Land users

Location: Lower Tugela district

Area covered: 8 km²

Area defined by: Farm

WOCAT

Summary of SWC Approach

Community-driven Protection of the Molatedi Dam Catchment area

Development and capacity building in participating communities through the implementation of measures to prevent topsoil losses through erosion in the Molatedi dam catchment area

GENERAL INFORMATION

Description: Initiated by Welkom Farmers' Association through the Marico corridor sub-regional soil conservation committee. The aims were

- 1) development and capacity building in participating communities and
- 2) implementation of measures to prevent topsoil losses through erosion in the Molatedi dam catchment area.

Target groups: Land Users

Location: Molatedi dam catchment

Area covered: 5000 km²

Area defined by: Watershed/catchment

Map:



Author: Boeta du Toit, Marico Bushveld Soil Conservation Committee, PO Box 151, Zeerust, 2865

WOCAT

Summary of SWC Approach

All Participants, with the Emphasis of Getting Know-how to the Farmer

Introduction of No-Till crop production systems to rural small-scale farmers

GENERAL INFORMATION

Description: Convert small-scale farmers from conventional ploughing to minimum tillage to no-till crop production. Introduce/upgrade technology by using certified seed, fertilisers, herbicides and pesticides. Associated cost increase results in a time saving which allows for additional production. Increased yields result in wealth creation.

Develop marketing options for farmers e.g. a maize farmer can sell green maize (boiled or roasted) for human consumption, maize grain, maize meal, poultry feed or poultry, small or large livestock feed or the carcass (feedlots). Change perception that farmers produce food for own consumption only. They must produce a surplus for sale to generate an income which is wealth creation in the rural areas.

Rich farmers = Wealthy Nation

Poor farmers = Poor Nation

Government policies must support rural farmers and ensure a good price for agricultural produce.

Upgrade the knowledge/skills level of extension officers (E.O.s) - gain farmers respect for E.O.s. E.O.s must be measured on farmer performance.

Improve the link and information flow from research organisations to E.O.s (and then to the farmer).

Research organisations are encouraged to initiate no-till projects to support farmers and E.O.s, e.g. herbicides for weed problems; fertiliser deficiencies and recommendations; crop options.

Target groups:

SWC specialists/Extension workers

Land Users

Teachers/School children/Students

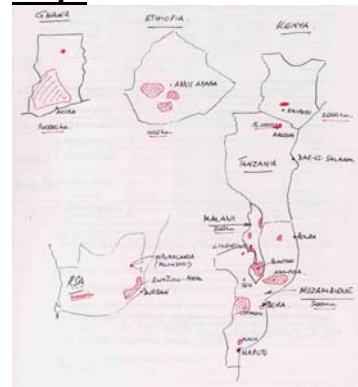
Politicians/Decision makers

Location: KwaZulu/Natal

Area covered: 10 - 100 km²

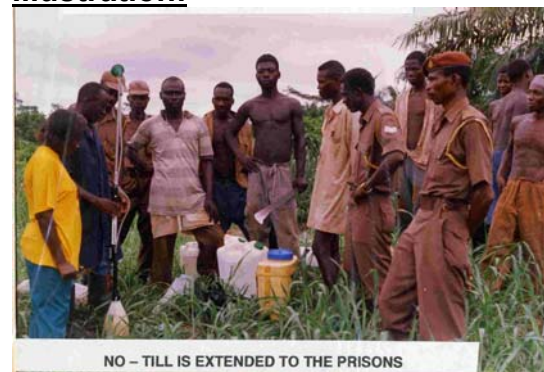
Area defined by: Administrative unit

Map:

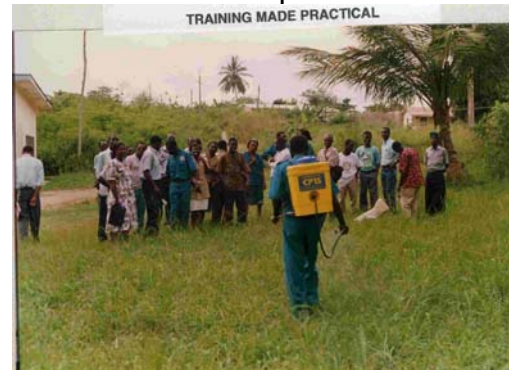


Author: Jim Findlay, Agricultural Resource Consultants, PO Box 3474, Parklands, 2121

Illustration:



No-till extended to prisons



Training of farmers at an information day

All Participants

PRA method, transect walk and Land Design. Discussions and develop plan of action

GENERAL INFORMATION

Description: At household level, target family members to address food security using all natural resources at their disposal, waste management, water, roof and run-off water, grey water and plan for actions.

Mobilisation at community level; household surveys, PRS Workshops with transect walks, planning, local government and chiefs (all stakeholder participants).

Celebrations e.g. harvesting festivals, Food Processing festivals and Tree-Planting festivals.

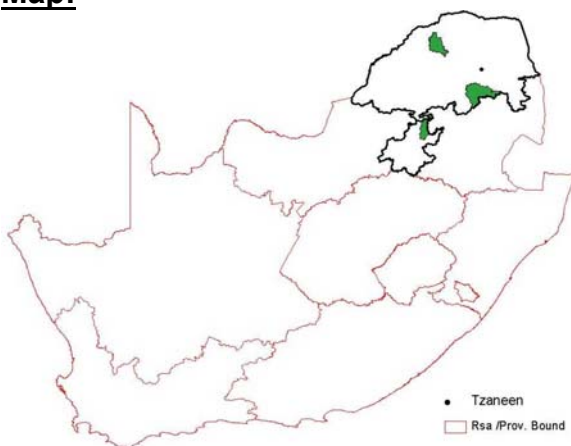
Target groups: Land Users

Location: Gauteng and Limpopo

Area covered: 0.2 km²

Area defined by: Socio-economic / cultural unit

Map:



Author: Tshepo Khumbane, PO Box 327, Wadrikt, Cullinan, 1002

Illustration:



Community meeting



Community meeting

12.3 CONSERVATION APPROACHES

WOCAT

Summary of SWC Approach

Conservation Committees

The control of livestock numbers, plant management/control, knowledge and control of plants and essential rest periods

GENERAL INFORMATION

Description: Conservation committees.
Successful commercial farmers.
Research.
Extension officer acts as an agent for transfer of research information.

Target groups:

Teachers/School children/Students
Politicians/Decision makers
Planners
SWC specialists/Extension workers
Land Users

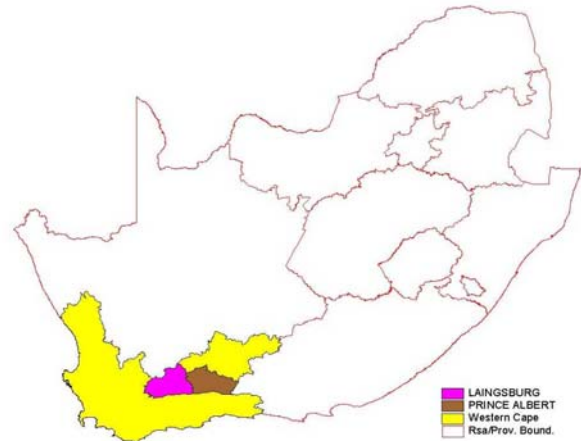
Location: Karoo

Area covered: 450000 km²

Area defined by:

Ecological unit
Watershed/catchment unit
Socio-economic/cultural unit

Map:



Author: Charl Du Plessis, Department of Agriculture, PO Box 6, Laingsburg, 6900

Minimum Tillage

Plough and plant in one operation to improve moisture management, to increase crop yield

GENERAL INFORMATION

Description: In view of erratic rainfall and shortage of tractors in the area, it is imperative that optimum use is made of equipment so that one tractor operator can service as many farmers as possible. By ploughing, fertilising and planting in one operation considerable time and money can be saved. Ploughing and planting can be done under optimum conditions, i.e. correct soil moisture content. The operation was done after the first rain. Participants provided their own seeds and fertiliser. A contractor provided a tractor.

Target groups:

Land Users
SWC specialists/Extension workers

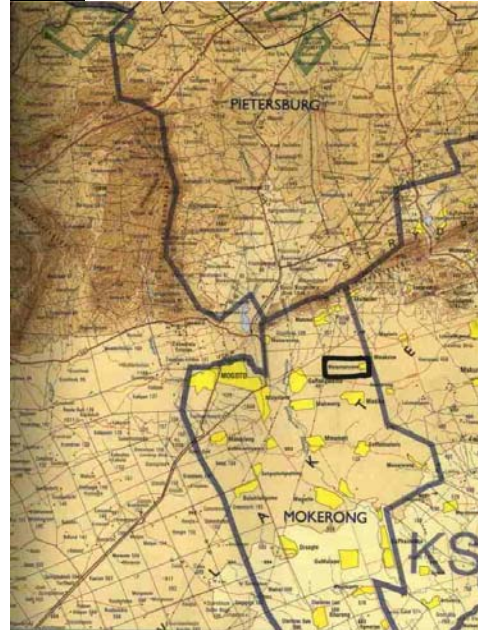
Location: Zebediela District

Area covered: 1 km²

Area defined by:

Administrative unit
Socio-economic/cultural unit

Map:



Author: Christo Spies, P/Bag X01, Chueniespoort, Potgietersrus, 0600

WOCAT

Summary of SWC Approach

Minimum Tillage on Commercial Farm

To disturb the soil structure as little as possible

GENERAL INFORMATION

Description: Increase soil structure and ground cover and decrease run-off water and soil erosion.

First experimental and then implemented on the rest of the fields.

No community involvement

Target groups:

SWC specialists/Extension workers

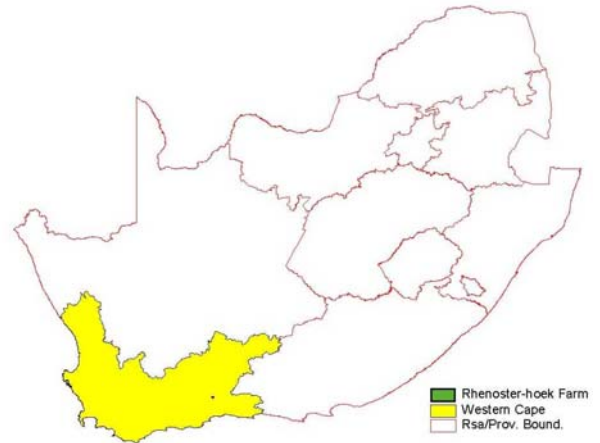
Land Users

Location: Eendekuil

Area covered: 10 km²

Area defined by: Watershed/catchment

Map:



Author: Willem Engelbrecht, Groenkol Farming, PO Box 61, Eendekuil, 7335

Rehabilitation Techniques in Southern Kalahari - Vegetative and Management

Shared interest by Mier Management Council and Provincial Department of Agriculture

GENERAL INFORMATION

Description: Initially a combined effort by Department of Agriculture and Mier Management Council to combat degradation of game camps.

Directed towards a male dominated farming community, also involving a few females (ages ranging from middle to old age). An objective was to educate towards awareness to degradation and techniques involving the rehabilitation of these areas and the prevention of getting to this state. Also including methods which prevent returning to this state.

Initially using farmer's days - education. Research came later, focussing on understanding the ecology of the area and then to concentrate on rehabilitation techniques. This was later introduced in farmer's days, school education and education of management council.

Stages of implementation:

- 1) Realisation by management council that veld was degraded.
- 2) Department of Agriculture requested to assist – in the form of trial and error (i.e. resting camps, poisoning of shrubs).
- 3) Resting of camps showed no improvement, so Department requested assistance from Agricultural Research Council (Range and Forage Institute) to gain understanding of ecology of area.
- 4) Once understanding gained and techniques developed, education in the form of farmer's days, school days and management council.

Role of participants:

- 1) Nature Conservation: Initially involved in game number management.
- 2) Department of Agriculture: Advisory capacity management of techniques.
- 3) ARC - Research and advisory.
- 4) Management council – labour control.
- 5) Community - involved through council in decision-making – also jobs provided through labour.

Target groups:

SWC specialists/Extension workers
Land Users
Teachers/School children/Students
Politicians/Decision makers

Location: Mier

Area covered: 40 km²

Area defined by:

Socio-economic/cultural unit
Ecological unit

Map:



Author: André van Rooyen, ARC – Range and Forage Institute, P/Bag X05, Lynn East, 0039

Illustration:



A photo of the technology taken from the air

12.4 WATER RELATED ASPECTS

WOCAT

Summary of SWC Approach

Water Harvesting and Basin Tillage (WHB) through Demonstrations

Optimising rainwater use, reduce runoff by use of basins and reduce evaporation losses by applying a mulch (stone/reeds) on the runoff strip and in the basins

GENERAL INFORMATION

Description: Given the marginal soils of a clayey nature and/or slope terrain, coupled with erratic rainfall events, the technology aims to harvest available rain water and prevent runoff and soil loss. At present, PRAs are conducted in target areas and so far, people are eager to adopt the technology. The aim is to train them and assist in constructing the basins so that after a year they will be able to take over the project entirely even though the team will still be around to provide advice should the need arise.

Target groups:

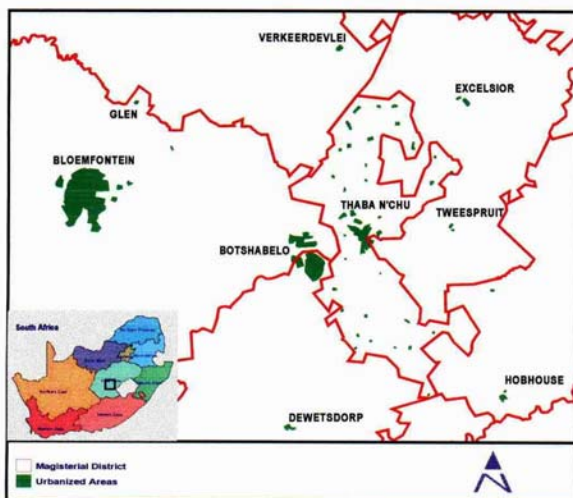
Politicians/Decision makers
SWC specialists/Extension workers
Land Users

Location: Bloemfontein, Botshabelo, De Wetsdorp and Thaba Nchu

Area defined by:

Socio-economic/cultural unit
Watershed/catchment unit

Map:



Author: Cobus Botha, ARC - Institute for Soil, Climate and Water, P/Bag X01, Glen, 9360

Illustration:



Preparing the basins



Demonstrating the technology through a model



Farmers attending an information day

WOCAT

Summary of SWC Approach

Working for Water

Government funded restoration/rehabilitation initiative as part of Working for Water project. Aim was to eradicate alien vegetation

GENERAL INFORMATION

Description: The aim was to eradicate alien invasive species and then to revegetate the area in order to recover the natural grazing for livestock. Community participation plays a very important role, making them aware of the importance of restoring degraded rangelands. The approach for applying SWC technologies included making use of community members (at a daily wage) to carry out the labour intensive technologies and thus also playing a part in increasing community awareness.

Target groups:

SWC specialists/Extension workers
Teachers/School children/Students
Politicians/Decision makers
Planners
Land Users

Location: Johannesburg

Area covered: 1 km²

Area defined by:

Ecological unit
Socio-economic/cultural unit
Watershed/catchment unit
Administrative unit

Map:



Author: Anuschka Barac, School of Environmental Science and Development, PU for CHE, P/Bag X6001, Potchefstroom, 2520

Illustration:



Preparing the site



Planting

WOCAT

Summary of SWC Approach

Working for Water Wetland Rehabilitation

To improve the quality and quantity of water production and biodiversity in the Blyde River catchment area

GENERAL INFORMATION

Description: Stabilise, landscape and re-vegetate degraded wetlands in the upper Blyde River catchment. The objective was to re-instate the previous water table and vegetation by slowing down run-off through the building of gabions, landfills, reshaping and hydroseeding.

Participants: Government funding

Target groups:

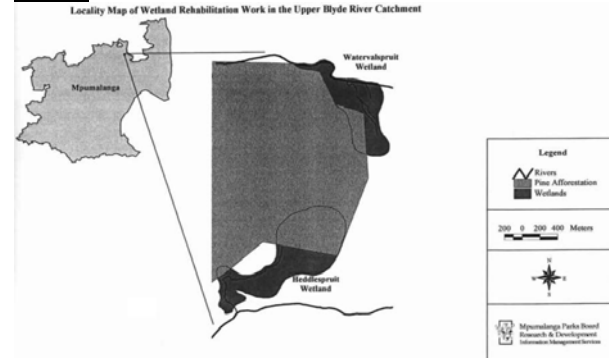
Local Community
Politicians/Decision makers
SWC specialists/Extension workers
Land Users

Location: Blyde River Catchment

Area defined by:

Ecological unit
Watershed/catchment unit
Socio-economic/cultural unit

Map:



Author: Frik Bronkhorst, Mpumalanga Parks Board, PO Box 1990, Nelspruit, 1200

Illustration:



Wetland area

