FYNBOS FORUM

Programme

Theme: What is our Fynbos Worth?

14 – 16 August 2002
Goudini
Rawsonville

24th Meeting!

Organised by the Fynbos Forum Committee.
Funded by the Conservation and Management of Ecosystems and Biodiversity Focus Area of the National Research Foundation

NRF

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COMMITTEE MEMBERS 2001 – 2002

Chairman:	Ms Kristal Maze
Vice Chair:	Ms Julia Wood
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Secretariat:	Ms Wendy Paisley

FYNBOS FORUM MISSION

The Fynbos Forum is an affiliation of researchers, planners, managers, landowners and a range of other stake-holders that meets annually to discuss management issues and research results, and to formulate priorities for future research and conservation management actions required to ensure the conservation and sustainability of Fynbos ecosystems.

In order to achieve this goal, we undertake to assess biological resources, ensure institutional capacity and consider socio-economic issues.

PROGRAMME

14-16TH August 2002

GOUDINI SPA, RAWSONVILLE

WEDNESDAY 14TH AUGUST

13h30-14h30 **Registration and Tea**

14h30- Field trip

18h30- Video: "Viva Biodiversity Viva – a Visual Summary: Mainstreaming Biodiversity . NBI (6 min.)

19h00 - **Get together and Dinner**
Welcome – Kristal Maze
Tribute to the late Chris Burgers – Ernst Baard
Evaluation of presentations – Sandy Fowkes

THURSDAY 15TH AUGUST

7h15-7h50 **Breakfast**

7h30-7h50 Late registration

Session 1: CAPE IN ACTION

Chairperson: Kristal Maze

8h00-8h15 C.A.P.E. in ACTION: Opportunities and challenges of being an active partner – Trevor Sandwith

8h15-8h30 Table Mountain Fund – Backing you to implement C.A.P.E. - Brett Myrdal

8h30-8h45 Agulhas Biodiversity Initiative – Tertius Carinus

8h45-9h00 Blaauberg Conservation Area – Joanne Jackson

9h00-9h15 Threatened plant project in the CFR – Domatilla C. Raimondo

9h15-9h30 Nelson Mandela MOSS strategic conservation planning project – Warrick Stewart

9h30-9h45 On the Road to persistence: An Interim Framework for Implementing Conservation Action in the Subtropical Thicket Biome – Andrew Knight

9h45-10h00 Data, data, everywhere but not a byte to share! – **Verna Love** & Colleen Seymore

10h00-10h15 *Discussion*

10h15-10h35 **Tea**

Session 2: PARTNERSHIPS

Chairperson: Xola Mkefe

10h35-10h50 The value of partnerships: a private land consolidation strategy for the Cape Peninsula – the case of the Noordhoek Kommetjie wetlands – **Mike Slayen** & Brett Myrdal

10h50-11h05 Partnerships and incentives for conservation in priority areas of the Cape Floristic Region – Chirs Martens, Mark Botha, Gerhard Gerber & **Anton Wolfaardt**

11h05-11h20 Ukuvuka – The worth of partnerships? - some lessons from the Ukuvuka partnership -Sandra Fowkes

11h20-11h35 Discussion

Session 3: RENOSTERVELD

Chairman: Anton Wolfaardt

11h35-11h50 Renosterveld conservation and management: where are we standing? – **Connie B Krug** & Anton Wolfaardt

11h50-12h05 Investigating landowner willingness to conserve renosterveld in the Cape lowlands – **Sue Winter**, Karen Esler, Heidi Prozesky & Mark Botha

12h05-12h20 Dispersal of seeds as a constraint in revegetation of old fields in Renosterveld – Ndafuda Shiponeni

12h20-12h35 Pattern in vegetation dynamics: identification and application in modelling restoration of old fields in west coast Renosterveld – **Rainer Krug** & Sue Milton

12h35-12h50 Profiling a besieged landscape – an environmental analysis of remnant West Coast Renosterveld – **Richard S Knight**, Ian P Newton & G Naidoo

12h50-13h05 Discussion

13h05-14h05 **Lunch**

Session 4: ECOLOGY & SYSTEMATICS

Chairman: Tony Rebelo

4h05-14h20 Keynote Address: The challenge of understanding impacts of past and future climate change on Fynbos diversity– Guy Midgley

14h20-14h35 Discussion

14h35-15h05 **Poster Session 1: CAPE IN ACTION, RENOSTERVELD & UTILIZATION (See Page 7 Numbers 1-13)**

15h05-15h30 **Tea**

	Session 4: ECOLOGY & SYSTEMATICS Chairperson: Ernst Baard	Session 5: AQUATIC ECOSYSTEMS Chairperson: Pat Holmes
15h30-15h45	Plant-insect-fungi interactions in the Cape Fynbos – **Francois Roets**, Leanne Dreyer, Pedro Crous, Dirk Bellstedt & Henk Geertsema	River/ wetland rehabilitation in the CMA: overview and practical implementation – **Julia Wood,** Liz Day & Geordie Ratcliffe
15h45-16h00	What is the value of fynbos to large mammalian herbivores – **Chavoux Luyt** & D Ward	Digging up the past: the restoration of Middlevlei – Dalton Gibbs
16h00-16h15	What do we lose from transformed renosterveld: A focus on carbon – **John Donaldson**, A Mills and JD Bosenberg	Rehabilitating the Rondegat river in the Cederberg: opportunities and constraints – Dean Impson
16h15-16h30	Competition in proteas and its relevance for flower harvesting – **William Bond**, Jeremy Midgley & Kristal Maze	Assessment of fish as bio-indicators of river health in rivers of the southwestern Cape – **Johan Hayes**, Hannes van Wyk & Charlie Boucher
16h30-16h45	Molecular systematics of Serruria based upon four non-coding plastid DNA regions – **Margaret de Villiers**, Gail Reeves, Tony Rebelo, Leanne Dreyer & Elisabeth Marais	Developing a classification system for Western Cape wetlands – **M Genevieve W Jones** & J A Day
16h45-17h00	Molecular phylogeny of *Oxalis* L. section *Angustatae* subsection *Lineares* based on *tmL-tmF* sequence data – **Kenneth Oberlander**, Leanne Dreyer and Dirk Bellstedt	Development of a GIS system for the Breede River Catchment with specific emphasis on the management of alien plants – **Joyce Loza**, Richard Knight & Christo Marais
17h00-17h15	Discussion	Discussion

17h15-18.15 **FYNBOS FORUM AGM**

18h15-19h15 Wine Tasting

19h30 **Dinner: Guest Speaker Professor Roy Siegfried**

FRIDAY 16TH AUGUST

7h15-7h50 **Breakfast**

7h30-7h50 Late Registration

Session 6: **POLICY & LEGISLATION**
Chairperson: Julia Wood

8h00-8h15 Keynote speaker: Specialist inputs into environmental evaluation: some policy and legal considerations - **Marlene Laros**

8h15-8h30 Discussion

	Session 6: POLICY, LEGISLATION & DEVELOPMENT Chairperson: Karen Kirkman	Session 7: UTILIZATION Chairperson: Maryke Middelmann
8h30-8h45	Towards a Biodiversity Strategy for the City of Cape Town – **Tania Katzschner**, Helen Davies & Gregg Oelofse	Domestication of Proteaceae for cut flower export – **Gail M Littlejohn** and JH Coetzee
8h45-9h00	The National Veld and Forest Fire Act (Act101 of 1998) – Susan Steyn	*Walker Bay Fynbos Conservancy: Eco-Trails Development – Paul Slabbert*
9h00-9h15	Weed and invader plant regulations – the practical implementation – answers and questions – Susan de Kock-Nel	Buchu (*Agathosma* spp.) cultivation does pay! – Louisa Blomerus
9h15-9h30	The value of Cape Flats Fynbos and cost implications to developers using the R300 (N21) Ring Toll Road Project as an example – Desiree du Preez	Economic Value of Fynbos – Jimmy Knaggs
9h30-9h45	Methods of transplant of existing mature vegetation for rehabilitation of old lands at residential development sites – **Fred Orban** & Desiree du Preez	Can alien vegetation clearing provide sustainable employment in an open market system? – Chad Cheney
9h45-10h00	Discussion	Discussion

10h00-10h30 **Poster Session 2: CONSERVATION PLANNING & MANAGEMENT, ECOLOGY (See Page8 & 9, Numbers 14-29)**

10h30-10h55 **Tea**

Session 8: **CONSERVATION PLANNING & MANAGEMENT**

Chairperson: Christo Marais

10h55-11h10	Keynote speaker: Politics, Pitfalls & Progress of Conservation Management in the Western Cape. - **Fanie Bekker**
11h10-11h25	Conservation management: insights from California – **Julia Wood** & Christo Marais –
11h25-11h40	The complexities of consolidating land ownership in the Cape Peninsula National Park and a brief comparison with the Santa Monica National Recreation Area – Paul Britton
11h40-11h55	Woody alien vegetation clearing in the Cape Peninsula National Park – historic and future costs –Chad Cheney $30 Cape Peninsula · Jan 98 - June 02 some parts 50% cleared. 68% of ~~R16700~~ 16400 ha.
11h55-12h10	Maximising efficiency in maintenance alien vegetation clearing: A contractors experience – John Cuthill
12h10-12h25	Poverty relief through the organised treatment and eradication of aliens – **Craig Spencer** & Monique van Wyk
12h25-12h40	Influence of fire severity on post-fire vegetation recovery on the Cape Peninsula – Douglas Euston-Brown, **Susan Botha** & William Bond
12h40-12h55	Use of object-orientated image processing – a tool for improved analysis of Cape landscapes – Richard S Knight & **Andrew Skowno**
12h55-13h10	Discussion
13h10-13h30	*Prize Giving & Closing – Kristal Maze*
13h30-14h30	**Lunch**

POSTER SESSIONS AND TITLES

Poster Session 1: CAPE in action, Renosterveld & Utilization

1 Small mammal community composition in fragmented agricultural landscapes: a case study in West Coast Renosterveld – Connie Krug.

2 Influence on Herbivory and Competition by Grasses on the Establishment of Shrub species on Grazing Lawns in West Coast Renosterveld. – **Donald M. Iponga**, Connie Krug and Sue J Milton.

3 Habitat preferences of large herbivores: A comparison between renosterveld and old fields – **Nicola Farley**, A G Schmidt and Sue J Milton.

4 RESTORE: A model for Restoration of Old Fields in West Coast Renosterveld – **Rainer M Krug,** Thorsten Wiegand, Sue J. Milton

5 Factors affecting alien grass invasion into West Coast Renosterveld fragments – **Suretha Van Rooyen** , Karen J Esler and Sue L Milton.

6 The use of matrix models to determine optimal harvesting strategies for two *Thamnochortus* species (*T. Insignis* Mast. and *T. erectus* (Thunb.) Mast, Restionaceae) – **Tessa Campbell**, Karen J Esler, and David Ward.

7 Plant species succession onto old fields in West Coast Renosterveld, with different grazing intensities. – **Ben Walton,** Connie Krug, A le Roux and Sue J Milton.

8 Does Protea breeding pay? – **Gail Littlejohn** & J H Coetzee.

9 Conservancies in the Garden Route Area –Justine Sharples.

10 Where have all the flowers gone? The West Coast Renosterveld Story – **Richard S Knight**, Connie B Krug, Rainer M. Krug and Ian.P Newton.

11 Biosphere Reserves: Benefits beyond boundaries. Ruida Pool.

12 Picking up the pieces. A conservation network for the Cape Lowlands – **Amrei von Hase,** Kristal Maze, and Dean Fairbanks

13 Mainstreaming the Biodiversity on the Cape Flats. – **Xola Mkefe** and Tanya Goldman.

Poster Session 2: Conservation Planning & Management, Ecology

14 Phenological responses of selected fynbos species to a temperature and moisture gradient – **Lize Agenbag,** Guy F Midgley and Karen J Esler.

15 New South African Vegetation Map - Tony Rebelo **& Walter Smit.**

16 New developments from the Protea Atlas Project: Tony G Rebelo.

17 A pilot study of the effects of invasive exotic plants, fire and soil chemistry on selected soil microorganism populations in the Silvermine Nature Reserve, Cape Peninsula, South Africa –**Charl Ciliers**, Charlie Boucher, Karen J Esler and Alf Botha.

18 Pollen dimorphism associated with the tristyly syndrome in selected *Oxalis* species -. **Ghirmai E Ghebremariam**, Léanne L Dreyer & Karen J Esler.

19 An Evaluation of the success of re-introduction of species into Rondevlei Nature Reserve, Western Cape – **Maresa van Niekerk**, Karen J Esler, Piet J Vorster and Dalton Gibbs.

20 Effect of Disturbance on Vegetation Cover at Rocherpan Nature Reserve in South Africa – **Gislain Ella,** D. Hill and Donald M. Iponga.

21 Outeniqua Nature Reserve: Cost effective biological surveys and data analysis – Theresa Kollmann & Paul Buchhulz.

22 Working for Wetlands: Noordhoek Wetlands Restoration Project - Julia Wood

23 Keysers River Restoration Project – Julia Wood

24 Environmental Management Plans – Natalie Newman.

25 Conserving evolutionary processes and genetic heritage in endemic vertebrates of the Cape Fold Mountains – ER Swartz, H Roos, R van Niekerk, **Michael Cunningham** & P Bloomer.

26 SKEP (Succulent Karoo Ecosystem Plan) – Sarah Frazee, Tessa Mildenhall & **Amanda Driver.**

27 A new perspective of Sub-Tropical Thicket – Jan HJ Vlok, **Douglas IW Euston-Brown** & RM Cowling

28 Development of the City of Cape Town's Online Environmental Geodatabase - **Richard Knight**, Lorraine Smit and Grant Benn.

29 SA-ISIS BioMAP: A demonstration of on-line access to biodiversity data – Rebecca Sims-Castley

30 BIOTA – Southern Africa: opportunities for collaborative research – Sue Mathews

Paper

Abstracts

Influence of fire severity on post fire vegetation recovery on the Cape Peninsula.

Douglas Euston-Brown[1], **Susan Botha[2]** and William Bond[3]
[1]PO Box 44066, Scarborough, 7975
[2]13 Devonshire st., Woodstock, 7925, ph: 021- 4480269, 084 329 8410
[3] Department of Botany, University of Cape Town, Ronderbosch, 7700.

After the devastating fires of January 2000, 52 600 m^2 permanent sites were sampled a year later to investigate the effects of fire severity on the recruitment of fynbos. The sites were spread throughout the burnt 8000 ha of fynbos, alien-invaded and alien-cleared land. Several characteristics of burnt plant skeletons were measured at each site to develop a useful *post-hoc* indicator of fire severity. The density and cover of species was also recorded. The results show that minimum remaining twig diameter on burnt plant skeletons is the most useful *post-hoc* biological indicator of fire severity, but was limited by differences in plant architecture between species. Fynbos seedling density and diversity was negatively impacted by hotter fires. In contrast, alien species showed an insignificant positive correlation with increasing fire severity (i.e. aliens recovered better after hotter fires).

Fynbos on granite and on quaternary sands (strandveld) was most negatively affected by aliens, while fynbos on rocky sandstone substrata on the mountains, and wetlands, showed greater resilience to aliens, probably as a result of greater microsite heterogeneity in the latter, which provide fire safe sites for the fynbos seed bank and resprouting plants. Certain functional groups (e.g. resprouting graminoids) were vulnerable to extinction in alien and cleared-alien vegetation that experienced hotter fires. It was concluded that severe fires should be avoided if maximum recovery of fynbos diversity is desired. Certain soils where fynbos diversity was most impacted were prioritized for alternative clearing methods.

A massive database, archived at the Institute for Plant Conservation (University of Cape Town) was established. The density and cover of over 800 species was collected in 624 1m^2 sub-plots, 156 100m^2 plots and 52 600m^2 sites across a range of substrata in fynbos, alien and cleared vegetation. All sites can be relocated from photographs taken two years after the fire (January 2002). This in conjunction with the database can be used for future monitoring and further studies of the permanently marked sites.

Competition in Proteas and its Relevance for Flower Harvesting.

William Bond[1], Jeremy Midgley[1] and Kristal Maze[2]
[1]Botany, University of Cape Town, Private Bag, RONDEBOSCH 7701
[2]Cape Conservation Unit, Botanical Society, Private Bag X10,Claremont 7735

Competition between plants has been widely studied but remains a difficult and contentious subject. A number of measures of competition use assumptions about the consequences of competition for plant performance and spacing patterns. For example, two species of competing proteas might be expected to separate in space so that plants of each species would be unlikely to occur as neighbours. A number of studies have been made on protea competition in fynbos using these approaches. Here we report the results of a study of competition between Protea neriifolia and Protea repens near Potberg. In common with previous studies, we found strong

evidence for intraspecific competition, especially for Protea neriifolia but little or no evidence for inter-specific competition. This means that dense stands of a protea produce fewer seeds per plant (and per stand) then sparse ones. The peculiar thing is that the presence of another protea species making an even denser stand has no statistically detectable effect on cone production. The effects of intraspecific competition on cone (and seed) production have been used to suggest ways of sustainable flower harvesting. Basically flowers that will produce seeds that will, after the next burn, produce seedlings surplus to the maximum density for flower production can safely be harvested. The idea was tested on the same stands in which we did our study from data collected 8 years ago. By working on the same stands, we were able to see whether protea populations had behaved as predicted by the harvesting model and whether the species occur in the same proportions now as they did as seedlings years ago. We report the surprising results of this study 8 years on.

The complexities of consolidating land ownership in the Cape Peninsula National Park and a brief comparison with the Santa Monica National Recreation Area

Paul Britton
Cape Peninsula National Park, P O Box 37, CONSTANTIA 7848

Since the initial national cabinet decision taken on 27th March 1996, to establish a national park in the Cape Peninsula, a protracted and complex process was followed to consolidate the land under the ownership and management of SANParks. The paper will give a brief history of the process, progress to date and will will highlight some of the problems and valuable lessons learned. A brief comparison will be given the very similar situation in the Santa Monica National Recreational Area (Los Angeles).

Buchu (*Agathosma* spp.) cultivation does pay!

Louisa Blomerus
Agricultural Research Council, Private Bag X1, Elsenburg, 7607.

Buchu (*Agathosma* spp; Rutaceae) is a valuable component of the Flora Capensis in South Africa. *Agathosma* hosts about 135 species of which only 2-3 is used for the extraction of the essential oil. Indigenous people have used the plant material for many years to anoint the body, probably for cosmetic reasons as well as for antibiotic protection. For medicinal use, leaves were chewed to relieve stomach complaints, while buchu vinegar was used for cleansing wounds. An infusion of buchu is often taken as a diuretic. Buchu oil is used in the food industry and especially *A. betulina* is used for its high isomenthone and diosphenol content.

These uses of the wild harvested buchu have resulted in over exploitation of the natural stands and a definite need to establish cultivated plantations. Being a 'wild' crop, very little about its horticultural traits is known. In the wild, the plants propagate by seed. With the correct harvesting techniques and germination treatments that were developed, germination can be highly successful. Alternative vegetative

propagation is under investigation since it is crucial for a breeding and selection program.

Knowledge on cultivation practices is needed to establish successful plantations. Detailed information on the crop science such as irrigation, pruning, sustainable harvesting and possibly fertilization must be investigated. Superior genetic diversity and the development of cultivars will benefit the industry by large.

By cultivation of this indigenous wild crop, the natural stands can be conserved and an industry can develop to fill the niche market of essential oils and herbal medicines.

Does it pay? In year five all inset cost can be covered - with profit.

Agulhas Biodiversity Initiative (ABI)

Sustainable Harvesting System – model for Cape

Tertius Carinus
SANS-Parks, P O Boc 120, L'Agulhas 7287

A joint partnership between SANParks and Fauna & Flora International is an integral component of the CAPE Program, which is designed to address the main threats to the globally significant lowland fynbos biodiversity of Agulhas Plain and to improve the livelihoods of the local communities living in the Agulhas Plain through a multiplicity of inter-linked conservation, development and socio-economic activities. In many ways ABI is a miniature model of CAPE with a number of cross-cutting elements.

Woody Alien Vegetation Clearing in the Cape Peninsula National Park – Historic and Future Costs.

Chad Cheney
Cape Peninsula National Park, Silvermine, P.O. Box 22619, Fish Hoek, 7974, South Africa

In 2001 the annual expenditure on the Cape Peninsula National Parks alien vegetation clearing programme exceeded R 11 million, with an overall expenditure exceeding R 29 million since 1999.
This paper examines what has been achieved with this expenditure and what are the future costs to remove the remaining seed bearing aliens and as well as the long-term maintenance cost. The benefits of multi-phased contracts are discussed as a measure of reducing contract prices and improving the affectability of clearing operations.

Can Alien Vegetation Clearing Provide Sustainable Employment in an Open Market System?

Chad Cheney
Cape Peninsula National Park, Silvermine, P.O. Box 22619, Fish Hoek, 7974, South Africa

Alien vegetation clearing is a young, yet rapidly expanding industry. Within the Cape Peninsula National Park (CPNP), over 100 independent contractors compete for alien clearing contracts. This paper examines if the CPNP's alien vegetation clearing programme is has been a mechanism for creating sustainable employment, especially for improvised communities. Analysis of the average contract duration, contract value, contract frequency and contract terminations for each contractor was made. Motivation is given for the need for contractors to be able to expand into secondary industries or clearing for the private sector.

Maximising efficiency in maintenance alien vegetation clearing – A contractors experience

John Cuthill
Rootsanall, P.O. Box 43995, Scarborough, 7975

Present alien clearing initiatives on the Cape Peninsula are largely focussed on clearing dense and medium infested areas. In the long term, large areas of the Cape Peninsula National Park will be rendered suitable for maintenance clearing.

When clearing for bio-diversity, it is imperative that effective strategies are employed in order to maximise productivity. This paper outlines many of these strategies - from the planning stages down to the specific daily goals, and presents recommendations on how to make maintenance clearing more cost-effective.

Weed & Invader Plant Regulations - The Practical Implementation - Answers & Questions.

Susan de Kock-Nel
Nat. Dept Agriculture, Direc. Land Use & Soil Man., Posbus 545, DURBANVILLE 7551.

A practical review of interesting cases and situations as experienced by the Directorate, will be discussed. Public perception and different implementing strategies will form part of the discussion. This will not be a scientific paper, but sharing our experience regarding practical case studies.

Molecular Systematics of Serruria based upon four non-coding plastid DNA regions.

Margaret de Villiers[1], Gail Reeves[2], Tony Rebelo[3], Léanne L Dreyer[1], & Elisabeth M Marais[1]
[1]*Department of Botany, University of Stellenbosch, Private Bag X1, Matieland, 7601, South Africa, devilliers@nbict.nbi.ac.za*
[2] *Leslie Hill Molecular Systematics Laboratory, Kirstenbosch Research Centre, National Botanical Institute, Private Bag X7, Claremont, 7735*
[3] *Ecology and Conservation, National Botanical Institute, P/Bag X7, Claremont 7735, Cape Town*

Phylogenetic analysis of four plastid non-coding DNA regions for 130 representatives of the South African Proteaceae subfamily Proteoideae has shown that several genera are polyphyletic. However, of the 16 genera present in the CFR, *Serruria*, *Protea*, *Faurea* and *Leucadendron* are well supported as monophyletic groups. Based upon the strong monophyly of the genus *Serruria* we have collected further DNA sequence data for 36 species to date for the *trnL* intron, *trnL-trnF* intergenic spacer, *rps16* intron and*atpB-rbcL* intergenic spacer. Levels of sequence variation among species of *Serruria* appear to be greater than those observed among other South African Proteoideae for these plastid regions, which thus far has led to a well-resolved phylogenetic tree that is highly congruent with existing taxonomy. We anticipate that these promising results will enable reconstruction of relationships among all 52 species of *Serruria*, and that this phylogenetic framework can be used for evaluation of the current taxonomy and ecological factors that may have played a role in the diversification of this lineage in the Cape Floristic Region.

What do we lose from transformed renosterveld? Changes in soil health and carbon sequestration as a result of agricultural activity.

John Donaldson, Anthony Mills, and DeWet Bösenberg
Conservation Farming Project, National Botanical Institute, Private Bag X7, Claremont 7735.

Conserving remnants of renosterveld vegetation is one of the conservation priorities for the Cape Floristic Kingdom. Most of the remnants occur on farmland where it is necessary to either provide incentives for conservation actions or to demonstrate that renosterveld has some intrinsic value for farmers. Soil health and carbon sequestration are important ecosystem services that underpin agricultural production, influence the regenerative capacity of cultivated and natural lands, and influence global climate change. In this paper we present data on changes in soil health and carbon sequestration between semi-natural and transformed renosterveld on the Bokkeveld Plateau near Nieuwoudtville. Our results show that soils under natural vegetation had higher nutrient concentrations, higher organic carbon, lower modulus of rupture, and faster infiltration rates than soils in the open or under some forms of cultivation. Data also show that conversion to wheat and pastures can result in the loss of up to 11 tonnes of carbon per hectare in the top 10cm of soil and up to 39t/ ha of dry plant biomass. The data shows that agricultural activities that disturb the soil through tillage or exposure of the soil surface to sunlight, result in a considerable reduction of soil carbon. We discuss the implications of these results for the implementation of conservation farming in renosterveld landscapes.

The value of Cape Flats Fynbos and cost implications to developers using the R300 (N21) Ring Toll Road Project as an example

Desiree du Preez
Ecosense, Posbus/PO Box 12697, Die Boord 7613, Tel/Fax 021 – 8872654, des@ecosense.co.za , besoek gerus/please visit ecosense.co.za

Cape Flats Fynbos have been classed irreplaceable in the CAPE database. All development being planned to impact on fragments of natural vegetation will be influenced by this information. In an impact assessment being undertaken for the R300 (N21) Ring Toll Road Project, some significant patches of fynbos have been identified by the botanist as being of high significance and irreplaceable, therefore having the potential to stop the project. The project, which is a private initiative, could create investment opportunities of tens of millions of Rand, and create employment opportunities.

A small irreplaceable fynbos remnant containing rare species that has the potential to stop such a project may be regarded has having higher value than such a project and its knock-on benefits. Alternatively, creative but expensive mitigation measures has to be implemented to enable the project to continue.

The worth of partnerships? - some lessons from the Ukuvuka partnership

Sandra Fowkes
Santam Cape Argus Ukuvuka Operation Firestop, Goldfields Centre, Kirstenbosch

Management for sustainable ecological integrity in the increasing complexity of 21st century South Africa will demand the mobilization of diverse resources. No single institution can provide all the resources required thus partnerships will become increasingly important. The skills to manage and optimise such partnerships are not yet the norm among conservation agencies and their partners, however experience is developing out of a number of initiatives.

The management of partnerships requires significant investments of time, emotional energy and institutional commitment to form and maintain them. Partnerships also demand flexibility and a willingness to learn and change from what emerges from their work.

The purpose of the paper is to share some of the lessons learned to date from one such initiative, the Santam Cape Argus Ukuvuka Operation Firestop Campaign. This is a short-term public private sector partnership that operates in the Cape Peninsula. The Campaign, which is at the mid-point of its 4 year life, is tasked with significantly reducing the risk of damage and danger from uncontrolled fire in both the mountains and the informal settlements. By the end of the Campaign the conservation authority (Cape Peninsula National Parks) should be able to burn for biodiversity without threat to urban edge properties or threat from the reaction of an uncomprehending and unsupportive public.

The paper outlines the emerging benefits such as a safe space for risk-averse institutions to pilot different approaches to problems. Examples will be given from the Ukuvuka Campaign as well as the challenges that it faces.

Digging up the Past, The Restoration of Middlevlei

Dalton Gibbs
Rondevlei Nature Reserve, City of Cape Town- Conservation, P O Box 30223 TOKAI.

Middlevlei is a small seasonal wetland found on Rondevlei Nature Reserve on the south western corner of the Cape Flats. It was mapped in 1900 and infilled by development in 1958. The site was further disturbed by the planting of alien Acacias. After incorporation into Rondevlei it was excavated in 1996-97. The results of the dormant seed bank that germinated after 38 years underground is examined.

Assessment of Fish as Bio-indicators of River Health in Rivers of the Southwestern Cape

Johan B Hayes[1], J. Hannes van Wyk[2] and Charlie Boucher[1]
[1]*Department of Botany, University of Stellenbosch, Stellenbosch, 7600*
[2]*Department of Zoology, University of Stellenbosch, Stellenbosch, 7600*

In South Africa, classified as being semi-arid, future management and sustainable use of rivers is of utmost importance. The River Health Programme, to which this study contributes, was initiated for this purpose. However, a need exists to assess the current health of South African rivers in order to induce future management and conservation plans.

The indigenous freshwater fauna of the CFR, although species depauperate, is arguably its most threatened biotic component, having a high level of endemism (84%) (Impson *et al.*1999). The Fish Assemblage Integrity Index (FAII), developed for rivers in summer rainfall areas is currently being applied on the Lourens, Houtbay and Disa rivers, according to the methods prescribed by Kleynhans (1999). Furthermore, recommendations are made in order to make the FAII more applicable to a winter rainfall region that displays much lower species richness.

Because pollution mostly affects organisms on cellular or molecular level, possible effects of estrogenic compounds on fish is also being investigated. Specific responses such as vitellogenin (Vtg) production and changes in gonad and liver morphology in male fish are being assessed. This is especially important, since estrogenic responses are non-lethal, but may be manifested as changes in community or population level, thus endangering the long-term viability of fish populations.

Rehabilitating the Rondegat river in the Cederberg: opportunities and constraints

Dean Impson,
WCNCB, Scientific Services, Jonkershoek, STELLENBOSCH

The Rondegat River is a small short perennial river that arises in the Cederberg Wilderness Area. The Table Mountain Fund recently approved a project to rehabilitate the river, focussing on eradicating alien fishes and plants, subject to certain conditions.

The rehabilitation project is not straightforward as it involves getting the support of key stakeholders, developing a vision and objectives for rehabilitation of the river, determing whether the proposed rehabilitation methodology is ecologically acceptable and constructing a barrier weir in the river above Clanwilliam Dam.

Blaauwberg Conservation Area : Moving towards achieving the vision

[1]**Joanne Jackson**, [2]Pat Titmuss
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For over 2 decades various planning initiatives have provided for a nature/ conservation area in the coastal strip between Bloubergstrand and Melkbosstrand, and inland to include the Blaauwberg Hill, an area approximately 25 km from the city centre of Cape Town. The May 2000 Development and Management Plan for the Blaauwberg Conservation Area (OvP Associates) proposes a concept for such a reserve and elucidates a vision for the area namely "To conserve, protect and enhance the unique natural, historical and cultural resources of this area for the enjoyment and education of present and future generations."

The BCA is a unique area of approximately 4000 ha comprising a mosaic of natural, cultural and historical resources. It is proposed as comprising 2 distinct but integral zones, the Primary Conservation Zone (PCZ) (approximately 1500ha), home to many of its unique attributes, surrounded by a Conservation Interface Zone (CIZ), designed as a 'buffer' to the PCZ and for ecological linkage functions to the broader area. Land ownership is both public and private, with the intention of acquiring land in the PCZ for public ownership, whilst the CIZ will remain in private ownership.

Ecologically, the BCA has been highlighted as a priority area for conservation of biodiversity. A unique feature of the BCA is that it possesses all three West Coast lowland vegetation types, namely Dune Thicket (Strandveld), West Coast Renosterveld and Sand Plain Fynbos. In addition, the area contains transition zones between these vegetation types. Its incorporation as a key component of C.A.P.E. and selection as a pilot project for submission to the Critical Ecosystem Partnership Fund (CEPF) give credence to the area's importance for biodiversity conservation. It is also one of the Cape Flats Core Flora sites (Botanical Society 1999) and will form an integral part of the proposed biodiversity conservation network for the City of Cape Town, in terms of its draft Biodiversity Strategy.

Since the adoption in 2000 of the Development and Management Plan and its recommendations by the former City structures, much work has been undertaken to advance the project and make the vision a reality. This paper will focus on the work done in this regard. It will highlight the successes achieved, the challenges faced, the partnerships established and look towards future actions.

Developing a classification system for Western Cape wetlands

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Although broad wetland classifications systems are available internationally, a comprehensive wetland classification system, which can be used for both desktop and field analyses, is lacking in South Africa but is required by the South African National Water Act (36 of 1998). Wetlands within the Western Cape were selected from different bioregions and wetland Regions. In this project geomorphological characteristics (drainage patterns, landform), hydrological pattern and timing of water availability, were recorded during winter and summer for each studied wetland. Water samples were also collected at the wetlands and analysed for ion and nutrient concentrations and samples of organisms were collected for identification. Multivariate cluster and multidimentional scaling analyses of the chemical and biotic data were used to aid identification of different types of wetland and possible characteristics which could be used to group wetlands. A hierarchical classification system was developed using drainage patterns (endorheic or exorheic systems) as the primary defining characteristic, followed by wetland landform and hydrological regime as the secondary and tertiary characteristics for identifying wetlands. Water chemistry and biotic characteristics were found to be less stable and less reliable than the physical wetland characteristics and have not been included into the higher levels of the classification system, but are recommended for use as wetland descriptors at lower levels in the hierarchical classification system. The use of structural characteristics (geomorphology and hydrology) and the hierarchical format of the classification system facilitates its use and ensures that the it is available for both wetland biologists and non-wetland experts. Intensive investigation of aquatic invertebrates, vegetation and water chemistry characteristics (particularly pH, conductivity and turbidity) over a few years might reveal the usefulness of these characteristics for wetland classification. Thus, more data is required to determine the water quality requirements of different wetland types, but the classification system will prove useful for the determining the quantity of water required by wetlands.

Towards a Biodiversity Strategy for the City of Cape Town

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The City of Cape Town (CCT) is located within an area of world class biodiversity and unique conservation value. The concentration of rare and endemic species is without parallel in an urban setting. Despite its biodiversity being recognised as Cape Town's greatest asset, it is under significant threat.

In October 2001 the CCT officially adopted the Integrated Metropolitan Environmental Policy (IMEP) and its concomitant Integrated Metropolitan Environmental Management Strategy (IMEMS). IMEP requires that detailed sectoral strategies be developed and implemented within two years for the six identified priorities. One of the priorities is the conservation and protection of biodiversity. The City is therefore required as a priority to develop and implement a detailed Biodiversity Strategy before October 2003.

Since the adoption in 2001 of IMEP and its recommendations, much work has been undertaken to develop a strategy to realise the visions of IMEP. This paper will focus on the work done in this regard and present the draft Biodiversity Strategy. A brief context, background and history of biodiversity in the CCT will be given as well as reference to the specific biodiversity commitments that the CCT has made.

The proposed framework for the Biodiversity Strategy will be illustrated following which more detailed discussion around each Strategic Objective will be given.

The paper will highlight the successes achieved to date, the challenges faced, the partnerships established and proposed future actions. The paper will also highlight that the implementation of the strategy, once endorsed by Council and all relevant role-players, will require resources, of which the city is short.

Economic Value of Fynbos

Jimmy Knagg, Paarl

Fynbos is seen to have no value or price in the market place. To put a value on the environment one must look at numerous factors.
The total economic value is the sum of use value and non-use value.
Use value can further be divided into:
Direct value - Where direct use is made of a resource (e.g. harvesting flowers)
Indirect value - benefits arise from ecosystem function (e.g. protection of watershed).
Option value - willingness to pay for the option of using a resource at some future date (e.g., possible future medicinal use of plants).
Non-use value could include option value and also the following;
Bequest value – the value placed on a resource that will ensure its existence for use by future generations (our descendants).
Direct value resources and some of the indirect value resources will give the total development benefits and the rest will give the total conservation benefit.

The next problem is to apportion a value to each of the resources.
For most of the direct values one would look at market prices to establish the values but even this is misleading.
As contrary as it may appear most indirect values can be calculated directly using cost-benefit analysis.
Option values could also be called 'what if' values. This value is almost impossible to calculate. One other problem is that present generations do possibly not value the environment, as future generations will
The bequest value could be equal to whatever it costs to preserve the fynbos especially endemic and endangered ecosystems.

It is just possible as Leiman stated for recreation, that fynbos as a whole may have a negative economic value.

Before any 'true' economic value can be apportioned to fynbos it will have to be marketed as a 'usable' commodity. A fynbos-marketing plan must be established and implemented.
Research will have to be conducted to find out what the present 'income' value of fynbos is, what are tourists spending, how much are flowers bring in, how much is being spent on fynbos education?
It has become clear from all the literature that there is insufficient information at present to arrive at a realistic numbers for an economic value for fynbos and extensive research is required.

"On the Road to Persistence: An Interim Framework for Implementing Conservation Action in the Subtropical Thicket Biome."

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Ensuring the conservation of the indigenous flora of South Africa is dependent upon effectively managing areas to maintain the integrity of the ecological processes on which these flora's are dependent. This is best done, whether the biome is karoo, grassland, savanna, forest, thicket, or fynbos, by adopting a strategic approach to the conservation of priority areas within these biomes.

A conceptual and methodological framework is an important tool for ensuring that the management of areas for the conservation of biodiversity and landscapes is implemented in an effective, efficient and rigorous manner. It provides a clear picture of the tasks that need to be undertaken, and of the range of conservation mechanisms (for example, National parks, or incentives for private landowners) that might be employed. A framework also provides a guideline which can be readily accessed by those involved in, or affected by, land management decisions.

An Interim Framework is proposed for the implementation of conservation action for the Subtropical Thicket Biome. It aims to translate priority areas identified using a systematic conservation planning approach[1] into effective mechanisms for conserving biodiversity and landscapes on-the-ground in local communities. Attempts are being made to integrate the implementation of conservation action with employment opportunities and improved skills and education of professional land managers.

This Interim Framework is readily transposed, and has broad application, to all biomes Southern Africa, including the Fynbos. It will form the basis of a strategy to implement the outcomes from the Subtropical Thicket Ecosystem Planning (STEP) Project, a biome-wide conservation planning project co-ordinated through the Terrestrial Ecology Research Unit, University of Port Elizabeth, with active participation and involvement from key stakeholders.

[1] Margules, C.R. & Pressey, R.L. 2000. Systematic conservation planning. Nature 405, pp.37-47.

Profiling of a besieged landscape – an environmental analysis of remnant West Coast Renosterveld

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Undertaking research in West Coast Renosterveld (WCR) is difficult since only scattered fragments of it exit (3% of what formerly occurred remains and is potentially researchable) and this is the basis for a reconstruction of its ecology. In this paper we present the results of a synoptic analysis of the current distribution of WCR, based on an identification of remnants identified through the use of spectral signatures derived from LANDSAT imagery. A supervised classification was undertaken which used expert opinion on what constituted "typical West Coast Renosterveld" for training and a maximum likelihood statistic for the classification of the imagery based on pre-defined Bayesian probabilities. The resulting map of WCR remnants was verified by means of 120 site visits to individual remnants. This classification has been tested against a decision tree developed from expert opinion, which was passed through a knowledge-based neural network. By way of a comparison, land that has been transformed to agriculture was similarly identified and then refined using seasonal signatures developed from long-term, monthly aggregated Normalized Difference Vegetation Indices (NDVI) extracted from AVHRR imagery. The results of each of the two approaches were compared and analysed with respect to geological, topographical and climatic trends in the landscape. Each Renosterveld remnant was profiled with respect to some 50 environmental variables and compared to the profiles for agricultural landscapes. Our results showed virtually no statistical overlap between agriculture and WRC profiles with respect to environmental variables. Averaged over the landscape current WRC occurs at twice the elevation and on slopes five times greater than agricultural activities. The implications of this study are that we have a marginalized account of what WCR is and that it is essentially an extinct habitat. Current research can only really tell us about the inland fringes and hilly outcrops of WRC and for clues about its ecology we need to extend our research activities into historical and cultural archeology/anthropology fields.

Renosterveld Conservation and Management: where are we standing?

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Lowland Renosterveld is one of most endangered vegetation types in South Africa. More than 90% has been transformed for agricultural purposes, leaving only scattered remnants. Those remnants are under increasing pressure, as agricultural methods grow more sophisticated, and invasion from alien species increases. CAPE identified lowland renosterveld as 100% irreplaceable, underscoring the urgency to conserve this habitat type. Renosterveld conservation faces a number of challenges, ranging from conservation planning to rehabilitation and restoration of the vegetation

type, a rift between agriculture and conservation and a lack of conservation incentives for farmers and landowner.

To address those issues and channel conservation efforts of various institutions, a workshop, titled 'Renosterveld Conservation and Management', was convened in September 2001. Aims of this workshop were to collate current knowledge on renosterveld in both management and conservation; to identify gaps in the current knowledge, and focus current and future research to close these gaps; facilitate co-ordination of ongoing and future research to encourage collaboration between scientists, managers and conservationists and to maximise outcome and establish a renosterveld working group or forum to facilitate dissemination of information gained to relevant stakeholders in renosterveld conservation and management. As an outcome of the workshop, a feasible way forward involving all parties concerned was developed.

In this paper, I will present the final output of the workshop and suggested way forward, and examine how far we have come in reaching our goals that were set a year ago.

Pattern in Vegetation Dynamics: Identification and Application in Modelling Restoration of Old Fields in West Coast Renosterveld

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Looking at old fields adjacent to 'natural' Renosterveld, one can observe certain pattern in the plant-recolonisation. These include the wave like pattern of return of Renosterbos and the declining density of natural vegetation away from the edge. Other examples of pattern in Renosterveld, which can be identified, are the same-size stands of Renosterbos, the species compositions in different successional stages after fire, seed density distributions along 'natural' Renosterveld – old fields edges and the small and medium scale distribution of single species or species groups (e.g. geophytes).

All these patterns are results of the combination of several dependant and / or independent processes. Examples of these processes include seed production, seed dispersal, growth, survival, germination, establishment, competition and facilitation. These processes are included in the model RESTORE, which is used to simulate the restoration of old fields in West coast Renosterveld.

One of the main problems in modelling is the actual fitting of the parameters and processes and the evaluation of the model. I will present an approach, which will use spatial and temporal patterns for this purpose. A detailed description of the model will be presented in poster format (RESTORE: A model for Restoration of Old Fields in West Coast Renosterveld).

Specialist inputs into environmental evaluation: some policy and legal considerations

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Many environmental evaluation processes are subject to engineering or planning project cycles. Those that aren't are nonetheless required to deliver predictive or management outputs within timeframes that may be unrealistic or impossible to enable rigorous ecological studies. This, together with a multiplicity of specialist approaches to conforming to the needs of environmental evaluation, causes a lack of consistency in dealing with special or threatened habitats, resulting in their loss and/or destruction.

Have we reached a point in ecological specialist practice where consistency in how we input to environmental evaluation has become essential to the long term conservation of the Cape Floral Kingdom? Are there policy positions from the Fynbos Forum or other bodies that could support this approach? Can existing law help?

Domestication of Proteaceae for cut flower export

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The three economically important genera of African Proteaceae provide the background to discussing the phases marked by the extent of control over the genetic material. Six steps in the domestication process are outlined: wild harvesting, basic domestication, clonal selection, interspecific hybridization, complete domestication and control of single genes. Each of these phases are discussed, briefly outlining the plant material use, the levels of control over the genetic quality of the material, the supporting research required to fully exploit the opportunities within each phase and the advantages and limitations.

Data, data, everywhere but not a byte to share!

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We live in the 21st century and are accumulating information at frenetic levels, but somehow this information remains within pockets of expertise or is not entirely usable due to the quality, cost and various compatibilities of the data, and the need for specialist technical skills to use the data. Excessive cost of software can also make it inaccessible. This paper aims to introduce Western Cape Nature Conservations Board's Conservation Planning Unit as a way towards real data sharing (and even downloading) and to make critical biodiversity information available to decision makers, planners and consultants.

Development of a GIS system for the management of the Breede River Catchment with specific emphasis to alien plant removal

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The Breede River catchment is situated in the Western Cape and extends 12 600km^2. Aliens are the biggest threat to our natural resources in that they use more water than indigenous species and increase the intensity and nature of fires. In addition to these impacts, in catchment areas they increase soil erosion and sedimentation and thereby increase the risk of floods and decrease water quality. The aim of this project is to investigate the potential impacts of alien plant removal programme in the Brede River Catchment. This study is undertaken at 2 scales at the catchment and at the site level. Colour aerial photos were acquired from the MBB's and were used to analyse for the distribution of aliens using supervised and unsupervised classification. The results depicted the percentage of aliens found at each site. Black and white historical aerial photos have been bought from Satellite Applications Center and their time series done from 1949 to 1998. These are still to be used to assess the changes in the catchment by comparing them with nalysed colour aerials. 28m spatial resolution images, NDVI (Normalized Difference Vegetation Index) composite images for the period 1992 to 1996 were downloaded from USGS (United States Geological Services) as ten-day maximum value NDVI composites. Using the NDVI's spatial changes in greenness of the area at catchment level and site were analysed in IDRISI using PCA (Standardized Principal Component Analysis). PCA of NDVI's produced a series of new images (components) related to original images with the second image showing 98% correlation with the original images. The correlation values of component 2 and each original image were plotted to display monthly changes throughout the series. The graphs were then compared to component 2 to assess what changes occur at site level. In this way seasonal change in NDVIs could be plotted for subcatment using MAPINFO.

What is the value of fynbos to large mammalian herbivores?

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The fynbos biome used to be home to a number of large herbivores, both seasonal visitors and permanent inhabitants. One of the endemics to the South Coast Renosterveld and grassy fynbos areas of the Overberg was Bontebok (*Damaliscus dorcas dorcas*). In a study at the Bontebok National Park, I examined the habitat preferences of the larger herbivores and how this can be used to determine sustainable stocking rates. Using a GIS to plot the usage of the available habitats, I inferred which habitats were preferred. To test if these habitat preferences can be explained by nutritional requirements, I also examined faecal quality (indicating diet quality) of Bontebok in the different areas. A number of issues confuse the use of habitat preferences to determine sustainable stocking rates, the most important being the social structure and behaviour of the herbivores. The possible effect of these behavioural issues has also been considered. The habitat preferences of the bachelor herd(s) can be used as an indication of present habitat quality, while the density of breeding territorial males may reflect the habitat quality in the past. Recent fire can be seen to be the best indicator of present habitat quality.

BIOTA Southern Africa – opportunities for collaborative research

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BIOTA Africa – Biodiversity Monitoring Transect Analysis in Africa – is an interdisciplinary research programme funded primarily by the German Federal Ministry of Education and Research (BMBF). It is made up of three core projects in Southern, West and East Africa, with the overall goal of gaining knowledge for decision-makers for the sustainable management of biodiversity, taking into account the functioning of ecosystems and the socio-economic framework.

BIOTA Southern Africa focuses on a 2000 km-long transect that extends from Cape Point to the Namibia-Angola border. The transect traverses the fynbos, succulent karoo, desert, nama-karoo and savanna biomes, and follows the main climatic gradient from the temperate, winter-rainfall area of the Cape to the semi-arid, summer-rainfall Kavango region. Remote-sensing and GIS studies, validated by field research, will be used to monitor changes to vegetation structures, soil characteristics and biodiversity along the transect in response to climate change and land-use practices.

In addition, about 30 1 km^2 Biological Observatories, some arranged in pairs **in** identical ecosystems but exposed to different land-use practices, have been established along the transect. Weather stations have been installed and inventories of organisms conducted at many of these observatories, and this baseline information will be made available to local researchers. In this pilot phase of the programme, sub-projects focus on the diversity of soils and their associated fungi, cyanobacteria, algae and lichens; the diversity of vegetation, arthropods and mammals; socio-economic aspects; and the development of standardised monitoring techniques and data management.

A number of South African researchers are involved in these sub-projects, and local participation is expected to increase with the launch of the main phase of Biota-Southern Africa in mid-2003. Project proposals for the main phase are likely to be called for towards the end of 2002. Although it is unlikely that significantly more funding will be available to local researchers, the programme presents other research benefits and opportunities, such as data-sharing and increased understanding of local ecosystems.

The challenge of understanding impacts of past and future climate change on Fynbos diversity

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The looming threat of climate change has raised the relevance of understanding how tightly plant species distributions and ecosystem processes are controlled by the abiotic environment. If species are sensitive to climate, the changes predicted for this century by global climate modellers threaten to alter current species distributions and could even extirpate many endemics with restricted ranges. I will discuss results of modelling the response of biome and species distributions to past (late Pleistocene to present) and future climate change in the Cape Floristic Region, and highlight some key areas of research which could improve our ability to predict the potential impacts of climate change, and reduce the uncertainties we currently face.

Table Mountain Fund – Backing you to Implement CAPE

Brett Myrdal,
Table Mountain Fund, Research Centre, KIRSTENBOSCH

Aimed at giving an update of the TMF work to date, contributing to the implementation of the CAPE strategy, outlining the future plans of the Table Mountain Fund, the opportunites for the involvement of the Fynbos Forums' partner in the funding opportunities from the TMF, and an update on the restructuring of the TMF Board.

Molecular phylogeny of *Oxalis* L. section *Angustatae* subsection *Lineares* based on *trnL-trnF* sequence data

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Oxalis L. is a large, cosmopolitan genus that exhibits a strong diversity centre within the Western Cape and Namaqualand, South Africa. Despite a reasonable alpha-taxonomic revision, the sheer size of the genus, a complex tristylous breeding system and tremendous epharmonic and genetic variation within species have prevented a clear understanding of the evolution and relationships within *Oxalis*.

Several sections demarcated by Salter (1944) are clearly artificial, existing primarily as assemblages of groups of related species, with only very generalised morphological characters providing cohesion between these groups. A good example of this is *Oxalis* section *Angustatae* subsection *Lineares*, which is grouped by Salter (1944) into 7 major assemblages, of which the species within each assemblage are considered closely related, whilst the relationships between these assemblages are unclear, perhaps even paraphyletic. Recent palynological research (Dreyer, 1996) has confirmed this pattern. Species contained within each assemblage possess similar pollen types, whilst vastly different pollen types are observed between the assemblages.

Our aim, using molecular phylogenetic techniques, is to clarify the relationships within this subsection. It currently includes 38 species (54 taxa) and represents *ca.* 20% of indigenous South African species. Outgroups for the phylogenetic analysis include species from each recognised section, as well as two naturalised American *Oxalis* taxa. The genera *Biophytum* and *Averrhoa* serve as generic outgroups. The chloroplast *trnL-trnF* gene and spacer region has been selected for the molecular study, as it has proven to be informative at species level in a pilot case study. Preliminary analyses of 54 species concur with the pollen data (Dreyer 1996), and are at variance with the classification of Salter (1944).

Work undertaken in this study presents a first step towards the larger goal of achieving a well-supported molecular phylogeny for the southern African members of *Oxalis*.

Methods of transplant of existing mature vegetation for rehabilitation of old lands at residential development sites.

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Springerbaai Coastal Eco Estate (in the Mossel Bay district) is a resort consisting of 100 approved residential units in a natural coastal environment setting. It is currently in the process of being developed (phase 1). The units are planned to be situated within Gourits River Valley Bush Veld on the coastal dune front (Valley Thicket), while the previously cultivated lands are to be rehabilitated to some extent for recreational and game farm use. The developers appreciate the natural environment that adds value to the Estate and are dedicated towards developing the resort in a sensitive way.

Large trees (2 m and taller) and plant groups that were in the way of services or structures were removed with soil by digger loader (JCB). These plants were immediately transported to and placed in prepared pits. The pits with newly planted plants were closed by hand and watered regularly for weeks. In addition, cut plant material was stacked on the old lands to assist with dispersal of seed to create new nodes of natural vegetation.

The results of the exercise (from casual observations) are encouraging, indicating towards successful transplant and rehabilitation methods. It is estimated that there is an approximately 70% success rate across the board with the transplants, with an even higher success rate with the trees. This was despite very dry climatic conditions experienced since the transplant exercise. Where plants died or cut material was stacked, the material created perches for birds or shelter for other animals. Resultantly seeds and organic material was deposited, encouraging recruitment of plants.

Threatened Plant Project in the CFR

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The Cape Floral Region (CFR) has been identified as one of 25 international biodiversity hotspots based on an index of biodiversity and threat. In 1998 South Africa had the highest number of extinct plant species and the third highest number of Red Data plant species globally. Roughly half of the current South African Red Data plant species occur in the CFR (ca. 1325 species) and the CFR is ranked as the hottest global hotspot in terms of its concentration of threatened plant species. The conservation of CFR threatened species has been largely neglected over the past four years. The National Botanical Institute will be running a threatened plant programme in the Cape Floristic Region to address this need to conserve threatened plants. This project will be one of the CAPE projects and is aimed at promoting awareness of threatened plants and habitats among civil society. The project purpose is to reduce loss of threatened species and habitats through facilitation of appropriate decision making by civil society.

More specifically the project aims to:

- produce a data base of information for threatened plants for use in development and conservation planning in the CFR

- promote landowner stewardship of endangered species through involving landowners and community members in data collection and monitoring
- ensure that red data lists for Cape taxa are continuously updated

Amateur botanists and passionate landowners will be involved in the project. They will help in the collection of new data on threatened species and be involved in conservation actions to protect these species.

Plant-insect-fungi interactions in the Cape Fynbos

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South Africa contains the small Cape Floral Kingdom (CFK), which is restricted to a mere 90,000 km^2. It includes approximately 9000 vascular plant species, most of which are found within the Fynbos biome. Despite numerous studies on the floral diversity of the Fynbos, the diversity of other biological groups has received less focused attention. Similarly, inter-organismal interactions between the different biological components are still poorly understood.

Proteaceae represents a major Fynbos plant family. Recently, several new species of ophiostomatoid fungi have been discovered within the infructescences of serotinous *Protea* species. Closely related fungi from the Northern Hemisphere are insect vectored, and cause important tree diseases such as Dutch elm disease. Convergent evolution has resulted in the *Protea* fungi resembling fungi from the Northern Hemisphere. The fact that fungal spores are produced in similar sticky masses on *Protea* infrutescences, also suggests vectored dispersal. The *Protea* fungi appear to be saprophytic, but their ecological role is still unknown. A specific relationship exists between fungus and host species, and we suspect this specific relationship to extend to vectors as well.

The main aims of our work are to clarify the role of these fungi in *Protea* infructescences, and to identify their insect vectors. Group specific PCR primers, and a reaction protocol were developed to scan insects for the presence of ophiostomatoid fungal DNA. Host specificity of the fungi was investigated, while also scanning for new fungal species. The diversity and seasonality of arthropods associated with a range of *Protea* infructescences were also assessed.

Results reveal seasonal occurrence patterns for insects and fungi on *Protea* infructescences. Potential insect vectors have been identified. Additionally, a new fungal species was discovered, which shows a dispersal mechanism similar to ophiostomatoid species. Results of this study significantly expand our knowledge of biotic interactions operational in the Fynbos biome.

C.A.P.E. in ACTION: Opportunities and challenges of being an active partner

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C.A.P.E. has moved solidly into action, with agreements signed by key stakeholders and funding avenues yielding positive results. The real challenge is for partners in government, scientific institutions, parastatals, NGOs, the private sector and generally civil society, to engage with C.A.P.E. in giving effect to the strategy. In this paper, the significant steps in implementing C.A.P.E. will be outlined as a contribution to understanding how implementation works and how it can be fostered. In addition, the opportunities to participate as well as the challenges will be discussed, as the year ahead provides significant scope for partners to take the lead and become the agents of C.A.P.E. throughout the Cape Floristic Region.

Dispersal of seeds as a constraint in revegetation of old fields in Renosterveld

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Species-rich Renosterveld vegetation does not return to old agricultural fields even after many years (10-20) of abandonment. In most cases the fields are slowly being taken over by non-indigenous species, particularly pasture grasses. While poor survival of indigenous seedlings due to competition, grazing or any other establishment constraints, might explain the failure of natural vegetation to colonise old fields, here we are testing the hypothesis that recolonisation by indigenous plant species is limited by seed dispersal. Actual information on dispersal syndromes and distances in Renosterveld vegetation is missing. We have quantified seed availability in old field and their distances from the natural vegetation using seed traps and soil seed bank composition assessment. We have also quantified seed dispersal in the dung of large mammals in this abandoned field. The preliminary results show high local dispersal in old field, especially from the alien pasture grasses (e.g *Bromus* or *Vulpia*) and indigenous lawn grass (Cynodon dactylon) which dominate the field. Seeds of indigenous renosterveld shrubs, tussocks grasses (e.g *Tribolium hispidum*) and geophyte seeds are limited towards the edge of the natural vegetation and decrease drastically into the field. We therefore conclude that the return of natural renosterveld species to old agricultural fields is to some extent limited by the seed availability and poor dispersal qualities of indigenous species.

Use of object-orientated image processing – a tool for improved analysis of Cape Landscapes

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Virtually all large-scale conservation planning frameworks are partly based on imagery derived from either photographs or satellites and is used for the development of layers within Geographical Information Systems (GIS). This data is processed through manual interpretations or digital processing or some combination of the two. Digital processing involves using grid or raster systems for data storage and the use of powerful modern statistical and numerical classification procedures. However, the technology in acquiring and processing imagery is advancing and we now have multi-spectral satellite imagery of 1 m resolution. This increased detail results in vastly increased volumes of data to be processed and have exposed the shortcomings of the conventional raster-based environment, where each grid cell (pixel) is an individual sampling unit and only makes use of colour (spectral signatures) at a single resolution for classification. Solutions for handling the increased quantity of data and the single-scale limitation involve pixel averaging and re-sampling them to lower resolutions. In both cases we essentially lose information and reverse the benefits of acquiring high-resolution imagery. In contrast object-orientated image processing will permit information to be used for classification of objects based on their properties such as texture and shape and the semantic relationships between different objects. Consequently the rules for classification can include textural variations within an object such as different roof angles of the same building (which will have different spectral signatures due to shadow effects) the geometric forms of objects such as rectangular to linear (the latter could be useful for the identification of roads) and the relationships between objects and could reflect that buildings are usually surrounded by gardens. Over and above these considerations objects can also be classified at scales that are independent of each other and therefore farm dams could be classified at one scale and large tracts of agriculture at another. Previous bottlenecks in digital processing of imagery can potentially be overcome with this technology and more accurate mapping of landscapes achieved. Using a variety of images at different resolutions we will demonstrate how useful object-orientated tools are for mapping of different landscapes in the CFK.

Walker Bay Fynbos Conservancy: -Eco-Trails Development

Paul Slabbert
Uluntu, Cape Town

The eco-tourism development plan was commissioned by the Walker Bay Fynbos Conservancy [WBFC]. WBFC was established in December 1999 with the purpose of conserving the fauna and flora and adoption of environmentally friendly land use practices in the area.

The WBFC is a collaborative management partnership between 19 private and public landowners [list annexure 1] who together manage 12 160 hectares of fynbos and forest on the western seaboard of the Agulhas Plain [map 1], with the mission to conserve both natural and cultural diversity through co-operative partnerships.

The development of a hiking and horse trail is ranked as a high priority project of the WBFC tourism programme (Walker Bay Fynbos Conservancy: Report on a survey of proposed conservancy management programmes and projects, September 2001). The project entails a Development and Business Plan of a hiking trail system as part of future eco-tourism projects in the Agulhas Plain. This trail system is within the Cape Floral Kingdom, the smallest of the world's six floral kingdoms and the only one to be found entirely within one country. The development of eco-tourism is a means of utilising the natural environment and generating funds to support conservation strategies. This development shows in the financial projections that the financial benefit to WBFC, can be utilised directly for conservation programmes such as alien vegetation and fire management programmes

The value of partnerships: a private land consolidation strategy for the Cape Peninsula – the case of the Noordhoek Kommetjie wetlands"

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With the establishment of the Cape Peninsula National Park over 20 000 hectares of the peninsula mountain chain is now under the dedicated conservation management of South African National Parks. However, over 5 500 hectares of conservation worthy land on the peninsula remains in private hands. Landowner attitudes on the peninsula represent the full spectrum – from dedicated conservationists to those with development intentions in mind.

The presentation tells the story of the partnership between SANParks, City of Cape Town, Ukuvuka, TMF and the Park Committee established to seek the consolidation of conservation worthy private land with the CPNP. The work of the partnership has involved appointing a dedicated Land Negotiator, preparing a comprehensive property database, undertaking a prioritisation of properties, preparing a land consolidation strategy and negotiating with landowners. A flexible, incentives based approach has been adopted with a range of options available to landowners for consolidating land with the Park – by acquisition, contract or through co-operative agreements.

The strategy is being tested and applied through the initiative to incorporate the privately owned Noordhoek Kommetjie wetlands, which represent the last remaining natural link between the northern and southern section of the CPNP. This initiative has been underway for nearly 4 years and has involved scientific studies, negotiations to put in place land acquisition agreements, a massive alien clearing project linked to a training program for the local unemployed and an international fund raising campaign.

The presentation stresses the value of partnership approaches to securing land for conservation and in so doing realising its true worth.

P.R.O.T.E.A Work for Water Project
Poverty Relief Project through the Organised Treatment and Eradication of Aliens

C. R. Spencer & M. Van Wyk
PROTEA Project Management Team, Overstrand Municipality, PBag X3, KLEINMOND 7195

The PROTEA project has investigated alternative methods of controlling alien vegetation. This was done to maximise cost effectiveness while keeping the poverty relief theme in mind. A recent investigation into a product named "The Mulch Master". A survey of some Hangklip Farms has revealed the following results:

Money saved = R 81 084.48
Time saved = 2914.5 person days

At an average of R 2 953.00 per ha (initial clearing) this translates to an additional 27 ha which our teams could clear.

The conventional clearing methods include manual clearing with teams of labour and in this instance would be extremely costly and would take several months. However, by combining the manual methods with the "Mulch Master" a cost saving of 23% could be realised. Furthermore, the time required to complete the initial clearing is much reduced. The money and time saved by employing the Mulch Master would place WFW Projects in a better position to negotiate further clearing contracts with other land-owners. Furthermore, initial clearing with the Mulch Master would result in re-growth of alien vegetation and therefore, WFW Projects would have to conduct intensive follow-up (labour intensive) and probably re-coup the lost person days.

DISCLAIMER: All figures stated within this document are based on current rates and standard rates of the National Work for Water Project, as of November 2001, and should be considered approximate.

NM MOSS Strategic Conservation Planning Project

Warrick Stewart
NM MOSS Project Co-ordinator, Port Elizabeth

The Nelson Mandela Metropole (Port Elizabeth, Uitenhage, Despatch and surrounds between the van Stadens and Sundays Rivers) is an area of convergence of five of South Africa's seven biomes. In particular the CAPE project identified St Francis dune fynbos and Algoa grassy fynbos within the Metropole as priority vegetation types for conservation. The NM MOSS (Nelson Mandela Metropolitan Open Space System) Project is a joint venture between the Wildlife and Environment Society of South Africa (EP Region), the Nelson Mandela Metropolitan Municipality, the Terrestrial Ecological Research Unit, and the Table Mountain Fund (TMF). To date the NM MOSS Project has identified the vegetation remnants in the Metropole, identified on the basis of conservation value and threats to biodiversity, and has integrated the outcomes of the Global Environment Facility-funded CAPE (Cape Action for People and the Environment) and STEP (Sub-Tropical Thicket Ecosystem Planning) Projects into it's planning. Using a computer based decision-support system (C-Plan) the NM MOSS Project will then systematically design a conservation plan for the area. The development and recreational requirements of the metro will be incorporated, and a holistic open-space plan will be produced. In an urban area, any Metropolitan Open Space System (MOSS) is a compromise between conservation and town-planning development needs. The aim is to systematically design a system that most effectively combines and addresses these requirements. The most valuable aspect of the plan is that it will be dynamic. Being computer-based it will allow for predictive decision making, which will provide vastly increased guidance to town planners, conservation managers and municipality councillors. Implementation of the plan will be achieved via a range of mechanisms, including the rezoning of council land to afford legal protection to the new open space system, conservation incentives for private landowners, and community conservation projects.

The National Veld and Forest Fire Act (Act 101 of 1998)

Susan Steyn
Assistant Director: Department of Water Affairs & Forestry, Division: Community Forestry: Western Cape, P/bag X16, Sanlamhof

The stated aim of the Act, i.e. "to prevent and combat veld, forest and mountain fires throughout the Republic", is plain. The fires are specified as "veld, forest and mountain fires" to distinguish the scope of the Act as excluding fires in built-up areas.

The National Veld and Forest Fire Act (Act 101 of 1998) sets out to put in place mechanisms to reduce the incidence of these fires - and to mitigate the damage that is done when they do break out. The Act imposes very specific fire prevention and control responsibilities on landowners - those living on and using the land. These include the responsibility, where there is a risk of veldfires, to prepare and maintain boundary firebreaks, have certain fire-fighting equipment and trained personnel with protective clothing available for fire fighting at all times. Landowners if absent also have the responsibility to appoint a responsible person to act on his or her behalf in case of fire - take action to control and extinguish the fire and notify owners of adjoining land.

Fire Protection Associations are to be set up in terms of Act 101 with the purpose of helping landowners and occupiers to prevent and fight fires in their areas. Put simply, an FPA is a gathering of affected landowners and land occupiers who work together to put in place strategies to address all aspects of predicting, preventing, managing and extinguishing veld and forest fires. Each FPA is established to ensure co-operation between neighbours in a fire-prone area in order to reduce the incidence of fires and improve the collective fire management of forests and veld.

The emphasis in every kind of disaster management is moving towards proactive prevention rather than reactive "cure". In this spirit, and according to the Act, the Minister of Water Affairs and Forestry will have to prepare and maintain a Fire Danger Rating System (FDRS) on a continuous basis for the entire country.

A Fire Danger rating is a way of expressing the degree of danger of fire using numbers. Once a system of numbers is in place to express the danger of fire, it will be possible to use the FDRS to identify activities that are dangerous given current conditions. A schedule of precautions to be taken when each rating is in effect will be set up and it will be possible to rate the fire danger in each area and for various periods during the year. Such a system will allow citizens to make informed decisions when planning to undertake controlled burning and will also raise the profile of fire and related matters in the public eye.

Investigating landowner willingness to conserve renosterveld in the Cape Lowlands

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Renosterveld is one of the most threatened vegetation types found within the Fynbos biome, with less than 1.6% being formally conserved. There is a growing national realization that the future conservation or destruction of threatened ecosystems, such as renosterveld lies predominantly in the hands of farmers and private landowners, considering that 80% of the remaining renosterveld is under private ownership. Legal restrictions have been found to have little effect on improving the willingness of landowners to conserve and therefore new methods of promoting conservation, such as the use of incentives, need to be investigated.

The principal aim of the project is twofold - to investigate the willingness of landowners to conserve renosterveld on private land and to determine the attractiveness of possible incentives to landowners. Two areas have been selected for data collection, namely the Botriver catchment and the Suikerkankop area near Bredasdorp in the Overberg, which differ with regard to the type of farming operation, landownership and tenure patterns, family history, renosterveld subtypes and climatic conditions.

Data will be collected by means of structured, personal interviews using a prepared questionnaire to guide the questions being asked and capture subject answers. A quantitative sociological approach to the survey has been adopted. Approximately 40

landowners have been randomly selected based on a stratification of the total area of renosterveld remaining on the property. The renosterveld remnants data has been provided by the Cape Lowlands project of the Botanical Society. The questionnaire has been designed to determine the following: reasons for retaining renosterveld on farms; renosterveld usage; perceived commercial and ecological value of renosterveld; management constraints; pre-determined causes of willingness to conserve; what might change landowner willingness to conserve in the future and what sort of incentives are attractive to landowners. The study will also attempt to investigate whether scheduling conservation action can be achieved by using the willingness of landowners to conserve as an indication of vulnerability. Preliminary results from the interviews will be discussed as well as how the nature of responses between landowners in Botriver and Suikerkankop compare.

Partnerships and Incentives for conservation in priority areas of the Cape Floristic Region (CFR)

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To counter the threats facing the CFR "Hotspot", the Cape Action Plan for the Environment (CAPE) calls for a substantial increase in the areas set aside for conservation purposes. With most of the priority land consisting of fragments occurring on private land and with declining budgets for conservation management and a dearth of funds for land acquisition, the establishment of private and communal conservation initiatives to complement a formal statutory reserve system, will be the only way of achieving all the targets set by CAPE.

Priority areas for conservation action have been identified as the lowlands, and several initiatives are further refining this at a cadastral scale. The Conservation Planning Unit set up in WCNCB will promote the uptake of these and other planning outputs into the mainstream planning frameworks. Opportunities to create many new formal reserves in these priority areas are limited, and private land will have to be utilised to create viable corridors and set aside sufficient remnant habitat.

The Fynbos Forum has constituted a working group on private conservation, to promote off-reserve conservation, incentives to encourage this, and thereby created a useful lobby platform and consensus building mechanism. This body will be the reference committee for private initiatives and has representation from government departments, conservation agencies, conservancies and NGOs.

The WCNCB and the Botanical Society are in the process of initiating a project which aims to focus conservation effort on strategic partnerships with and empowerment of civil society and the development and use of co-operative management models and incentive schemes. This will ensure that priority areas in non-state ownership establish biodiversity corridors linking large habitat parcels through landscape gradients, while at the same time also conserving vital lowland habitat remnants.

In this paper, we will be providing an overview of the Incentives project, and providing information on the plan for the next two years.

River/Wetland rehabilitation in the CMA: overview and practical implementation

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River/wetland rehabilitation is a relatively new field in the CMA. Although several research-based rehabilitation projects are currently underway, many aspects surrounding the practical implementation of recommendations for rehabilitation remain largely a case of trial and error. In addition to projects where rehabilitation is the primary project objective, numerous other projects are often driven largely by engineering (e.g. flood/erosion control) or aesthetic/social (e.g. provision of amenity value) objectives. In many of these cases, recommendations have often been made for ecological improvements (e.g. in habitat quality), to be implemented as secondary objectives. However, as in the case of formal rehabilitation projects, these recommendations are largely untested. Moreover, different consultants or managers are forced to follow the same learning process, learning from successes and failures of their individual projects – there is no process for pooling of experiences and mutual learning.

In order to improve our understanding of the ecological effects of different activities on rivers and wetlands, and to gain a clearer perspective of their strengths and weaknesses, measured in ecological terms, 11 case studies were assessed by the Freshwater Consulting Group. All involved manipulation of rivers/wetlands for a range of categorised objectives. The study is envisaged as the first, pilot stage of a larger project, which aims at providing a practical handbook of the strengths and weaknesses of different approaches, assessed from an ecological perspective.

Conservation management: insights from California

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Earlier this year various researchers and managers were invited to Los Angeles, California to attend a workshop entitled "Managing Conservation Lands in the Mediterranean-Type Ecosystems: Southern California and the Cape Region of South Africa". A primary focus of the workshop was to compare the Santa Monica Mountains National Recreation Area with the Cape Peninsula National Park. This paper seeks to share with Fynbos Forum members some of the insights into the California situation and what lessons can be applied to our situation. The major insights are discussed under the following topics: Fire and Urban Edge, Alien Vegetation and Development Threats. Other issues discussed at the workshop were education, rehabilitation and research.

POSTER

ABSTRACTS

Phenological responses of selected fynbos species to a temperature and moisture gradient

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Jonaskop, one of the highest peaks in the Riviersonderend Mountain Range, Southwestern Cape, presents us with a natural environmental gradient, associated with altitudinal change along the mountain slope. Jonaskop lies within the fynbos biome, but temperature and moisture levels varies to such an extent along the gradient, that the vegetation changes from a succulent karoo-renosterveld ecotone on the lower dry north-facing slopes to mountain fynbos at the higher altitudes. This gives us the opportunity to examine and compare how individuals of the same species respond to different climatic conditions within a limited geographical area.

In this study we are investigating responses to climate variation by observing phenological characteristics. We are concentrating on growth, which is being monitored intensively for individual plants of five species at selected sites along the gradient. Other phenological aspects such as timing and duration of flowering, and leaf longevity are also considered. We are using both established adult plants, as they occur naturally on the gradient, and transplanted seedlings. The transplanted seedlings give us the added opportunity to monitor responses in plants growing outside their natural range, in potentially unfavourable climate conditions.

In this study we are investigating responses to climate variation by observing phenological characteristics. We are concentrating on growth, which is being monitored intensively for individual plants of five species at selected sites along the gradient. Other phenological aspects such as timing and duration of flowering, and leaf longevity are also considered. We are using both established adult plants, as they occur naturally on the gradient, and transplanted seedlings. The transplanted seedlings give us the added opportunity to monitor responses in plants growing outside their natural range, in potentially unfavourable climate conditions.

This will help us answer two important questions: are there any trends in phenological variation that can be related to climatic variation, and secondly, are these trends the same for all plants, even if they are different species, and from different genera and families. Through understanding how fynbos species respond to natural climate variation, we can get an idea of how they would respond to a future change in climate. This is very important in the face of global climate change warnings becoming a reality.

This project forms part of the NBI's ongoing research on climate change, and will contribute to assessing the potential of fynbos to persist under changing climatic conditions.

The use of matrix models to determine optimal harvesting strategies for two *Thamnochortus* species (*T. insignis* Mast. and *T. erectus* (Thunb.) Mast., Restionaceae)

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Little is known about the population biology of Restionaceae even though it is a characteristic family of the Fynbos Biome. Two species, *Thamnochortus insignis* and *T. erectus* have economic importance as thatching reed. A study by Ball (1995) provided information on the comparative seed and regeneration biology of the two species in order to optimise the harvesting strategy of these two species. To facilitate an optimal harvesting strategy it is necessary to make projections about the effects of the strategy. This is not possible in the field due to the long life span of the plants. Mathematical models, however, allow one to make projections into the future based on empirical data and thus allow the development of a truly optimal harvesting strategy. This study aims at the development of matrix models to determine sustainability of the resource by an optimal harvesting strategy. Preliminary results of a simple matrix model are presented.

A pilot study of the effects of invasive exotic plants, fire and soil chemistry on selected soil microorganism populations in the Silvermine Nature Reserve, Cape Peninsula, South Africa

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This study examines soil chemical and microbial population changes in different sites following the extensive wildfires in 2000 on the Cape Peninsula. The effects of standing exotic plants and stacks of mechanically cleared exotic plant material on post-fire populations and their recovery were investigated. These were compared to burnt fynbos and the burnt cleared areas which surround wildfire burnt stacks. Microbial populations and chemical changes were also monitored in unburnt Mountain Fynbos and dense unburnt stands of invasive exotic plants.

Differences in soil chemistry and microbial populations occurred in the various post-fire environments studied while marked seasonal changes were also apparent. Microbial populations are linked to pre-fire vegetation characteristics, fire intensity, to the management of exotic plants, soil chemical changes and seasonal influences but are variable in their responses. High volumes of (standing or stacked) woody exotic plant biomass have the most drastic impacts on post wildfire microbial populations, especially during summer. During winter however, microbial populations are determined by soil nutrients and texture.

Conserving evolutionary processes and genetic heritage in endemic vertebrates of the Cape Fold Mountains

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Molecular Ecology and Evolution Program (MEEP), Dept. Genetics, University of Pretoria

Intraspecific diversity is recognised in the International Convention on Biological Diversity as one of three fundamental levels of biodiversity (CBD 1992, article 2). In comparison to species or ecosystems, however, patterns of genetic diversity are poorly understood and have seldom been addressed within a conservation planning framework in southern Africa. Genetic diversity is relevant to fynbos conservation in several ways. The amount and distribution of within species diversity tells the story of that species; of how abundance has changed with past climates and of historical connections among currently isolated areas. By combining genetic patterns across species we can reconstruct a history of the fynbos landscape and develop a greater appreciation of diversity hotspots across the Cape Floristic Region. Genetic analyses can also identify historically independent lineages within species, some adapted to different environments, or even unrecognized species. In this poster we present results from a WWF funded project on indigenous fish of the Cape Floristic Region and outline our approach to a similar study on frogs and lizards of the Cape Fold Mountains. Our preliminary comparison of fish from 18 river systems revealed two distinct evolutionary lineages within the Cape Kurper, six lineages within the Cape Galaxias and 15 unique lineages of Redfin Minnows. Both the Cape Kurper and Galaxias show a discontinuity between west coast rivers and those flowing to the south-east coast, whereas Redfin Minnow lineages tend to be more restricted. Some of these lineages are vulnerable to extinction through neglect.

SKEP (Succulent Karoo Ecosystem Plan)

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This poster gives an overview of the SKEP project, including:

- why the Succulent Karoo is special
- threats to biodiversity in the Succulent Karoo
- what SKEP aims to achieve
- SKEP has conducted a rapid systematic conservation plan, with stakeholder participation
- next steps: secure further funding for project development and implementation

"Effect of Disturbance on Vegetation Cover at Rocherpan Nature Reserve in South Africa"

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Situated on the West Coast of South Africa, Rocherpan is divided into two sections - the "old" veld (35 years old) and "new" one (10 years old). The younger was used as a grazing land until it became part of the Reserve. A study has been conducted to determine if a difference exists between the old and new field. We used species diversity and richness as measurements of the effect of disturbance caused by grazing on the new veld. We also compared vegetation cover between the two sites along 4 sets of 50 m of transect lines in each side as well as plant density using 5 plots of 5 m × 5 m across those lines. All data sets were compiled into one database for analysis. We found that species diversity and cover were higher per plot in the new veld than in the old one, and their number were positively correlated with the history of each site. We assumed that the difference was a result of overgrazing and additional environmental variations such as seasonal changes or soil quality. Thus the probability of change varies with the nature of the disturbance, conditions and interactions that follow it.

A new perspective of Sub-Tropical Thicket

.JHJ Vlok[1], **DIW Euston-Brown[2]** & RM Cowling[3]
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Subtropical thicket vegetation was re-classified and mapped for the STEP (Subtropical Thicket Ecosystem Planning) project. The outcome of this exercise was a new perspective of thicket types and their distribution. The mosaic concept (where one identifies thicket as bush clumps in the adjacent biome or vegetation type e.g. fynbos, karoo, grassland, forest) has not been mapped previously. This approach captures more of the variability in vegetation, especially in transitional areas where different biomes meet. The approach may be most useful if applied across the whole of Southern Africa and Africa, and not only in the STEP planning domain.

Two paragraphs about the poster:

The poster will show the thicket maps that were produced in our report for STEP in February 2002. The classification will be presented and photographs of the main types will be linked to the maps. One or two paragraphs will describe how this approach differs from previous maps/mappers, and what this means. A special section will deal with how thicket relates to fynbos, and how thicket may have influenced fynbos evolution and diversification.

The end use of this product for STEP will also be briefly described.

Habitat preferences of large herbivores: A comparison between renosterveld and old fields

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West Coast Renosterveld has vanished at an alarming rate and today a mere 3% of it remains, of which Elandsberg Private Nature Reserve (EPNR) conserves the largest portion – 1000ha. Renosterveld, which once covered soils having the highest rated agricultural potential in the Western Cape, has today largely been converted into wheatlands and vineyards. In the Western Cape lowlands the incentive to transform the remnant veld into planted lands is particularly high because of its very low forage value, but renosterveld was probably the vegetation type that supported the large herds of game in the past.

Records show that the Cape flats were teeming with large game, but within fifty years of European settlement all large game was shot out. Movement of game, densities and the role of this large game in the ecology of renosterveld, however, cannot be determined from the records. Since some of the larger antelope have recently been reintroduced into renosterveld areas, this information is required as a knowledge of habitat preferences and other ecological requirements of herbivorous animals is basic to any management programme.

This project proposes to determine the preferred habitat of all the large herbivore species on EPNR as well as determine a trend in activities in habitats selected. It aims to compare utilization of renosterveld areas to old wheat fields by the large herbivores as well as to identify variables contributing to habitat selection and to establish seasonal movement of the herbivore species. This should provide information relevant for management of the reserve and insight into how the herbivores will utilize the old fields once the natural vegetation has been restored.

Pollen dimorphism associated with the tristyly syndrome in selected *Oxalis* species

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Hetrostyly is a genetic polymorphism in which plant populations are composed of two (distyly) or three (tristyly) morphs that differ reciprocally in the height of their stigmas and anthers. The main features of heterostylous plants are the herkogamous morphological expression, fixed morph frequency a ratio of 1:1:1, a sporophytically controlled, diallelic self-incompatibility system and suite of ancillary characteristics (morphological polymorphisms).

Tristyly only occurs in three families, Pontederiaceae, Oxalidaceae (genus *Oxalis*) and Lythraceae. *Oxalis* is particularly well represented in southern Africa, with 210 species (270 taxa) known from the region. Approximately half of the world's *Oxalis*

species are endemic to South Africa. Modification of heterostyly has occurred in all three families, mostly in the form of a loss of self-incompatibility, changes in morphological expression and/ or expression of ancillary characters. As yet, there is no evidence for the breakdown of tristyly among South African *Oxalis* species.

Influence on Herbivory and Competition by Grasses on the Establishment of Shrub species on Grazing Lawns in West Coast Renosterveld.

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With only 3% of its original extent remaining, and a mere 0,5% conserved, West coast Renosterveld is one of the most threatened vegetation types in South Africa. It is heavily impacted by agriculture, alien vegetation and urbanisation. As a result, West Coast Renosterveld has been reduced to small patches, which are, restricted to hills and koppies in the lowlands of the Western Cape. It is thus impossible to reconstruct exactly how Renosterveld functioned in the ecology of the Cape Floristic Region. The movements of large herbivores between burnt fynbos vegetation and Renosterveld cannot be determined. We have hints that Renosterveld was once grassland, but may equally well have always been a shrubland, dominated by Renosterbos, *Elytropappus rhinocerotis* (Asteraceae) (Skead, 1980).
Natural vegetation does not return onto adjacent old fields even after years. Renosterbos apparently establishes easily, but only forms monospecific stands, and a species-rich indigenous plant community does not return (Cowling, Pierce and Moll, 1986). This can be for two reasons: the return of indigenous species is either seed and seed dispersal limited or the seedlings of indigenous plants can not establish on the old fields due to the competition by grasses or by grazing from herbivores, or a combination of both.

The aim of my project is to examine the factors influencing the establishment of indigenous (renosterveld) shrub seedling on old fields. I will investigate how grazing by large herbivores, competition by grasses and a combination of both influence the survival and growth of the seedling and ultimately, how this influences the plant community in lowland Renosterveld.

Where have all the flowers gone? The West Coast Renosterveld Story

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Of all of the South African vegetation types, West Coast Renosterveld (WCR) has been considered to be the most at risk with respect to species extinctions and loss of habitat integrity through patch size reduction and fragmentation. With less than 3% not transformed and about 1% formerly conserved the opportunities for its

conservation have become limited. Consequently existing remnants are almost exclusively classified as being mandatory for its conservation. One of the tasks when planning conservation networks is to identify objectives and targets for maintaining biodiversity. In the case of WCR this is difficult since so little remains and there is little consensus on the ecological paradigms that characterize it. The Broad Habitat Units classification developed for C.A.P.E. used generalized envelopes based on overlays of geology, topography and climate and define the WCR as being restricted to nutrient-rich Malmesbury and Klipheuwel shales, granites and alluviums at comparatively low altitudes and within 250 to 700 mm winter rainfall climates. However, the character of WRC is much less precisely described with a range of opinions describing it as formerly a C3-grass dominated landscape through to a closed-canopy asteraceous dominated shrubland, and that the disturbance regimes that maintained its biodiversity could be herbivore or human induced or that it is adapted to periodic fires. Documented history suggested that WRC previously supported abundant large herbivores including Eland, Bluebuck, Quagga, Rhinoceros, Hippopotamus and Elephant and carnivores such as Lion and Hyena. Archeological reconstructions suggest WCR to be a landscape where the Khoikhoi practiced nomadic, cattle-based pastoralism. Even reconstructing the botanical affinities is fraught with problems as to whether it is a vegetation type with its own uniqueness or a transition to either fynbos (mountain or sandplain), or succulent karoo. Further, current WCR vegetation is also non-uniform and the heuweltjies communities within it appear to support vegetation derived from the thicket-biome. Without more research it will be difficult to develop a conservation strategy that identifies what it was, what it is today and what it will be tomorrow?

Development of the City of Cape Town's Online Environmental Geodatabase.

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No other major city of the world has the responsibility for conserving as much, as unique or as globally significant biodiversity as that of the City of Cape Town. For a number of years the City Administrations have been collecting large quantities of environmental and biological information, and are committed to make this information available to the broader scientific and environmental consulting communities. In 2000 the "Environmental Significance Mapping" data was first released for comment. Feedback indicated a need for metadata descriptions, and rationalization of information into a smaller number of coverages. The first Internet-distributed version was developed at UWC in 2001, principally for post-graduate training, and student feedback indicated that more contextual layers such as a search for street names and erf numbers needed to be included, but they welcomed the use of the 1996 high-resolution aerial photography. In July 2002, the City of Cape Town initiated and funded the re-development of the Internet version, based on a MS SQL relational database. This Internet version will provide a full range of spatial tools (including identify features, standard query building, selecting features that intersect a line/rectangle/polygon, selecting within user-defined distance buffers and a full metadata description for each coverage), specific searches based on erf, street and suburb inputs and for results to be overlaid onto high-resolution 1998 colour aerial

photography. All results, either as reported in tables or maps could be saved and pasted into reports. In the redesign, a streamlined and City of Cape Town Corporate feel was emphasized. Since a great number of layers still existed they were organized into group headings and individual coverages accessed through a cascading drop down menu and those selected for querying were highlighted. The resulting product was compared to some 200 distributed GIS applications around the world. The results of this review confirm it to be the most the comprehensive urban environmental management tool available via the Internet. The first phase is completed and includes all environmental significance layers. A further two themes describing Biodiversity of Terrestrial and Aquatic systems and Coastal and Marine systems will be available shortly.

Small mammal community composition in fragmented agricultural landscapes: a case study in West Coast Renosterveld

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Studies in agricultural landscapes in Europe have shown that small mammal species (e.g. wood mouse, *Apodemus sylvaticus*) are useful indicators of change in arable landscapes (Tattersall et. al 2001). In West Coast Renosterveld, of which more than 90% have been transformed for agricultural purposes, only scattered fragments are left, and a number of species are extinct (Kemper et al. 1998). Indicator species for the assessment of the quality of renosterveld or as a measure for successful rehabilitation (Greig 1981) are lacking. In addition, mammalian components of Renosterveld have not been studied yet in respect to their response to fragmentation and degradation (Cameron 1999).

Renosterveld fragments are very varied not only in shape and size, but also in surrounding matrix (i.e. land use) type, which influences the composition of small mammal communities and the survival of viable populations in the remaining patchy habitat. Generalist species, like *Rhabdomys pumilio*, might able to survive or even profit from this highly transformed landscape, while other species, which are dependent on certain plant or insect species, may not be able to sustain viable populations in small and / or isolated fragments.

I therefore propose a study on the small mammal communities in lowland Renosterveld with the following aims and objectives:

1) Determine how the habitat fragmentation of Renosterveld in the Western Cape due to current and historic land use practices influences and changes the composition of small mammal communities.
2) Establish a set of indicator species (both rodents and insectivores) for the degree of habitat fragmentation and degradation of lowland Renosterveld patches
3) Provide guidelines for minimal areas required for maintaining indigenous animal populations in highly fragmented agricultural landscapes.

RESTORE: A model for Restoration of Old Fields in West Coast Renosterveld

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Due to the highly fragmented nature of the remaining West Coast Renosterveld, re-vegetation of old fields becomes an increasingly important issue. Nevertheless, the question remains if the system is seed limited or establishment limited. To identify the limiting factor for the re-vegetation of the old fields with 'natural' Renosterveld, a project funded by the WWF SA / Table Mountain Fund was launched which will investigate seed dispersal and establishment and their role in the restoration of old lands in Renosterveld. This project is circled around a spatio-temporal individual and rule based model for the restoration of old fields in West Coast Renosterveld and the dynamics in early successional stages. In this poster I will present the model RESTORE and its underlying processes and parameters.

Outeniqua Nature Reserve: Cost effective biological surveys and data analysis

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One of the core goals of the WCNCB is to maintain ecological systems, conserve genetic diversity and natural heritage and to ensure sustainable utilisation. In order to achieve these goals, a thorough ecological knowledge of the reserve(s) is needed and also regular monitoring needs to be done, called ecological auditing. The methods used for ecological auditing are determined by various constraints and lessons learned.

We are using Outeniqua reserve as a case study and the methods used are based on "lessons with the benefit of hindsight". The methods are a combination of using various people, tools and systems, for example volunteers, CyberTrackers and GIS, to simplify the surveys and monitoring.

1. Planning, developing, prioritisation.
   - Collecting only data that is relevant and useful in answering the questions being asked. Determining the data to be collected and prioritised using GIS.
   - Eliminate the "shotgun approach" and "personal hobby horses" that is not cost effective.
2. The identification and implementation of cost effective recording methods.
   - Using computers (CyberTracker) to record and store data in the field (i.e. reducing the number of steps between an observation being made and report presentation, to analyse data and produce reports.
3. The utilisation of the public in biological surveys.

- Making use of volunteers (for example pensioners) to collect data.
- Using various training facilities (for example Saarsveld) to help with statistical analysis of collected data, to the mutual benefit of the students and the WCNCB.

Does Protea breeding pay?

Gail M. Littlejohn & J.H. Coetzee
ARC Fynbos, Private Bag X1, Elsenburg 7607.

The socio-economic impact of research and cultivar development in Proteaceae was investigated. The main tool used to measure the economic impact was the delivery of new cultivar plants to farmers and the projected change in demand for new cultivar material. Social benefits included particularly job opportunities in a labour intensive industry. The study revealed a positive socio-economic benefit of breeding Proteaceae cultivars for the purpose of producing cut flowers for the export market.

Mainstreaming Biodiversity on the Cape Flats.

Xola Mkefe and Tanya Goldman
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Plants of the Cape Floristic Kingdom are nowhere more threatened than in the pockets of natural habitat dotted around the Cape Flats. The only way in which these remnants stand any chance of surviving as refugia for rare and endangered plant species - sometimes ones that are very narrow endemics - is if local communities take an interest in them and take on the role of custodians and protectors. The Mainstreaming Biodiversity project is a joint initiative of the City of Cape Town, the National Botanical Institute, the Table Mountain Fund of WWF-SA, and the Botanical Society of South Africa. Its starting point is the inventory of 38 core botanical sites identified in earlier work by City, BotSoc and NBI. Starting with the Edith Stephens Wetland Park in Philippi, Wolfgat Nature Reserve and the Macassar Dunes on the False Bay coast, and Harmony Flats in Strand, the project will raise the profile of this patchwork of sites, will work towards the development of coherent management plans, look for sustainable conservation status for the sites, and above all will involve local communities in securing their future as natural heritage hotspots.

Environmental Management Plan (EMP)

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Environmental Management Plans (EMP=s) are a tool that facilitates appropriate environmental input during the construction phase of development and construction activities, be they private or government funded. EMP=s form a crucial component of the Integrated Environmental Management (IEM) process and ultimately the

attainment of sound environmental practice during all phases of construction related activities (CMC : EMP)

The familiarisation of EMP=s in application approvals with in local government is being accepted and adopted as the future of environmental control for all development activities.
The EMP is a new concept that is still in its early years.

Biosphere Reserves : Benefits Beyond Boundaries

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Biosphere reserves are special places for people and nature. They are sites of excellence to explore and demonstrate approaches to conservation and sustainable development on a regional scale.

Much of Earth's biodiversity occurs in semi-natural and rural areas outside protected natural areas. Thus biosphere reserves have an important role to play in conserving biological diversity through a unique idea and a different approach to management.

The Ankh, the MAB symbol of microcosm and the biosphere, is being used to designate biosphere reserves as those special places that preserve and enable the evolutionary processes of life. Biosphere reserves are spaces for reconciling people and nature.

This poster will discuss the dimensions and functions of biosphere reserves in general. Some co-operative mechanisms and international connections will be highlighted.

New developments from the Protea Atlas Project:

AG Rebelo
Protea Atlas Project, National Botanical Institute, Private Bag X7, CLAREMONT 7735

The Protea Atlas Project (www.nbi.ac.za/protea) stands at 250 000 records of proteas from 60 000 localities. The data are being finally checked and got ready for final distribution to interested parties. An atlas – both paper and electronic - will be produced in 2003.

In the meantime, we are using Bayesian modelling to fill in the gaps, in partnership with staff at the Dept of Evolutionary Biology - University of Connecticut. Using environmental variables (rainfall, temperature, geology, relief, frost, altitude) we are interpolating the distribution ranges of species. More excitingly, our model includes a neibourhood effect. Data are being modelled at 1' resolution. The model intrinsically calculates species richness at any cell from the probabilities of individual species presence. Among the exciting results to date is an unexpected 'ghosting' effect where data for a species 'incorrectly' maps the distribution of sibling species.

Unfortunately, run times are long (weeks) and only small areas and a few species have been analysed to date.

Two other spinoffs of the Bayesian modelling are a phylogeny of the Proteaceae – Gail Reeves is sequencing DNA and we will be capturing morphological data for a combined resolution of the tree; and, field work to map our gaps. Mapping gaps requires the recording of null plots where proteas are absent, except that often proteas are not absent. Previously unmapped Fynbos pockets westsoutwest of Warmwaterberg (on shales), in the Cango formations of the northern Little Karoo have now been mapped. A new subspecies, or a major range extension for *Leucadendron elimense elimense* to the hills just south of Genandenal, is the result of these gap fillings.

The Protea Atlas data continue to be used. They have formed a major data source for the new Fynbos vegetation map in production. They are being used to model climate change and its implications. They continue to inform CAPE and other projects like the Lowlands Project. They will be incorporated into PRECIS and be made available to inform EIAs, IEMs and EMPs.

New South African Vegetation Map

A.G. Rebelo & **W. Smit**
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For several years now phytosociologists have been hard at work putting together a new detailed vegetation map to replace Low and Rebelo's vegetation map. The rational for this was that Low and Rebelo was a concensus opinion map, pooling expertise and opinions, but not based on hard data. The new vegetation map was to be based on data collected by Acocks, vegetation ecologists and others interested in plant communities. It has been over 5 years in the making. The first stages of capturing all the data in notebooks, field sheets and scientific papers has been completed and the first maps produced for ground truthing. Data for the Fynbos have been mapped at about 1:100 000 - 250 000 scale, firstly from satellite images, then from the geological map of the region, but augmented by phytosociological data, Moll and Bossie's map, Protea Atlas data and the Lowlands Project.
Here we present the Fynbos Biome section of this map. The rationale has been to divide Fynbos and Renosterveld into its geological components. Thus we have Sand, Sandstone, Quartzitic, Granite and Shale Fynbos, and Granite, Silcrete and Shale Renosterveld. A new category of Alluvium Renosterveld and Alluvium Fynbos, completes the geological background. Cederberg Fynbos has been divided into a flat-land and dissected area components. These are readily discernable on satellite photographs, but are not quite so robust phytosociologically. Riviersonderend, Hex, Langeberg and Swartberg Sandstone Fynbos have been segregated into Dry (northerly) and Mesic (southerly) components. Two other important communities have been mapped for the first time: Alpine Fynbos and Cederberg Shale Communities. The latter are major components of the Mountain Flora, but are very poorly studied. Strandveld, Thicket, Karoo and Forest types are also mapped.
Detailed descriptions of these vegetation types are being compiled. Unfortunately, much of Fynbos is very poorly studied. Several new types have been identified –

these are totally unknown. The limestone and conglomerate floras from the northern Little Karoo basin are unexplored. The Granite Fynbos and Renosterveld communities at Robertson, and the Shale Fynbos communities in the Riviersonderend harbour the Red Data Book *Leucospermum formosa: what else do they contain?* Clearly, we have only just begun to map out what we do not know.

Conservancies in the Garden Route Area

Justine Sharples
WCNCB George

Since 1996 Cape Nature Conservation has invested a significant effort in the establishment and maintenance of conservancies in the Garden Route Area. Presently twelve conservancies are registered in this area with Cape Nature Conservation, of which seven are urban conservancies and the remaining five rural conservancies.

Through the work of many volunteers within these conservancies many successful conservation projects have been initiated. Benefits to the environment are obvious with projects such as alien vegetation removal, erosion control and recycling being ongoing in many conservancies. In urban conservancies the creation of wildlife habitats / refuges, is a very important project, especially considering the 'pressure' which the Garden Route experiences in the busy holiday seasons.

The promotion of environmental awareness and sensitivity through Conservancy newsletters, open days, radio interviews, environmental education and newspaper articles has already improved the understanding of our natural environment in many communities.

The role of Cape Nature Conservation is the provision of support, motivation, facilitation and advice to these conservancies. While these functions take on many forms, Cape Nature Conservation is able to improve its effectivity in the communities via the conservancies. In this way we are achieving far more for conservation than would otherwise have been possible.

By the promotion of awareness of the natural environment conservancies are able to draw attention to the natural assets in their own areas, creating a feeling of ownership and encouraging involvement of the conservancy members.

Due to the fact that many people move to the Garden Route because of its natural beauty, the conservancies, in partnership with Cape Nature Conservation, are helping them to understand and appreciate the value of a healthy natural environment.

SA-ISIS BioMAP: A demonstration of on-line access to biodiversity data

Rebecca Sims-Castley
SA-ISIS BioMAP, Terrestrial Ecology Research Unit, Department of Zoology, University of Port Elizabeth, P.O. Box 1600, Port Elizabeth 6000

The South African Integrated Spatial Information System (SA-ISIS) is a web-based information system making spatially explicit biodiversity information and analytical tools accessible to decision-makers at all levels of society, thus promoting biodiversity conservation, environmental health and human welfare in South Africa. Common problems associated with utilizing most biodiversity data include lack of access or availability due to the decentralized and unstandardized nature of existing datasets, as well as inherent shortcomings in the data themselves due to the *ad hoc* nature of collections, presence-only data, biased sampling and large temporal and spatial gaps in collection effort. As a result, decision makers are not able to utilize this vast store of existing information to make informed decisions about the environment. Furthermore, many decision-making agencies either do not have access to appropriate spatial data, nor have the skills or budgets to use the expensive, sophisticated specialist software and tools required to manipulate these data. The biodiversity component of SA-ISIS, BioMAP, has attempted to overcome some of these obstacles by (1) cataloguing and integrating many of the biodiversity databases within South Africa into a distributed database, and (2) providing on-line GIS mapping tools and spatial models to visualize, query and manipulate these data. Specific examples of these resources are demonstrated.

An Evaluation of the success of re-introduction of species into Rondevlei Nature Reserve, Western Cape

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Re-introduction is the intentional movement of an organism into a part of its native range (original geographic range); from which it has disappeared or become extirpated in historic times, as a result of human activities or natural catastrophe. Rondevlei Nature Reserve on the Cape Flats of the Western Cape has extremely high plant diversity and contains species endemic to the area. The Cape Flats have been subjected to severe habitat fragmentation and subsequent species loss due to urbanization, agriculture and the invasion of woody aliens. The re-introduction of threatened species into Rondevlei was done in an attempt to restore the area that was alienated by Acacia spp. and to rescue selected Cape Flats species threatened by extinction. The success of this process is being evaluated to determine if the re-introduction program was successful and whether re-introduction is a viable option to the above problems. Success of re-introduction is defined as the ability of a population to survive and reproduce, and re-introduction is only considered to be successful when a species is safely relocated in their ecological as well as their evolutionary context. Twenty-two species have been re-introduced into a part of Rondevlei over the last eight years. The aim of this study is to examine the reproductive status of the re-introduced species in order to determine the viability of the re-introduction program. The viability of the seed of the re-introduced species will be determined; the seed bank in the re-introduced as well as non re-introduced area will be examined and compared; the above ground vegetation will be assessed; and the soil in both the re-introduced and the non re-introduced areas will be analysed and compared.

Factors affecting alien grass invasion into West Coast Renosterveld fragments

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With only 1.76% conserved West Coast Renosterveld left, of which 80% is privately owned it is crucial to prioritize the conservation and management of this fragile vegetation type. Because of its occurrence on more fertile soil, Renosterveld has been cleared for cultivation and other agricultural use and thus fragmented to a critical point. These remaining fragments are subject to extensive edge effects and the exact parameters of a fragment viable for conservation must be determined. To contribute to the establishment of this, the extent of alien grass species invasion into the remnant Renosterveld patches will be determined through collecting data using transect lines. Sampling will include four different management treatments: grazed vs. ungrazed and burned vs. unburned. The sampling would also include two different surroundings: fertilized crops vs. unfertilized pasture lands, to determine the extent and the difference of the effect each of these have on the relic patches. The extent of invasion by alien grass species from the adjacent cultivated lands, identification of the major alien species posing a threat and what the exact species composition of these edges of remnant patches are, would provide the basis to compare the different management regimes in terms of the disturbance regime associated with it and then identify factors within each which could promote alien establishment. Ultimately the results would contribute to the identification of factors affecting alien grass invasion into the Renosterveld fragments, provide information to aid in establishing the most effective management regime and to determine the exact area of pristine Renosterveld left for conservation.

Renosterveld Riches - Snippets on the Lowlands Flora

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A single fieldwork season spent exploring the plants in the Ovberberg and on the West coast has revealed some of the previously unknown and some nearly forgotten gems of the lowland flora. The discovery of five brand-new plant species in addition to countless range extinctions and the astonishing rediscovery of plants that were last seen in the nineteeth century and thought to be extinct caused great excitement in botanical circles. Several of the interesting stories even reached the general public through various media reports. The findings made so far (more fieldwork to follow) have already greatly extended our knowledge of the lowlands flora and they demonstrate the value of primary data collection. It makes our conservation efforts of the remaining renosterveld patches ever more urgent - as we become more aware of what is in danger of being lost - but also much more meaningful.

Plant species succession onto old fields in West Coast Renosterveld, with different grazing intensities.

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West Coast Renosterveld is restricted to fertile soils in the winter – rainfall region of the Western Cape, on the ecotone between mesic Fynbos and Strandveld/ Succulent Karoo shrubland. As 97% of this vegetation type is converted to wheat fields, vineyards and villages, the remaining fragments have an irreplaceable conservation value. Renosterveld has a high diversity of endemic geophytes. The challenge for conservation is that there is no information on the precolonial composition of Renosterveld, or on the effects of disturbances on composition or diversity of the vegetation. Conservation agencies and land – owners require baseline information to guide management decisions.

My research is based on three properties in the Wellington Magisterial District, namely the Voelvlei Reserve (WCNCB), THE Elandsberg Private Nature Reserve and Krantzkop (Somchem). Together these constitute the largest remaining fragment of this vegetation type. The general aim of my research is to gain an understanding of the effects of past ploughing, burning and grazing on the composition and diversity of West Coast Renosterveld. My research questions are (1) How do plant communities differ between natural vegetation and old fields in terms of cover, composition, species richness and diversity? (2) How are these variables influenced by different grazing intensities and fire history? (3) What are the dominant species and lifeforms in all treatments? (4) How does the proportion of alien plant species vary among treatments?

My approach will be to compare the cover and composition of vegetation that has previously been ploughed with adjacent natural "controls". These comparisons will be carried out for sites that burned on known dates across a gradient of increasing indigenous mammal grazing intensity (Voelvlei<Elandsberg<Krantzkop). Sampling will be carried out in winter and spring using modified Whittaker plots ($1000m^2$). During summer, $25m^2$ plots will be sampled using the Braun Blanquet technique to determine percentage cover and lifeform composition.

Results of my research will provide a basis for use of fire and grazing for biodiversity conservation in this endangered vegetation type.

Working for Wetlands: Noordhoek Restoration Project

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Alien clearing & wetland rehabilitation in the South Peninsula received a boost in November 2001. To facilitate the R3.45 million Dept. of Env Affairs & Tourism (DEAT) funded project a unique partnership between the Santam / Cape Argus, Ukuvuku: Operation Firestop Campaign, the City of Cape Town (South Peninsula Administration) and the Wildlife and Environment Society of South Africa: Western Cape Region (WESSA: WC) was formed. Poverty alleviation and community upliftment was the major focus of the project which aimed to employ approximately 600 people from the local community during the 4 month project which ran until end of April 2002. Apart from some work in others parts of the CMA, this project focused on the Noordhoek Wetlands.

Keysers River Restoration Project

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In early 2001, City of Cape Town, initiated a process to explore 'partnerships for sustainability' for a section of the Keysers River system in Cape Town. Within a short time local businesses, Tellumat, Pfizer, Gabriel, Zest, Cape Candles and Pinecore, joined forces with the SPA to revitalise, restore and maintain the river into the future. Wildlife and Environment Society of SA came on board to supervise and train the workers on the ground; and manage the trust account which contains the project finances. Common Ground Consulting was appointed to facilitate the project.

It is hoped that this project will become a blueprint for addressing local government /corporate /community involvement in sustainably managing all our river systems in the City of Cape Town. In this regard, two other projects on watercourses in the South Peninsula have been initiated.