

Final report

March 2011

**Project Title: National Rangeland Monitoring and
Improvement Programme**

Project Leader: Mr AD Short



**agriculture,
forestry & fisheries**

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA



1. Project number	21.1.1/06AAPS-01/RFI
2. Title	National Rangeland Monitoring and Improvement Programme (NRMIP)
3. Project Manager	Alan Short
4. Co-Workers	NRMIP Technicians
5. Collaborators	<ul style="list-style-type: none"> • Dr M Peel (ARC) • Dr Tony Palmer (ARC) • Mr Clement Cupido (ARC) • Gilbert Pule (ARC) • Julius Tjelele (ARC) • Ntuthuko Mkhize (ARC) • Limpopo Department of Agriculture • KZN Department of Agriculture and Environmental Affairs • Western Cape Department of Agriculture • Free State Department of Agriculture • Gauteng Department of Agriculture • WWF-SA • Enkangala Grassland Trust • Grasslands programme • University of Cape Town • South African Environmental Observation Network • Department of Agriculture, Forestry and Fisheries (Land Use and Soil Management Directorate) • North-West University • ARC-ISCW • Kwanalu • Fort Hare University
6. Duration	Jan 2006 – March 2011
7. Reporting Period	January 2006 – March 2011
8. Long term objectives	<ol style="list-style-type: none"> 1) Develop a Rangeland Monitoring and Improvement Program based on current guidelines for veld management for various production environments. 2) Train and deploy interns as Range Officers to the various biomes for monitoring of the veld according to national guidelines. 3) Develop research capacity through funding and mentorship of postgraduate students,

	recruited from various universities and the pool of interns.
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9. Final progress

9.1 Objective 1: Develop a Rangeland Monitoring and Improvement Program based on current guidelines for veld management for various production environments.

A project manager was appointed to the project in June 2008, prior to which the project had been managed by the Programme Manager for the Rangeland unit at the Agricultural Research Council.

Several key concepts were developed for the project at the initial planning workshop and at subsequent discussion with stakeholders when the project manager was appointed. Firstly, collaboration with other institutions and projects are crucial in order to utilise the experience available nationally and in order not to waste money, time and effort on unnecessary “parallel” projects. This concept remained a core principle of the entire programme until the end. Existing datasets are incredibly valuable and should be sourced and added to the project’s database. Administration of the project would remain a serious task and an administrator should be appointed, and a database should be designed and built for the project.

The first task of the project manager was to meet with as many possible stakeholders, including all of the provincial departments of agriculture, national department of Agriculture (including the Land Use and Soil Management Directorate), universities, farmers’ groups and many others.

The results of those meetings are shown in Table 1. As can be seen from the table, the potential for cooperation was enormous and was partly fulfilled by the various NRMIP projects (detailed below).

Table 1: Results of meetings with different stakeholders nationally

Institution	Current projects (VCA = veld condition assessment)	What do they expect from the NRMIP?	People who can conduct a veld condition survey	Potential for cooperation
ARC – Savanna Ecosystems Dynamics Project	Large-scale monitoring programme over twenty years in wildlife industry, Lowveld	Cooperation and collaboration as objectives are very similar	3 (+2 NRMIP technicians)	Currently cooperating extensively with two NRMIP technicians permanently assigned to Savanna programme
KZN Department of Agriculture	Multiple ad hoc VCA; Extensive database		± 5	Excellent; already cooperating on two major projects;
Ezemvelo KZN Wildlife	Biodiversity stewardship programme;		± 7	Excellent; already cooperating on one major project and one smaller project
Eastern Cape Dept. of Agriculture	Monitoring proposal and extensive VCA data, currently not captured in database		± 5	Good; several projects where we can cooperate and good relations with department
Western Cape Dept of Agriculture	Surveying grazing capacity across province	Continuity in monitoring efforts; currently programmes tend to shut down when individuals leave	± 4	Excellent; already cooperating on current project
Northern Cape Dept of Agriculture	Limited		1	Good; They are keen for our assistance but have limited capacity of their own
North-West Dept. of Agriculture	Several registered projects but not implemented at time of meeting (Sept 08); Historical monitoring sites available as for FS	Hope for technical support; expect work to be done correctly to be useful	±3	Good; keen to cooperate; may require legal agreement

Institution	Current projects (VCA = veld condition assessment)	What do they expect from the NRMIP?	People who can conduct a veld condition survey	Potential for cooperation
Limpopo Dept of Agriculture	Several projects where VCAs required	More research to test hypotheses of rangeland change; training	10	Good; one former NRMIP technician employed there and already requested our assistance
Free State Department of Agriculture	Historical monitoring sites not resurveyed for many years;		4-5	Currently poor; require further engagement with the department
Mpumalanga Dept of Agriculture	Proposed monitoring programme in Highveld; several extension projects	Closing the gap in terms of resources; much knowledge gone with Kevin Kirkman	4-5	Good; keen to collaborate on at least one project
Gauteng Dept. of Agriculture, Conservation and Environment	One land reform farm plan required	Extension work	0 in Agriculture; a few in Conservation	Poor; require further engagement; currently contracted to GDACE for a farm plan but not specifically as NRMIP
Grassland Programme	Several major programmes including demo farm	Technical assistance on projects	0 – employ consultants	Good; currently project manager sits on Agricultural Task Team committee, together with several other industry representatives
Enkangala Grassland Project	Affiliated to Grassland Programme; Demo farm and carbon sequestration	Technical and scientific support	0 – consultants	Excellent; currently participating in one major project
Succulent Karoo Ecosystem Programme	Various research and community projects		Several	Reasonable; currently collaborating with individual institutions who are members of SKEP
Red Meat Producers' Association		Farmer support; especially technical advice	Unknown, but members consist of thousands of producers with varying veld experience	Excellent; project favourably received at AGM
National Wool Growers' Association			Unknown, but members consist of hundreds of producers with varying veld experience	Limited engagement to date but favourable reception from chairman
Kwanalu (KwaZulu-Natal Farmers' Union)		Technical advice; Use formal farm visit protocol adopted by members to ensure farm visits welcomed	Unknown, but members consist of hundreds of producers with varying veld experience	Excellent; already collaborated on one major programme
University of Cape Town	Fixed point photo database (Prof. Timm Hoffman)	Combine national veld condition database with national photo database; contribute to national photo database	Several with many years experience; as well as post-grad students	Excellent; Prof. Hoffman enthusiastic about NRMIP and keen to give training on fixed-point photography
University of Fort Hare	Long-term trials and various research projects	Technical support; research collaboration	Several with many years experience; as well as post-grad students	Good; currently one technician registered for MSc and three technicians based at UFH; need formal agreement since Dr Dube leaving
North-West University			Several with many years experience; as well as post-grad students	Good; Prof Kellner co-developer of FIXMOVE programme of LUSM, which NRMIP is involved in
University of Pretoria	Various research projects		Several with many years experience; as well as post-grad students	Good; collaborating on one small project, and one technician registering for honours in 2010
Tshwane University of Technology	Various research and training projects; large database of botanical surveys conducted by Mike Panagos and colleagues		Several with many years experience; as well as post-grad students	Excellent; two technicians registered for B.Tech; extensive discussions with Mr Panagos
Institute for Soil, Climate and Water, ARC	Land Degradation Assessment		Unknown, mostly soil scientists and remote sensing?	Good; potential for NRMIP to assist with ground-truthing of LDA

Institution	Current projects (VCA = veld condition assessment)	What do they expect from the NRMIP?	People who can conduct a veld condition survey	Potential for cooperation
Directorate of Land Use and Soil Management, DAFF	FIXMOVE; national grazing capacity map; AGIS	Technical support	2-3?	Excellent; already cooperating on FIXMOVE project
University of KZN	Long-term trials; various research projects		Several with many years experience; as well as post-grad students	Good; project manager has long-standing relationship and is registered for MSc
SANParks	Kruger veld monitoring programme; VCA database	Technical support and scientific input	Unknown, several	Excellent; one project already registered with Kruger and Savanna ecosystem dynamics project, ARC has long-standing relationship with Kruger
South African Environmental Observation Network (SAEON)	SAEON long-term database	Technical and scientific support	Unknown	Excellent; collaborating on Kruger project and on one other major project. Potential for further cooperation in data management
Institution	Current projects (VCA = veld condition assessment)	What do they expect from the NRMIP?	Human capacity (number of people who can conduct a veld condition survey)	Potential for cooperation
KZN Department of Agriculture	Multiple ad hoc VCA; Extensive database		± 5	Excellent; already cooperating on two major projects;
Ezemvelo KZN Wildlife	Biodiversity stewardship programme;		± 7	Excellent; already cooperating on one major project and one smaller project
Eastern Cape Dept. of Agriculture	Monitoring proposal and extensive VCA data, currently not captured in database		± 5	Good; several projects where we can cooperate and good relations with department
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Limpopo Dept of Agriculture	Several projects where VCAs required	More research to test hypotheses of rangeland change; training	10	Good; one former NRMIP technician employed there and already requested our assistance
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Enkangala Grassland Project	Affiliated to Grassland Programme; Demo farm and carbon sequestration	Technical and scientific support	0 – consultants	Excellent; currently participating in one major project

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Kwanalu (KwaZulu-Natal Farmers' Union)		Technical advice; Use formal farm visit protocol adopted by members to ensure farm visits welcomed	Unknown, but members consist of hundreds of producers with varying veld experience	Excellent; already collaborated on one major programme
University of Cape Town	Fixed point photo database (Prof. Timm Hoffman)	Combine national veld condition database with national photo database; contribute to national photo database	Several with many years experience; as well as post-grad students	Excellent; Prof. Hoffman enthusiastic about NRMIP and keen to give training on fixed-point photography
University of Fort Hare	Long-term trials and various research projects	Technical support; research collaboration	Several with many years experience; as well as post-grad students	Good; currently one technician registered for MSc and three technicians based at UFH; need formal agreement since Dr Dube leaving
North-West University			Several with many years experience; as well as post-grad students	Good; Prof Kellner co-developer of FIXMOVE programme of LUSM, which NRMIP is involved in
University of Pretoria	Various research projects		Several with many years experience; as well as post-grad students	Good; collaborating on one small project, and one technician registering for honours in 2010
Tshwane University of Technology	Various research and training projects; large database of botanical surveys conducted by Mike Panagos and colleagues		Several with many years experience; as well as post-grad students	Excellent; two technicians registered for B.Tech; extensive discussions with Mr Panagos
Institute for Soil, Climate and Water, ARC	Land Degradation Assessment		Unknown, mostly soil scientists and remote sensing?	Good; potential for NRMIP to assist with ground-truthing of LDA
Directorate of Land Use and Soil Management, DAFF	FIXMOVE; national grazing capacity map; AGIS	Technical support	2-3?	Excellent; already cooperating on FIXMOVE project
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Institution	Current projects (VCA = veld condition assessment)	What do they expect from the NRMIP?	Human capacity (number of people who can conduct a veld condition survey)	Potential for cooperation
University of Witwatersrand	Bushbuckridge rural facility	Technical assistance with VCA	Unknown but few	Excellent; one workshop where we contributed to research design; anticipate future collaboration

Institution	Current projects (VCA = veld condition assessment)	What do they expect from the NRMIP?	People who can conduct a veld condition survey	Potential for cooperation
KZN Department of Agriculture	Enkangala Carbon Sequestration project; Vryheid project	Technical assistance with VCA	± 5	Excellent; already cooperating on two major projects;
Ezemvelo KZN Wildlife	Enkangala Carbon Sequestration project; Vryheid project	Technical assistance with VCA	± 7	Excellent; already cooperating on one major project and one smaller project
Limpopo Dept of Agriculture	Several projects where VCAs required	VCA	10	Collaborated on large project in Blouberg District
Mpumalanga Dept of Agriculture	Proposed monitoring programme in Highveld; several extension projects	Technical assistance; scientists also require much guidance to get started	4-5	Good; keen to collaborate on at least one project; little progress since last year
Grassland Programme	Several major programmes including demo farm	Technical assistance on projects	0 – employ consultants	Good; currently project manager sits on Agricultural Task Team committee, together with several other industry representatives; collaborating on two projects
Enkangala Grassland Project	Affiliated to Grassland Programme; Demo farm and carbon sequestration	Technical and scientific support	0 – consultants	Excellent; currently participating in one major project
North-West University	FIXMOVE project as well as Local Level Monitoring Programme	Minimal directly with NWU; however, we can expand their programmes	Several	Good; Prof Kellner co-developer of FIXMOVE programme of LUSM, which NRMIP is involved in
Directorate of Land Use and Soil Management, DAFF	FIXMOVE; national grazing capacity map; AGIS	Technical support	2-3?	Excellent; already cooperating on FIXMOVE project
South African Environmental Observation Network (SAEON)	SAEON long-term database	Technical and scientific support	Unknown	Little progress since last year; much potential for collaboration
National Department of Agriculture – Grootfontein	Monitoring programme in three regions	Technical support	Several	Assisted with major surveys in Northern Cape; potential for future collaboration

One of the key findings of the meetings and interviews with other institutions was the serious shortage of skilled personnel with the ability to conduct veld condition surveys.

Although not revealed in these interviews, personal experience has also demonstrated that the range of skills required in complete assessment and analysis of natural resources is far less even than the numbers described above: not all of those personnel who are capable of conducting veld condition surveys (i.e. using appropriate methods to sample and identify key plants) have the additional skills required to identify other key environmental and management factors and to transform the raw data into practical recommendations.

9.1.1 Popular publications about the project

Two articles were published in Farmer's Weekly about the project and on collaborative work with Dr Tony Palmer:

1. Bezuidenhout R and Short DE 2010. Veld management: researchers and farmers to join forces. Farmers' Weekly: 24-25. 5 March 2010
2. Bezuidenhout R 2010. Satellite can help improve veld production estimates. Farmer's Weekly: 32-34. 3 September 2010

9.1.2 Projects

The NRMIP was broken down into a number of different projects. Every project was based strongly on collaboration with other stakeholders, especially governmental and non-governmental institutions.

A summary of the projects is detailed in **Error! Reference source not found.**. A total of over 300 sites were surveyed using a variety of methods, all of which are captured in the database. The majority of the work was undertaken in the grassland (over 200 sites) and savanna (81 sites) biomes (Figure 1). The current team has training and experience in these two biomes and working in different biomes requires collaboration with experienced staff in those biomes.

Every project was undertaken in collaboration with other institutions (at least 16 institutions, and several more not formally accounted for in the reports, were involved to a greater or lesser extent in the projects) (Table 2). Collaboration was crucial to the success of the projects and no monitoring programme can adequately proceed without building partnerships.

9.1.3 Methods

Methods used were chosen according to the objectives of each project. However, a number of common variables were measured across all projects. In the Cape (Northern and Western) the local experts measured the vegetation, as the NRMIP team did not have the knowledge and experience for those biomes.

9.1.3.1 Site layout and description

In all cases, a clearly defined site was marked out, usually with a 100m transect, upon which all measurements were based. The FIXMOVE project used two 200m transects at right angles, while the Enkangala Carbon project used two parallel 50m transects. In all cases, transects were laid down the slope, with the exception of some transects in the Western Cape, which were laid in the direction of the prevailing wind. The purpose of this was based on the concept of Landscape Function Analysis, where the flow of resources is measured.

As far as possible, the following variables were collected for all sites:

- Date
- Latitude and longitude of the start and end points of the transect
- Management system
- Soil type, depth and texture
- Signs of erosion
- Invasive plants
- A fixed-point photograph from the top of each transect facing downslope

9.1.3.2 Herbaceous vegetation composition

The composition of the grass layer was recorded, in most cases by the classic nearest plant-point technique. In the case of the Limpopo project, a quadrat-based cover assessment method was used. In the Harrismith project, many sites were surveyed using a visual assessment technique in order to gather as much data as possible in the shortest possible time, backed up by transect surveys.

9.1.3.3 *Woody vegetation and weeds*

In all cases, woody vegetation and undesirable plants was recorded (so-called “woodies and weedies”). This variable has often been neglected in the past in many veld condition surveys, and we believed it is a critical variable. Often, woody plants or undesirable plants are not recorded in formal assessments until it is too late for effective management interventions; a good example of this phenomenon is *Seriphium plumosum* (Bankrotbos), an indigenous shrub which has taken over large parts of the Highveld and massively impacted grazing lands.

Generally, an area-based survey was used, usually a rectangular belt-transect along the length of the 100m transect, but in the first major project a circular area was surveyed. The number of plants within the area was counted and their height and canopy diameter recorded, amongst other variables.

In one project, the Enkangala Carbon project, the Point-Centred-Quarter (PCQ), a plotless method, was used. However, it was found that this technique is unsuitable for areas with few woody plants.

9.1.3.4 *Basal cover and soil surface condition*

The condition of the soil surface and the basal cover was recorded using various methods in each project, in order to give a more balanced picture of the condition of the veld and the capacity to protect the soil from erosion and excessive run-off.

Table 2: Summary of projects undertaken by the NRMIP

Project title	Description	Project Manager	Personnel involved	Collaborating institutions and staff	Biome	Vegetation types	Number of sites	Methods
Comparison of veld condition survey methods	Three different methods of veld condition survey (step-point, quadrat frequency and plant number scale) were compared in a formal assessment of operators (4 teams) and sites (4 sites). The quadrat frequency method was preceded by a pilot study to determine optimum quadrat number and size per plot. All methods have strengths and weaknesses but the classic step-point method showed the least operator effect and was most able to distinguish between sites.	Alan Short	All NRMIP personnel, J Tjelele, L Dziba, G Pule, N Mkhize	KZN Dept of Agriculture: C Botha, E van Zyl, G Peddie, W Diko	Grassland	Gs 12 East Griqualand Grassland	4	Plant-number scale, step-point (with and without forbs) and quadrat frequency (40 quadrats of 20x20cm)
Acocks survey method: estimation of operator effect	14 transects of 100m were surveyed by three teams using the scoring technique used by Acocks. The transects were determined by generating a grid on GIS and uploading the grid to a hand-held GPS. The difference between operators was quite large	Alan Short	NRMIP personnel at Irene	None	Savanna		1	Acocks cover-abundance score
Ball historical resurvey	The visit was a follow-up from a preliminary visit in May, with Doreen Sithole. Mr Ball has six historical veld monitoring sites on his farm, which he monitored for several years in the 1960s. A team consisting of Alan Short, Doreen Sithole, Basanda Nondlazi and Mmapula Bothoko visited the farm to resurvey the sites. In addition to the 1000-point surveys originally conducted, we also surveyed the woody vegetation and the soils.	Alan Short	Doreen, Mmapula, Basanda, Alan	Dennis Ball and Son	Savanna	Svcb 20 Makhodo Sweet Bushveld	4	Belt transect Point intercept
Blouberg Integrated Livestock Enterprise Cooperative	To assist the Limpopo Department of Agriculture to conduct baseline surveys and establish monitoring sites for a communal rangeland livestock production initiative. Twelve members of the NRMIP team joined several members of the Limpopo Department of Agriculture for ten days in Blouberg Municipality.	Alan Short	All NRMIP except de Beer	Limpopo Department of Agriculture: Lesego Bodibi and Colleagues	Savanna	SVcb 18 Roodeberg Bushveld SVcb 19 Limpopo Sweet Bushveld SVcb 20 Makhado Sweet Bushveld SVcb 21 Soutpansberg Mountain Bushveld SVcb21 Soutpansberg Mountain Bushveld	55	Belt transect Braun-Blanquet cover score Photos

Project title	Description	Project Manager	Personnel involved	Collaborating institutions and staff	Biome	Vegetation types	Number of sites	Methods
Carbon sequestration in Enkangala grasslands	Surveyed 32 sites - 16 pairs of contrasts. Collaborative project with Brent Corcoran from EWT. Soil samples taken to analyse for Carbon, soil description. NRMIP did veld condition survey (2 x 100 m transect on either side of the holes dug for each site) and Landscape Function analysis (1 of the 100m transects). Also did PCQ for woody plants (6 points x 3 height classes).	Brent Corcoran, EWT	A Short, B Nondlazi, A Zweni, L Mbele, M Batlhatswi, M Botlhoko, O Mabelebele	KZN Dept of Agric; Ewt; KZN Wildlife; Institute for Natural Resources	Grassland	FOz 2 Northern Afrotropical Forest Gd 5 Northern Drakensberg Highland Grassland Gd 7 uKhahlamba Basalt Grassland Gm 14 Wakkerstroom Montane Grassland Gm 15 Paulpietersburg Moist Grassland Gs 10 Drakensberg Foothill Moist Grassland Gs 3 Low Escarpment Moist Grassland	32	PCQ Nearest plant-point LFA
Veld management plan for Cyferfontein farm	Gauteng Department of Agriculture (GDARD) contracted the ARC to prepare a farm plan for Cyferfontein farm. The aim of the ARC-API was to; 1. Investigate through veld condition assessment whether the production system, the types of animals and their numbers were ideal and optimum for the farm. 2. To investigate through the use of soil characteristics, particularly soil depth, the possibility of having planted pasture on the farm 3 To recommend changes to the current management based on the findings obtained from veld condition assessment.	Dan Motiang	Alan Short Gilbert Pule Garry Patterson (ISCW)	GDARD	Savanna	SVcb 10 Gauteng Shale Mountain Bushveld	4	Plant Number scale Nearest plant-point
Grazing and biodiversity in Harrismith district	Part of Grasslands Programme and follow-up from Vryheid project. 12 farms participating around Harrismith area, NRMIP role to do basic veld surveys and report back on grazing capacity and veld condition	Alistair Paterson	1) Alan 2) Mmapula 3) Olga 4) Doreen 5) Lindiwe 6) Michael	Grasslands Programme; Free State Department of Agriculture	Grassland	Gm 4 Eastern Free State Sandy Grassland Gm 5 Basotho Montane Shrubland Gs 10 Drakensberg Foothill Moist Grassland Gs 3 Low Escarpment Moist Grassland	67	Belt transect Van Zyl Visual veld Assessment Van Zyl Species cover assessment Nearest plant-point Photos

Project title	Description	Project Manager	Personnel involved	Collaborating institutions and staff	Biome	Vegetation types	Number of sites	Methods
Grazing capacity in Vryheid district	The Enkangala Project is looking at 3 different levels of farmer: those who are actively looking to protect biodiversity; commercial farmers where veld management is aimed at improving the veld; and then grazing lands with low management. The second group have been identified in three different areas: Vryheid beef farmers, Colenso game farmers, and Free State.	Alistair Paterson	1) Malenyalo 2) Doreen 3) Michael 4) Mmapula 5) Hennie	Enkangala Project; KZN Dept Agriculture and Environmental Affairs (Erika van Zyl, Johan Fourie); RPO	Grassland	Gs 7 Income Sandy Grassland	11	Nearest plant-point LFA
Mooiplaas	Farm plan for Mr Frits Kroon, Pretoria East	Alan Short	Malenyalo, Alan, Lindiwe	None	Savanna	SVcb 6 Marikana Thornveld	8	Belt transect Nearest plant-point
Nelius Greyling Farm plan	Nelius Greyling requested a veld condition survey and fodder flow plan for a farm located in Mpumalanga. The farm is split in two, with the smaller portion (about 500ha) being predominantly arable lands and the larger portion (about 1200 ha) being veld). Met 12 Jan 2011.	Alan Short	Olga Mabelebele	Moses Mabhide to assist with fodder flow planning	Grassland	Gm 8 Soweto Highveld Grassland Gm 12 Eastern Highveld Grassland	5	Belt transect Nearest plant-point
Resurveying historical Veld condition sites in East Griqualand	Many thousands of vegetation surveys have been conducted in South Africa over the past century using a variety of methods. The opportunity therefore exists to find these data, relocate the sites and resurvey the sites using the same techniques as used previously. The veld condition database at the KwaZulu-Natal Department of Agriculture and Environmental Affairs was searched for sites older than ten years nearest-plant-point method	Alan Short	Basanda Nondlazi, Malenyalo Batlhatswi, Doreen Sithole, Kwezi Booi, Thembi Mabuza	KZN Department of Agriculture and Environmental Affairs - Felicity Mitchell Cobus Botha, Brent Forbes, Piers Whitwell. Kokstad: William Diko	Grassland	Gs 10 Drakensberg Foothill Moist Grassland Gs 12 East Griqualand Grassland	71	Circular plot Nearest plant-point LFA Photos

Project title	Description	Project Manager	Personnel involved	Collaborating institutions and staff	Biome	Vegetation types	Number of sites	Methods
Testing the FIXMOVE methodology in KZN and the Eastern Free State	The FIXMOVE project (Fixed Point Monitoring of Vegetation) consists of 1000 sites scattered randomly across South Africa. We chose approximately 30 of those sites along a transect from Harrismith to Durban, in Districts along the N3, to test the methodologies and try our own methods.	Alan Short	1) John Clayton 2) Michael - project leader 3) Olga 4) Basanda 5) Lindiwe 6) Mmapula	DAFF	Grassland, Savanna	Gd 4 Southern Drakensberg Highland Grassland; Gh 7 Winburg Grassy Shrubland; Gm 4 Eastern Free State Sandy Grassland; Gm 5 Basotho Montane Shrubland; Gs 10 Drakensberg Foothill Moist Grassland; Gs 11 Southern KwaZulu-Natal Moist Grassland; Gs 4 Northern KwaZulu-Natal Moist Grassland; Gs 6 KwaZulu-Natal Highland Thornveld; Gs 7 Income Sandy Grassland; SVs 2 Thukela Thornveld; SVs 4 Ngongoni Veld	24	Belt transect Nearest plant-point LFA Photos
Western Cape Department of Agriculture grazing capacity assessment	Series of surveys: 3 for each camp, at increasing distances from the waterpoint (from c. 20m up to c 1km). Vegetation surveys were conducted as 1000 canopy-intercept points on 4x250m transects at 1m intervals. Landscape function analysis was conducted on a separate transect downslope, or along the direction of the prevailing wind in most cases.	Alan Short	A ShortM BotlhokoM Batlhatswi D Sithole K Booie A Zweni T Mabuza	Western Cape Dept of Agriculture: N Saayman, Hannes Botha, Lambert's Bay staff	Fynbos, Succulent Karoo	FFd 2 Leipoldtville Sand Fynbos FS 1 Lambert's Bay Strandveld SKs 7 Namaqualand Strandveld	27	LFA Photos
Whitehead Farm Plan	The farm is about 520 ha, a substantial proportion of which (about half) consists of old lands, and a substantial proportion of the remainder which consists of wattle infestations. Nevertheless, the veld is in good condition and there is good potential grazing in the old lands if well managed.	Alan Short	Malenyalo	KZN Dept Agriculture (G. Peddie, E van Zyl)	Grassland		4	Nearest plant-point Belt Transect Photos
Totals				± 16	4	31	312	± 10

Location of sites surveyed by National Rangeland Monitoring and Improvement Programme 2008-2011

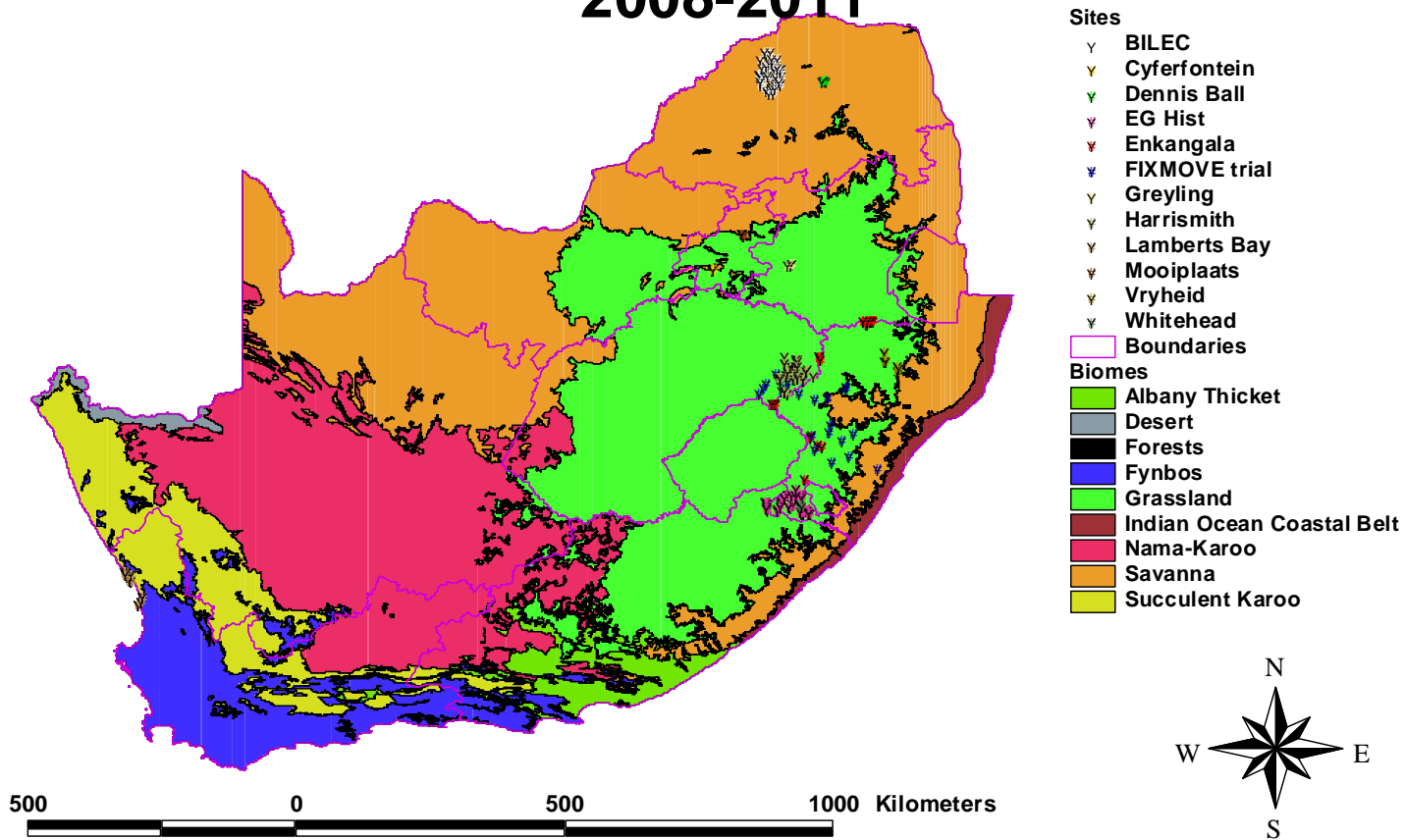


Figure 1: Distribution of sites and projects for the NRMIP

9.1.4 Data management

The programme resulted in a database of detailed data incorporating vegetation, soils, landscape and management variables. The database should be backed up by DAFF, as well as with other biological monitoring programmes, particularly the South African Environmental Observation Network, to combine the knowledge gained by this project with other, related programmes around South Africa and internationally.

9.2 Objective 2: Train and deploy interns as Range Officers to the various biomes for monitoring of the veld according to national guidelines

9.2.1 Lowveld monitoring programme

Two technicians were assigned to the Savanna Ecosystem Dynamics project, run by Dr Mike Peel in Nelspruit. Three technicians were stationed at the University of Fort Hare. The remainder of the team was stationed at Irene.

The two technicians assigned to the Savanna Ecosystem Dynamics project were permanently assigned to the lowveld team to assist with field work. Occasionally, one team member was loaned to the NRMIP for a specific project for a short period.

9.2.2 Fort Hare

Two technicians were stationed at Fort Hare University in Alice early in the programme, to collaborate with the University's Grassland Science Section on the long-term trials, and assist the University with practicals and other training of University students. One technician was transferred to Fort Hare from the Western Cape in 2008 (see below). The team assisted with surveys in KZN, the Western Cape, Limpopo, and collaborated with Dr Tony Palmer's team on a project in the Northern Cape.

Attempts to start up collaborative projects with the Eastern Cape Department of Agriculture were promising but ultimately unsuccessful, and the programme shifted its focus to East Griqualand and other projects.

9.2.3 Western Cape

One technician was stationed at the Western Cape, to assist the ARC Rangeland team at the University of the Western Cape. In 2008 she was transferred to Fort Hare to provide additional assistance to the Eastern Cape team.

The remainder of the team were allocated to projects according to their skills, training, experience and the requirements of the project. Team members not allocated to projects remained in the office to capture data and complete reports from previous exercises.

9.2.4 Summary

The technicians assigned to the NRMIP, from the time of arrival of the project manager in June 2008, were as follows:

Table 3: Technicians appointed to the NRMIP from June 2008 onwards

Surname	First Names	Date of appointment	Date of departure	Reason	Present qualification
Batlhatswi	Malenyalo	01 Sept 2006	31 Aug 2011		BSc
Booi	Kwezi	01 Sept 2006	31 Aug 2011		N.Dip
Bothoko	Mmapula Rose	01 Sept 2006	31 Aug 2011		B.Sc
De Beer	Hendrik Stephanus	28 Jul 2009	31 Mar 2011	Contract expired	N.Dip
Keromecwe	Oupa	01 Sept 2006	31 Mar 2009	Resigned	BSc. Hons
Ligege	Mudi	01 Sept 2006	Aug 2009	Resigned	B.Ped Agric. (Hons)
Mabelebele	Olga	01 Sept 2006	31 Aug 2011		B.Tech
Mabuza	Thembisile	01 Sept 2006	31 Aug 2011		MSc
Madia	Johanna Mabosholo	17 Jun 2009	Dec 2009	Resigned	B.Agric. Man (Hons) (Pasture Science)
Manaka	Moloko Lucas	17 Jun 2009	31 Mar 2011	Contract expired	B.Agric (Hons) (Animal Production)
Mbele	Lindiwe Phangisile	17 Jun 2009	31 Mar 2011	Contract expired	N.Dip
Mokwala	Makomane Michael	15 Jun 2009	31 Mar 2011	Contract expired	BSc.Agric (Animal Science)
Nondlazi	Basanda	01 Sept 2006	1 Feb 2011	Resigned	B.Tech
Rabothata	Collen	01 Sept 2006	31 Mar 2009	Resigned	BSc.Agric
Short	Alan	01 Jun 2008	31 May 2011	Contract expired	MSc
Sithole	Doreen	01 Sept 2006	31 Aug 2011		MSc.Agric

Surname	First Names	Date of appointment	Date of departure	Reason	Present qualification
Zweni	Akhona	01 Sept 2006	31 Aug 2011		N.Dip

9.2.5 Congresses and workshops

The staff were given every opportunity to attend congresses, workshops, short courses and other networking and training events. Whenever possible, they were encouraged to present work or to collaborate on posters and presentations. The team attended the three Grassland Society of Southern Africa Congresses in 2008, 2009 and 2010. Some individuals were not able to make all the congresses for specific reasons (such as the four technicians who were hired in June 2009, or individuals who had study commitments).

Thembisile Mabuza was accepted for the International Rangeland Congress in Argentina in April 2011, and was partially sponsored by the organisers of the IRC. This was a huge honour as only a handful of ARC employees attended the Congress.

Other workshops and training courses attended by the staff since June 2008 include: Research Skills Workshop 2009, Research Skills Workshop 2010, Soils Identification course, and a Wild flower Identification Course in 2009.

Table 4: Workshops, short courses and symposia attended by NRMIP members

Year	Event	NRMIP Participants
2007	GIS course	5
2008	GSSA annual congress	9
2008	Landscape Function Analysis course	4
2008	Succulent Karoo Ecosystem Programme (SKEP) planning meeting	1
2008	Vegetation Monitoring Workshop, Kruger National Park	1
2008	Red Meat Producers' Organization National Executive Council Meeting	1
2009	GSSA annual congress	8
2009	GSSA research skills workshop	5
2009	Soils identification course	5
2009	Wildflower identification course	10
2009	Pasture workshop	4
2009	ISCW wetland day	4

Year	Event	NRMIP Participants
2009	ARC statistics course	12
2009	Agriculture Task Team and 3rd Annual Grassland Partners' Forum	1
2009	Wits Rural Facility workshop	1
2010	GSSA annual congress	8
2010	GSSA Research skills workshop	7
2010	LOCORES lowveld farmers' day with Allan Savory	2
2010	ISCW wetland day	1
2011	International Rangeland Congress, Argentina	1

9.2.6 Informal training and mentorship

Through on-the-job training, repeated practise, and mentorship by more experienced scientists and technicians, the team has been able to build up their levels of expertise in the following areas:

- Analysis and interpretation of results, using the tools available in Excel and other software
- Mapping using traditional and digital tools
- Leadership and project management
- Communication with clients and other stakeholders
- Efficient field work
- Species identification, and harvesting and storing of unidentified species
- Site selection according to project objectives
- Presentation to scientific and non-scientific audiences
- Teaching undergraduate students
- Report writing, including layout and design of reports using the tools available in MS Word and Excel
- Data capture and checking
- Budgeting and planning

As a result of their experience, the self-confidence and the professional skills of the team members has grown exponentially since the start of the programme.

9.2.7 Training of farmers and students

The team also contributed to skills transfer through media such as farmers' days or practical sessions for students. Through these occasions, the members of the team

developed their own skills in the subject, as well as developing their skills in training, public speaking and other relevant areas.

Table 5: Training events in which the NRMIP contributed

Year	Event	NRMIP participants	Trainees
2008	Klipgat farmers' day	3	±40
2009	Ga-Rasai farmers' day	3	±30
2009	GSSA Roodeplaat veld management course for emerging farmers	2	±80
2009	UNISA grassland science practical	2	20
2010	UNISA grassland science practical	3	15
2010	Vryburg emerging farmers monitoring training	1	6
2010	Middelburg Farmers' Association	1	±50
2010	Memel Farmers' day	1	±50
2011	TUT first-year introduction	7	±200

9.3 Objective 3: Develop research capacity through funding and mentorship of postgraduate students, recruited from various universities and the pool of interns.

Several staff members are registered for further degrees, while others have recently completed their studies (Table 6). Two staff members, Basanda Nondlazi and Thembi Mabuza, used the opportunity to complete two further qualifications (B.Tech followed by BSc(Hons) and BSc(Hons) followed by MSc, respectively). They are to be applauded for their achievements.

Since 2008, the following staff from the programme have graduated, or are studying further.

Table 6: NRMIP staff who are studying or completed further studies

Name	Starting qualification	Final Qualification	Institution	Status
Akhona Zweni	N.Dip	B.Tech	Nelson Mandela Metropolitan University	Studying
Alan Short	BSc.Agric	MSc	University of KwaZulu-Natal	Graduated April 2011
Basanda Nondlazi	N.Dip	BSc (Hons)	University of Zululand	Graduated May 2011

Name	Starting qualification	Final Qualification	Institution	Status
Hendrik Stephanus de Beer	N.Dip	B.Tech	Tshwane University of Technology	Studying
Kwezi Booi	N.Dip	B.Tech	Nelson Mandela Metropolitan University	Studying
Olga Mabelebele	N.Dip	B.Tech	Tshwane University of Technology	Graduated May 2011
Thembisile Mabuza	BSc	MSc	University of Fort Hare	Graduated May 2011

9.4 Outputs

Two peer-reviewed publications in two journals, two master's and one honours thesis, 12 popular publications in three different magazines, 14 presentations at conferences and workshops, and 44 unpublished reports were complete at the time of writing. A number of papers, articles and reports are still in preparation at this time (at least twenty more landuser reports and four peer-reviewed papers). Outputs are listed below with NRMIP team members' names highlighted in bold.

9.4.1 Peer-reviewed publications

1. O'Connor TG, Martindale G, Morris CD, Short AD, Witkowski ETF and Scott-Shaw CR 2011. Influence of grazing management on plant diversity of Highland Sourveld grassland, KwaZulu-Natal, South Africa. *Rangeland Ecology and Management* 64: 196–207
2. Palmer AR, Short AD and Yunusa IA 2010. Biomass production and water use efficiency of grassland in KwaZulu-Natal, South Africa. *African Journal of Range and Forage Science* 27(3): 163-170

9.4.2 Dissertations

1. Short AD 2010. Rangeland and Animal Performance Trends in Highland Sourveld. MSc. thesis. University of KwaZulu-Natal, Pietermaritzburg. 96 pp
2. Nondlazi BX 2010. Specific leaf area of grass in relation to altitude, temperature, and rainfall. BSc (Hons) (Agric) thesis. University of Zululand, KwaDlangezwa. 21 pp
3. Mabuza T 2010. Evaluating Long Term Effects of Fire Frequency on Soil Seed Bank Composition and Species Diversity in a Semi-Arid, South African Savanna. MSc. (Agric) thesis. University of Fort Hare, Alice. 88 pp

9.4.3 Popular publications

1. Peel M, Pule H, Short AD and Dziba LE 2010. Impact of land management on water cycle in the bushveld of Zimbabwe: A collaborative southern African initiative. *Grassroots* 10(3): 32
2. Short AD 2008. GSSA research skills workshop. *Grassroots* 8 (4): 33
3. Short AD 2009. Grassland conservation in Midrand: Managing our shrinking heritage. *Grassroots* 9(3): 6-11
4. Short AD 2010. The beginning of summer. *Veeplaas* October - November 2010
5. Short AD 2010. Beplan jou voervloei vir die jaar. *Veeplaas*: 59. October 2010
6. Short AD 2010. Can we use the ordered-distance method to estimate basal cover in tufted grasslands? *Grassroots* 10(1): 15-18
7. Short AD 2010. Challenges and possible solutions in running long-term trials. *Grassroots* 9(4): 9-13
8. Short AD 2011. Managing sourveld. *Veeplaas*: 1. March 2011
9. Short AD 2011. Planting time. *Veeplaas*: 1. February 2011
10. Short AD and du Toit F 2008. The Eskom Expo for young scientists, 2008: GSSA award for best ecological project. *Grassroots* 8 (4): 16-18

9.4.4 Conferences and Workshops

1. Booï K, Bothhoko R and Short AD 2009. The long-term effects of stocking rate and animal type on veld condition. 44th Annual Congress of the Grassland Society of Southern Africa: Meeting Rangeland, Pasture and Wildlife Challenges in a Changing Landscape. Grassland Society of Southern Africa, UNISA, Roodepoort. pp 66
2. Knowles A, Short AD, Botha JO, Manson AD and Corcoran BJ 2010. Environmental and management influences on soil carbon stocks in moist high-altitude grasslands. 45th Annual Congress of the Grassland Society of Southern Africa: Sustainable and Adaptive Practices in Range and Pasture Systems, with an Emphasis on Arid Regions. Kimberley, Northern Cape. pp 115
3. Mabuza T and Mopipi K 2010. Long term effects of burning frequency on soil seed bank and herbaceous species diversity in the false thornveld of the Eastern Cape, South Africa. 45th Annual Congress of the Grassland Society of Southern Africa: Sustainable and Adaptive Practices in Range and Pasture Systems, with an Emphasis on Arid Regions. Kimberley. pp 119
4. Nondlazi B and Ligege MA 2009. Unplanned veld fires: an increasing challenge for resource-poor farmers. 44th Annual Congress of the Grassland Society of Southern Africa: Meeting Rangeland, Pasture and Wildlife Challenges in a Changing Landscape. Grassland Society of Southern Africa, UNISA, Roodepoort.
5. Nondlazi B, Scogings PF and Short AD 2010. Spatial variation in community aggregate specific leaf area of grass in KwaZulu-Natal, South Africa. 45th

- Annual Congress of the Grassland Society of Southern Africa: Sustainable and Adaptive Practices in Range and Pasture Systems, with an Emphasis on Arid Regions. Kimberley, Northern Cape. pp 114
6. O'Connor TG, Martindale G, Morris CD, Short AD, Witkowski ETF and Scott-Shaw CR 2010. Influence of grazing management on plant diversity of Highland Sourveld grassland, KwaZulu-Natal, South Africa. 45th Annual Congress of the Grassland Society of Southern Africa: Sustainable and Adaptive Practices in Range and Pasture Systems, with an Emphasis on Arid Regions. Kimberley, Northern Cape. pp 109
 7. Palmer AR, Kaempffer C, Hints D and Short AD 2010. Exploring trends in above-ground herbaceous biomass and evapotranspiration in the KNP: towards a water use efficiency model for semi-arid savannas. Kruger Network Meeting. Kruger National Park.
 8. Palmer AR, Kaempffer C and Short AD 2010. Exploring trends in above-ground herbaceous biomass and evapotranspiration in the Kruger National Park: Towards a water use efficiency model for semi-arid savannas. 45th Annual Congress of the Grassland Society of Southern Africa: Sustainable and Adaptive Practices in Range and Pasture Systems, with an Emphasis on Arid Regions. Kimberley, Northern Cape. pp 78
 9. Short AD 2009. Fire, biodiversity and soil in the Drakensberg: Twenty years of research on the Brotherton Burning Trials. Grasslands, Timber and Fire. Grassland Society of Southern Africa, Bishopstowe Farmers' Hall, Pietermaritzburg. pp 11
 10. Short AD 2010. Veld management in the grassveld. Presentation to Memel Farmers' Day, 11 May 2010.
 11. Short AD 2010. Welcome to the National Rangeland Monitoring and Improvement Programme. Middelburg Farmers' Association Meeting, 19 May 2010. Middelburg, E.C.
 12. Short AD, Batlhatswi M and Sithole D 2009. Reliability of three methods of botanical survey for monitoring purposes. 44th Annual Congress of the Grassland Society of Southern Africa: Meeting Rangeland, Pasture and Wildlife Challenges in a Changing Landscape. Grassland Society of Southern Africa, UNISA, Roodepoort. pp 54
 13. Short AD, Mabuza T, Mabelebele O and Nondlazi B 2009. Changes in veld condition in East Griqualand: the reliability of historical datasets. 44th Annual Congress of the Grassland Society of Southern Africa: Meeting Rangeland, Pasture and Wildlife Challenges in a Changing Landscape. Grassland Society of Southern Africa, UNISA, Roodepoort. pp 57
 14. Short AD and Mokwala M 2010. Progress on the National Rangeland Monitoring and Improvement Programme. 45th Annual Congress of the Grassland Society of Southern Africa: Sustainable and Adaptive Practices in Range and Pasture Systems, with an Emphasis on Arid Regions. Kimberley, Northern Cape. pp 111

9.4.5 Unpublished reports

1. Knowles A, Short AD and Botha JC 2010. Enkangala Ecosystem Services Study: Soil Carbon Assessment Report. The Cirrus Group, Stellenbosch. pp 35
2. Batlhatswi M 2010. Veld Resource Assessment and Veld Management Plan for the Farm Rietkuil. Agricultural Research Council, Pretoria. pp 25
3. Batlhatswi M 2010. Veld Resource Assessment and Veld Management Plan for the Farm Riversdale Farm. Agricultural Research Council, Pretoria. pp 21
4. Batlhatswi M 2010. Veld Resource Assessment and Veld Management Plan for the Farm Stafford. Agricultural Research Council, Pretoria. pp 27
5. Batlhatswi M 2010. Veld Resource Assessment for Coleford Nature Reserve. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 15
6. Batlhatswi M 2010. Veld Resource Assessment for the Farm Rietspruit. Agricultural Research Council - Animal Production Institute, Pretoria. pp 24
7. Batlhatswi M 2010. Veld Resource Assessment for the Farm Riversdale. Agricultural Research Council - Animal Production Institute, Pretoria. pp 21
8. Booi K, Mabuza T and Zweni A 2010. Veld Resource Assessment for the Farm Long Island. Agricultural Research Council - Animal Production Institute, Pretoria. pp 19
9. Booi K, Mabuza T and Zweni A 2010. Veld Resource Assessment for the Farm Matatiele Commonage. Agricultural Research Council - Animal Production Institute, Pretoria. pp 36
10. Bothoko MR 2010. Veld Resource Assessment for the farm Koppie Alleen 194/1. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 10
11. Bothoko MR 2010. Veld Resource Assessment for the farm Zuurbron 131/2. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 14
12. Mabelebele O 2010. Veld Resource Assessment for the farm Royal Natal Nature Reserve. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 22
13. Mabuza T 2010. Veld Resource Assessment for the Farm The Hague. Agricultural Research Council - Animal Production Institute, Pretoria. pp 25
14. Mabuza T 2010. Veld Resource Assessment for the Farm Thornham. Agricultural Research Council - Animal Production Institute, Pretoria. pp 17
15. Mabuza T 2010. Veld Resource Assessment for the Farm Thornham. Agricultural Research Council - Animal Production Institute, Pretoria. pp 17
16. Mabuza T 2010. Veld Resource Assessment for the Farm Wanstead. Agricultural Research Council - Animal Production Institute, Pretoria. pp 20

17. Mabuza T 2010. Veld Resource Assessment for the Farm Weltevreden. Agricultural Research Council - Animal Production Institute, Pretoria. pp 25
18. Mabuza T, Booie K and Zweni A 2010. Veld Resource Assessment for the Farm Vogelvlei. Agricultural Research Council - Animal Production Institute, Pretoria.
19. Nondlazi BX 2010. Veld Resource Assessment for Bannockburn Farm. Agricultural Research Council, Pretoria. pp 31
20. Nondlazi BX 2010. Veld Resource Assessment for Brandfontein Farm. Agricultural Research Council, Pretoria. pp 43
21. Nondlazi BX 2010. Veld Resource Assessment for Die Kroon Farm. Agricultural Research Council - Animal Production Institute, Pretoria. pp 26
22. Short AD 2010. Veld Resource Assessment for the farm Abbotsford. Agricultural Research Council - Animal Production Institute, Pretoria. pp 20
23. Short AD 2010. Veld Resource Assessment for the farm Bergvliet 192/1 & 192/3. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 14
24. Short AD 2010. Veld Resource Assessment for the farm Greenfield. Agricultural Research Council - Animal Production Institute, Pretoria. pp 29
25. Short AD 2010. Veld Resource Assessment for the farm Karmel 7820. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 14
26. Short AD 2010. Veld Resource Assessment for the Farm Kokstad Research Station. Agricultural Research Council - Animal Production Institute, Pretoria. pp 54
27. Short AD 2010. Veld Resource Assessment for the farm Koppie Alleen 194/1. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 11
28. Short AD 2010. Veld Resource Assessment for the farm La Belle Esperance 191. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 28
29. Short AD 2010. Veld Resource Assessment for the farm Matatiele Nature Reserve. Agricultural Research Council - Animal Production Institute, Pretoria. pp 42
30. Short AD 2010. Veld Resource Assessment for the farm Maxwell 15163/1. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 12
31. Short AD 2010. Veld Resource Assessment for the farm Moorfield. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 16

32. Short AD 2010. Veld Resource Assessment for the farm Ncandu Forest Reserve. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 16
33. Short AD 2010. Veld Resource Assessment for the farm Rivierplaas 433. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 11
34. Short AD 2010. Veld Resource Assessment for the farm Single Tree. Agricultural Research Council - Animal Production Institute, Pretoria. pp 22
35. Short AD 2010. Veld Resource Assessment for the farm Uitvlugt 432. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 11
36. Short AD and Batlhatswi M 2010. Veld Resource Assessment for the Farm Mooiplaats. ARC-API, Pretoria. pp 30
37. Short AD and Batlhatswi M 2010. Veld Resource Assessment for the farm Summerhill. Agricultural Research Council - Animal Production Institute, Pretoria. pp 32
38. Short AD, Pule H and Patterson G 2009. Natural Resource Assessment for the Farm Cyferfontein. Agricultural Research Council, Pretoria. pp 26
39. Sithole D 2010. Veld Resource Assessment for Kamberg. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 31
40. Sithole D 2010. Veld Resource Assessment for the Farm Flitwick Grange. Agricultural Research Council - Animal Production Institute, Pretoria.
41. Sithole D 2010. Veld Resource Assessment for the Farm Mooifontein. Agricultural Research Council - Animal Production Institute, Pretoria.
42. Sithole D 2010. Veld Resource Assessment for the Farm Mount Currie Nature Reserve. Agricultural Research Council - Animal Production Institute, Pretoria. pp 44
43. Sithole D 2010. Veld Resource Assessment for the Farm Paradise. Agricultural Research Council - Animal Production Institute, Pretoria. pp 22
44. Zweni A 2010. Veld Resource Assessment for the farm Giant's Castle. Enkangala Carbon Sequestration Project. Agricultural Research Council - Animal Production Institute, Pretoria. pp 16

9.5 Conclusions

The programme was a good start in the objective of establishing a national rangeland monitoring programme. One of the major issues that needs to be resolved for public funding in such programmes is the scale of operations and the specific questions to be addressed; the FIXMOVE programme is a national rangeland monitoring programme requiring a budget on a similar scale to that of the NRMIP, but with some different goals and approaches to the project.

One key component of the programme which was successful, but could have been improved, was the core principle of collaboration. Every single project was conducted in collaboration with at least one other, and in most cases, multiple stakeholders. We believe that this approach is essential to a successful monitoring programme.

The programme functioned by breaking the national project into smaller, regional projects, each with specific goals that overlapped with the goals of the national programme. Although this approach was successful in the projects where it occurred, it also meant that large areas of the country were underrepresented by the study, particularly the karoo. However, it must also be noted that other rangeland monitoring programme funded by, for example, DAFF and by the Western Cape Department of Agriculture are occurring in those regions.

Within the constraints of the limited time available to the project, and the late appointment of a project manager, the programme can be said to have achieved the first and third objectives of the programme, and partially achieved the second. We have a database of over 300 sites from around the country, which can be queried for a great deal of information on the rangelands of those sites. We have developed the capacity of a large number of technicians whose skills will hopefully benefit South Africa.

If the programme is to truly achieve its objectives of monitoring the rangelands of South Africa, then it should be continued. The lessons learned from the first five years of the project must be carefully weighed and incorporated into new funding cycles.