



FYNBOS FORUM

REPORT

THEME: Delivering the Goods

01-05 August 2005
Pine Lodge
PORT ELIZABETH

Organised by the Fynbos Forum Committee.

Funded by C.A.P.E.

AND

The Conservation and Management of Ecosystems and
Biodiversity Focus Area of the National Research Foundation



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ACKNOWLEDGMENTS

FYNBOS FORUM

1-5 August 2005

We wish to acknowledge with many thanks the following for their financial assistance this year:

1. National Foundation for Research Development (NRF) for sponsorship
2. The Capacity Building Programme (CBP) managed by the Table Mountain Fund for sponsoring 14 participants to attend the Fynbos Forum this 2005
3. Critical Ecosystems Partnership Fund (CEPF) for funding the Fynbos Forum Research Strategy.
4. The Botany Department of the University of Cape Town for facilitating the NRF funding
5. The Botanical Society of South Africa for hosting the secretariat, and the special offer of Field Guides.

COMMITTEE MEMBERS 2004 – 2005

Chairman:	Ms Julia Wood
Committee:	Mr Mark Botha Donovan Kirkwood Dr Richard Knight Dr Connie Krug Dr Christo Marais Mrs Maryke Middelmann Ms Zohra Parkar-Salie Dave Richardson Mrs Anne-Lise Schutte Vlok Mr Warrick Stewart
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.

PREVIOUS FYNBOS FORA

1988	:	Avalon Hotel, Montagu
1989	:	ClanWilliam
1990	:	Stellenbosch, The University of Stellenbosch, Die Ark
1991	:	Bredasdorp, Potberg
1992	:	UCT, Cape Town
1993	:	16 & 17 March (Drosdy Museum, Swellendam)
1994	:	13-15 July (Bien Donné, Stellenbosch)
1995	:	5-6 December (Mispah Youth Centre, Grabouw)
1996	:	17-18 July (The Nekkies Dist. Worcester)
1997	:	16-18 July (Genadendal)
1998	:	22-24 April (Die Herberg, Waenhuiskrans, Arniston)
1999	:	September (Rein's Nature Reserve, Albertinia)
2000	:	7-9 June (Ganzekraal Holiday Resort & Conference Centre)
2001	:	01-03 August (Calitzdorp Spa)
2002	:	14-16 August (Goudini, Rawsonville)
2003	:	05-08 August (Hartenbos Resort, Hartenbos, Dist. Mossel Bay)
2004	:	10-13 August (Club Mykonos, Langebaan)

Time	Mon 1 Aug	Tues 2 Aug	Wed 3 Aug	Thur 4 Aug			
07h15			Breakfast and late registration	Breakfast and late registration			
07h30		Breakfast and late registration					
08h00				Paper Session 6: <i>Planning</i>	Paper Session 7: <i>Aquatic and Riparian Ecosystems</i>		
08h30							
08h45				Workshop 1: <i>Environmental Education</i>			
09h00							
09h15		Welcome – Julia Wood		Workshop 2: <i>Land use Planning</i>			
09h30		Opening Address					
09h45		Paper Session 1: <i>Setting the Scene - What Fynbos Forum is all About</i>	Paper Session 8: <i>Capacity Building and Education</i>	Workshop 3: <i>Fynbos Forum Research Strategy</i>			
10h00							
10h15				Tea (served during workshops)			
10h30				workshop ctd	workshop ctd	workshop ctd	
11h00			Tea & Baviaanskloof Video		Keynote Address by Hans Lambers		
11H20				Paper Session 11: <i>Partnerships</i>		Paper Session 12: <i>Ecology and Ecophysiology</i>	
11h30		Tea	Paper Session 9: <i>Monitoring and</i>	Paper Session 10: <i>Biological</i>			
12h00		Paper Session	Paper Session				

13h00		2: <i>Fynbos Research: An Eastern Perspective</i>	3: <i>Stewardship</i>	<i>Evaluation</i>	<i>Invasives</i>					
13h05		Lunch			Lunch					
13h15										
13h30										
14h00		Paper Session 4: <i>Urban Conservation</i>	Paper session 5: <i>Ecology: Fragmentation & Oxalis Research</i>	Field Trips		Paper Session 11: cont.	Paper Session 12: Cont.			
14h30						Paper Session 13: <i>CAPE Fynmense</i>				
15h00						Closure				
15h50										
16h00		Tea & Poster Session								
16h10										
17h00	Registration	AGM						Tea		
17h45										
18h00		Heiveld Co-operative Video								
18h30										

19h00	Dinner	Dinner	Banquet Dinner and Awards	Dinner
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Fynbos Forum 1-4 August 2005 Programme

PLEASE NOTE: Presenter's names are in italics.

Time	Mon 1 Aug
17h00	Registration
19h00	Dinner

Time	Tues 2 Aug
7h30	Breakfast & late registration
9h00	Welcome – <i>Julia Wood</i>
9h15	Opening address – <i>Speaker to be confirmed</i>
	Paper Session 1: Setting the Scene - What the Fynbos Forum is all about? Chair: Xola Mkefe
9h45	<i>Trevor Sandwith: Fynbos Fynmense: People in the Mainstream of C.A.P.E.</i>

10h00	<i>Mandy Driver</i> : Integrating Biodiversity in Spatial Development Frameworks: Lessons and Challenges from the Western Cape Provincial SDF	
10h15	<i>Ismail Ebrahim</i> : Conserving Threatened Plants in the CFR: CREW in Action	
10h30	<i>Zwai Peter</i> : Communication for Conservation	
10h45	Tony Rebelo: <i>The Red Data List of Proteas</i>	
11h00	<i>Brett Myrdal</i> : The Table Mountain National Park – Progress and Lessons in Striding Towards the Goal of Being Recognised as the World’s Leading Urban National Park by 2010	
11h15	Baviaanskloof Mega Reserve: Working with Communities	
11h30	Tea	
	Parallel Session 2: Fynbos Research: an Eastern Perspective Chair: Karen Esler	Parallel Session 3: Stewardship Chair: Andrew Skowno
12h00	Keynote address: <i>Richard Cowling</i> : Fynbos Diversity and Dynamics: Looking West from the East	<i>Mark Botha</i> : Stewardship and Agro Industries in Conservation: Lessons from Brazil
12h15	<i>Christo Botes</i> : Pollination Ecology of Sympatric <i>Satyrium princeps</i> and <i>S. membranaceum</i> in the Eastern Extreme of the CFR	<i>Brian Reeves</i> : Creating and Managing a Multiple Landowner Conservation Initiative that Contributes to Target Achievement: a Case Study of the St Francis Conservancy
12h30	<i>Serban Proches</i> : Insect Diversity in Fynbos and Neighbouring Biomes	<i>Matthew Norval</i> : The Baviaanskloof Mega Reserve, Eastern Cape Province, South Africa:
12h45	<i>Nigel Barker</i> : DNA-Based Research: A New Generation of Fynbos Studies?	<i>Chris Martens</i> : The CapeNature Stewardship Programme
13h00	<i>Discussion</i>	<i>Reginald Jantjies</i> : Stewardship Partnerships in Action
13h15	Lunch	
	Parallel Paper Session 4: Urban Conservation Chair: Toni Xaba	Parallel Paper Session 5: Ecology: Fragmentation & Oxalis Research Chair: Pat Holmes
14h00	Keynote address: <i>Dalton Gibbs</i> : Biodiversity for Our People – the Urban Imperative	<i>Raphael Kongor</i> : The Effect of Habitat Fragmentation on Species Distribution in Lowland Fynbos: a Case Study in the Sand Plain Fynbos of the Riverlands Nature Reserve and its Environs
14H15	<i>Eldrid Uithaler</i> : Conservation in Urban Communities: a Case Study in the Nelson Mandela Metropolitan Municipality	<i>Comelia Krug</i> : Small Mammal Assemblages and Populations in Fragmented Habitats of the Western Cape Lowlands
14h30	<i>Rupert Koopman</i> : Trials and Tribulations of the Greater Harmony Flats Reserve: Making a Corridor Work	<i>Odetta Curtis</i> : The Effects of Habitat Fragmentation on the Black Harrier <i>Circus maurus</i> in the Lowlands of the Western Cape, South Africa

14h45	Charline McKie: A phone call, a fax, a visit.....and don't forget to follow up	<i>Sandy Siqueira</i> : General Assessment of the Reproductive and Pollination Biology of <i>Oxalis</i> in South Africa
15h00	<i>Eugene Moll</i> : Are we loving our small reserves to death?	<i>Léanne Dreyer</i> : An Assessment of the Tristylous Breeding System of <i>O. purpurea</i> (<i>Oxalidaceae</i>) in South Africa
15h15	<i>Adam Welz</i> : Reconciliation Ecology – going forward to nature	<i>Johlene Zietsman</i> : An Assessment of the Reproductive Biology and Ecology of Selected Rare and Endangered <i>Oxalis</i> species
15h30	<i>George Davis</i> : Urban Conservation in the CFK – Follow up from last year's workshop	<i>Karen Esler</i> : Flowering Phenology of South African <i>Oxalis</i> - Possible Indicators of Climate Change
15h45	<i>Discussion</i>	<i>Discussion</i>
16h00	Tea & Poster Session	
17h00-17h45	AGM	
18h30	Heiveld Co-operative Video: Everybody's cup of Tea	
19h00	Dinner	

Wed 3 Aug		
Time 7h15	Breakfast & late registration	
8h00	Parallel Paper Session 6: Planning: Chair: Sue Winter <i>Stephen Holness</i> : Beyond Reserve Selection: Integrating Systematic Conservation Planning Principles into Protected Area Management	Parallel paper Session 7: Aquatic & Riparian Ecosystems: Chair: Toni Belcher <i>George Davis</i> : Western Cape Wetlands Forum

8h15	<i>Paul Britton: Conservation Development Framework (CDF): A Spatial Planning Tool for Protected Areas.</i>	<i>Dean Impson: Current and Proposed Piscicide Operations in the CFR: Status, Lessons Learnt and Stakeholder Involvement</i>
8h30	<i>Tertius Carinus: Translating Research into Action – Maps as Management Tools</i>	<i>Steven Lowe: The Impact of Invasive Fish on Foothill River Ecosystems in the Cape Floristic Region</i>
8h45	<i>Johan Burger: The Sandveld Area Wide Planning Process</i>	<i>Sean Marr: Conservation Protocol for the Indigenous Freshwater Fishes of the Cape Floristic Region</i>
9h00	<i>Andrew Knight: Translating Regional Conservation Priorities to Local "Conservation Opportunities"</i>	<i>Natalie Newman: The Nuking of Die Oog – a Fishy Tale</i>
9h15	<i>Verna Bowie: Why is it so hard to incorporate biodiversity issues into cultivation?</i>	<i>Rembu Magoba: Comprehensive Assessment of the Ecological Water Requirements of the Olifants/Doring River</i>
	Parallel Paper Session 8: Capacity Building & Education	
	Chair: Jayne Coleman	
9h30	<i>Rodney February: Capacity Building Programme, TMF</i>	<i>Lindi Smith-Adao: The Relationship Between Riparian Vegetation, Channel Discharge and Channel Morphology in the Lourens River, Western Cape, South Africa</i>
9h45	<i>WESSA EP: Bethelsdorp Eco-Schools</i>	<i>Patricia Holmes: Targets for Ecosystem Repair in Fynbos Riparian Vegetation</i>
10h00	<i>Richard Knight: Bridging the Educational Divide Using eLearning: Implications for all courseware development and instruction</i>	<i>Gail Cleaver: Wetland Restoration</i>
10h15	<i>Nancy Job: Putting Biodiversity Plans to Work for Local Municipalities</i>	<i>Japie Buckle: Status of Wetlands in the Southern Cape</i>
10h30	<i>Warrick Stewart: Supporting Land-use Planners and Decision-makers to Ensure a Sustainable Land-use Legacy</i>	<i>Discussion</i>
10h45	Discussion	
11h00	Tea	
	11h15 Western Baviaanskloof Initiative / Baviaanskloof Mega Reserve Video	
	Parallel Paper session 9: Monitoring & Evaluation	Parallel Paper session 10: Biological Invasives:
	Chair: Azisa Parker	Chair: Connie Krug
11h30	<i>Gael Campbell-Young: Paarl Mountain Nature Reserve Herbarium Project</i>	<i>Sara Muhl: Grass Invasion in Renosterveld</i>
11h45	<i>Glenton Moses: The Need to Monitor Biodiversity in the City of Cape Town</i>	<i>Fiona Impson: Biological Control of Australian <i>Acacia</i> species in South Africa: a Seedy Affair</i>
12h00	<i>Wessel Vermeulen: Towards the Sustainable Harvesting of <i>Bulbine latifolia</i> in the Southern Cape</i>	<i>Alan Wood: Success of the Gall Rust Fungus <i>Uromycladium tepperianum</i> in Controlling <i>Acacia saligna</i></i>

12h15	<i>Toni Belcher</i> : State of Rivers Report for Greater Cape Town's Rivers	<i>Tony Gordon</i> : Biological Control of <i>Hakea sericea</i> : Past Successes Revisited and Present Activities
12h30	<i>Tovhowani Ndiitwani</i> : Ecological State of the Diep River catchment	<i>Jeff Manuel</i> : A Case for Delisting Category 1 Invasive as a Catalyst for Eradication: The Spanish Reed hypothesis
12h45	<i>Chantel Petersen</i> : Preliminary Results of River Health Assessments Conducted on Rivers of the Overberg Region, Southwestern Cape	<i>Saskia Fourie</i> : Recovery of Indigenous Vegetation After Clearing of Alien Invasive Vegetation in the Albany District, Eastern Cape
13h00	<i>Cecilé Reed</i> : River Health Monitoring in the Garden Route Illustrating the Effects of Changing Land-use on Water Quality	<i>Alexander Schutz</i> : Organic Amendments: A Recipe for the Restoration of <i>Acacia</i> Invaded Fynbos
13h15	Discussion	<i>Karin Neethling</i> : The Effect of Soil Type and Climate on the Growth and Survival of <i>A. saligna</i> and <i>A. cyclops</i> Seedlings on a Mountain Gradient in Villiersdorp, South Africa.
13h30	Packed Lunch Field Trips	
19h00	Dinner: Awards	

	Thurs 4 Aug		
Time			
7h15	Breakfast & late registration		
8h00-11h00	Parallel Workshop 1: Environmental Education Convenor: Jayne Coleman	Parallel Workshop 2: Land Use Planning Convenor: Mandy Driver	Parallel Workshop 3: Fynbos Forum Research Strategy Convenor: Julia Wood and Mandy Barnett
10h00	Tea – will be served during the workshops		
	<i>Paper Session 12: Ecology & Ecophysiology:</i> <i>Chair: Mike Cramer</i>		

11h00 - 11h15	Keynote address: <i>Hans Lambers: Mineral Nutrition of Geographically Restricted and Widespread Species of the Proteaceae in Western Australia</i>	
	Parallel Paper Session 11: Partnerships Chair: Mandy Barnett	<i>Parallel Paper Session 12: Ecology & Ecophysiology:</i> Chair: Tony Rebelo
11h20	<i>Paul Gerber: The Use of Fire Protection Associations in Reaching Biodiversity</i>	Mike Cramer: <i>Phosphorus and Biodiversity in Fynbos: Causal Link or Misleading Correlation</i>
11h35	<i>Andrew Knight: The Challenge of Consilience: why the knowledge of all stakeholder groups is equally essential, and valid, for sustainable land management</i>	<i>James Reeler: The Role of Life History and Species Mobility in Determining the Distribution of Two Proteas</i>
11h50	<i>Augustine Morkel: Private Sector Funding of Biodiversity Projects: Are They Interested?</i>	Richard Knight: <i>Revealed Patterns of Establishment of an Introduced Leucospermum cordifolium (Proteaceae) – Implications for Ant-Plant Mutualism</i>
12h05	<i>Sue Winter: Greenwashing or Real Benefits for Biodiversity? Perspectives from the Biodiversity & Wine Initiative</i>	Fernando Ojeda: <i>Fire, Rain, and the Evolution of Seeder and Resprouter Forms in Fynbos Ericas</i>
12h20	<i>Werner Voigt: The Role of SANBI Botanic Gardens in Biodiversity Conservation</i>	Lize Agenbag: & Karen Esler: <i>Fynbos and Succulent Karoo Growth Patterns on an Elevational Gradient – Glimpses into a Future of Climate Change</i>
12h35	<i>Toni Xaba: Botanical Gardens' Role in Ecosystem Conservation: The Betty's Bay Approach</i>	Heidi Hawkins: <i>Protea Farming: Putting Back What We Take Out - But How Much?</i>
12h50	<i>Carly Cowell: Millennium Seed Bank Project South Africa – Fynbos Conservation Through Seed Collection</i>	Mariette Smart: <i>Carbohydrates, Gene Expression and Flowering in Protea species</i>
13h05	<i>Lunch</i>	

14h00	<i>Julia Wood: Table Mountain Fund into the Future</i>	Caren Jarmain: <i>Total Evaporation from a Mature Stand of Protea-dominated Fynbos</i>
14h15	Xola Mkefe: Building People Building Parks	<i>William Stafford: Soil Bacteria Associated with Proteaceae Plants</i>
14h30	<i>Dalton Gibbs: Bulldozers and Biodiversity – Radical Makeovers.....</i>	Discussion
14h45	Discussion	
	Paper Session 13: CAPE Fynmense Chair: Julia Wood	
15h05	<i>Azisa Parker: C.A.P.E. Partners' Conference 2005: Key lessons, insights and recommendations</i>	
15h20	CF Nature: Harmony Flats (video)	
15h35	Nature's Valley Trust: Fynbos, Butterflies and Little People	
15h50	Closure	
16h10	Tea	
19h00	Dinner	

Friday: 5 Aug Breakfast and return home

POSTER TITLES AND NUMBERING

Poster Session

Tuesday 2 August @ 16h00

1	<p>Present status and freshwater requirements of the macrophytes of the Olifants Estuary, South Africa Janine Adams, Tom Bornman and Chantel Bezuidenhout Department of Botany, Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth, 6031</p>
2	<p>Re-survey of woody alien vegetation on Table Mountain, South Africa – 40 years on <u>Key-words:</u> Table Mountain, alien vegetation, comparative data Zohra Boltman and Eugene Moll Biodiversity and Conservation Biology Dept., University of the Western Cape, Private Bag X17, Bellville 7535</p>
3	<p>Walking towards the future <u>Key words:</u> Community, Youth, Urban conservation Elzanne Burger, Cape Flats Nature / City of Cape Town, Helderberg Nature Reserve, P O Box 19, Somerset West ,7129</p>
4	<p>Alien Infestation vis Chemical Contamination: A glimpse at the Bitou and Keurbooms Rivers Buthelezi, S.N.P. CapeNature, RCU: Aquatic Scientist (RHP), 4th Floor, York Park Building; York Str. P/ Bag X6546; George, 6530; SA</p>
5	<p>Threatened species of the Cape Floristic Region: the story thus far <u>Key words:</u> Threatened species, Western Cape, assessments Fahiema Daniels, SANBI, Private Bag X101, Pretoria, 0001</p>
6	<p>EnviroYouth – Encouraging Leadership for a Sustainable Future <u>Keywords:</u> Leadership, Sustainable, Youth John Davids, Tsofelo Hlatywayo, Arnel van Noie & Mandisa Mdala CapeNature, Boland Mountain Business Unit, Limietberg Nature Reserve, P/Bag X 14, Paarl, 7620 CapeNature, Boland Mountain Business Unit Office, P O Box 1981, Somerset West, 7129</p>
7	<p>Education for Biodiversity and Sustainable Living Roleen Ellman, Gold Fields Environmental Education Centre, Kirstenbosch National Botanical Garden, South African National Biodiversity Institute (SANBI)</p>
8	<p>Long-term vegetation monitoring - a 30-year record from Table Mountain <u>Keywords:</u> Vegetation change, trampling, paths Paul Emms and Eugene Moll Biodiversity and Conservation Biology Department, University of the Western Cape, Private Bag X17, Bellville 7535</p>
9	<p>A practical field procedure for identification and delineation of wetlands and riparian areas – final draft. <u>Key words:</u> wetland, riparian, delineation Compiled by: Forestry Industry, National Government, Provincial Nature Conservation Boards and</p>

	Wetland NGO's. Naomi Fourie, Department of Water Affairs and Forestry, Private Bag X16, Sanlamhof, 7532
10	Spearheading the biodiversity and wine initiative in the Schapenberg wine region <u>Key words:</u> Schapenberg, Biodiversity Wine Initiative Andreas Groenewald, Heather Epstein, Dianne Marais Schapenberg-Sir Lowry's Conservancy, Box 246, Sir Lowry's Pass, Cape 7133
11	Impacts of the invasive species <i>Arundo donax</i> (giant reed) on biodiversity at the community-ecosystem level <u>Key words:</u> <i>Arundo donax</i> , biodiversity, community-ecosystem Gené Guthrie, Richard Knight and Brian van Wilgen Biodiversity and Conservation Biology Department, University of the Western Cape, Private Bag X17, Bellville 7535
12	Re-Introduction of Klipspringer (<i>Oreotragus oreotragus</i>) into the Table Mountain National Park <u>Key Words:</u> Klipspringer, Table Mountain National Park, Monitoring AntoinetteJini, Gavin Bell South African National Parks, P.O. 37 Constantia, 7848
13	Putting Biodiversity Plans to Work for Local Municipalities. <u>Key words:</u> Spatial Development Frameworks, Municipal Biodiversity Summary Map Nancy Job, Conservation Unit, Botanical Society of South Africa, P. Bag X10, Claremont, 7735.
14	Hands on environmental education about medicinal plants on the Cape Flats <u>Key words:</u> Medicinal, Cape Flats, Education Zithobile Lembethe, Cape Flats Nature / City of Cape Town, Edith Stephens Wetland Park, Lansdowne Road, Philippi
15	<i>Medicinal plants of the Cape Flats</i> <u>Key words:</u> Medicinal, Urban, Cape Flats <i>Marx-Lenin Nagan, Cape Flats Nature / City of Cape Town, Strandfontein Depot, Weltevreden Road, Mitchells Plain</i>
16	Private Protected Areas and their role in conservation – the Little Karoo <u>Keywords:</u> game farmers, private land, protected areas Lorena Pasquini, Department of Geography, Sheffield University, Sheffield S10 2TN, UK Department of Botany, PO Box 77 000, NMMU, Port Elizabeth 6031
17	The Vegetation of South Africa: The Fynbos Vegetation, Conservation Status, Transformation Status, Endemicity T. Rebelo, Protea Atlas Project, SANBI
18	Specialised 'dauciform' roots of Cyperaceae exhibit convergent physiology with 'proteoid' roots of Proteaceae to challenge phosphate-poor environments <u>Key words:</u> plant nutrition, citrate exudation, root clusters Shane, M W^{1,2}, Cawthray GR¹, Cramer MD^{1,2} and Lambers H¹ ¹ School of Plant Biology, Faculty of Natural and Agricultural Sciences, The University of Western Australia, Crawley, WA 6009, Australia ² Department of Botany, University of Cape Town, Private Bag, Rondebosch, 7701, South Africa.

FIELD TRIPS

03 August 2005

13h30 for rest of afternoon

1. **Wes Berrington** is happy to run a fieldtrip to **the van Stadens Wildflower reserve**, incl. van Stadensberg mnt range (Lady Slipper) - will be largely a botanical trip to look at threatened habitats and plant species of special concern (RDBs etc.)
2. **Eldrid Uithaler** and Clyde Scott can lead trip to **van der Kempskloof/Parsonsvlei** - threatened habitats and species of special concern (RDBs etc.) + environmental education + plans for fledgling community conservation initiative
3. **Warrick Stewart** will organise a trip dealing with urban conservation issues in the Metro along with the relevant NMMM staff - will be habitat orientated, but ecosystem service, aesthetic, and management issues will also be addressed.
4. **Linda Redfern** will take us on a **Tour of Coega Development: taking in the National Ports** - A visit to Authority's new deepwater harbour, the Coega Development Corporation's surrounding Industrial Development Zone; where more than 30% of the land has been retained as permanent open space, and, the Holding Nursery which currently houses a large part of the one million plants salvaged (on an on-going basis) from sites before bush clearing operations commence.

WORKSHOP ABSTRACTS

Thursday 4 August 2005

8h00-10h30

C.A.P.E. Conservation Education Program – Towards a Strategy for Conservation Education in the Cape Floral Region

Jayne Coleman, *C.A.P.E. Conservation Education Programme, Environmental Education & Sustainability Unit, Rhodes University, GRAHAMSTOWN*

The C.A.P.E. Conservation Education Program is a cross-cutting program of the overall C.A.P.E. Program. This program is responsible for supporting conservation education in the CFR by assisting C.A.P.E. Programs and projects with the co-ordination, development and implementation of conservation education initiatives. This

workshop at the Fynbos Forum is to discuss and formulate a draft strategy for conservation education in the CFR and look for implementation partners for the different aspects of the strategy.

Currently conservation education has a number of different aliases – it includes environmental education, social ecology and community-based outreach for example. Most organizations have programs that run independently of any others and this leads to some confusion as certain audiences and topics receive very high levels of attention while others are practically ignored. The workshop session will require participation and input from all of the organizations working in the CFR who undertake any form of conservation education. It will provide an opportunity for the different role-players to meet and seriously look at the best way forward for conservation education in the CFR.

All participants at the Fynbos Forum will receive a draft strategy document prior to the Fynbos Forum plus a questionnaire that will deal with their organizations conservation education policies, strategies, staffing, infrastructure and funded programs that have been implemented. It is hoped that these questionnaires will be completed and submitted prior to the Fynbos Forum so that an overall picture can be developed for presentation at the workshop. Due to the limited resources in human, infrastructure and financial capital available for conservation education, yet the recognition of its vital importance, it is critical that a co-coordinated strategy to address conservation education in the CFR is developed. Implementation of the strategy would be undertaken by the different role-players and information shared with other role-players and partners.

Fynbos Forum Working Group on Land-Use and Biodiversity Mainstreaming biodiversity in land-use planning and decision-making: projects and progress

Mandy Driver & Charl de Villiers, *Conservation Unit, Botanical Society, Private Bag X 10, CLAREMONT 7735*

Background

The last three years have seen a growing focus in the C.A.P.E. programme, and at Fynbos Forum, on mainstreaming biodiversity priorities in land-use planning and decision-making.

At FF2003, a workshop session on guidelines for incorporating biodiversity considerations in environmental assessment laid the foundation for the Fynbos Forum Biodiversity Guidelines, which will be published later this year.

At FF2004, a valuable information sharing session on integrating biodiversity priorities into land-use planning and decision-making led to the establishment of the FF Working Group on Land-Use and Biodiversity. This Working Group hosted a workshop in October 2004 on how to overcome obstacles that prevent the effective uptake of biodiversity priorities in land-use planning and decision-making. Participants undertook to report back at FF2005.

Aims of the FF2005 workshop session

This year we would like to provide an opportunity for the growing number of projects in this field to present and discuss their lessons in more detail than is possible in a FF presentation. Several of these projects were in their infancy at FF2004, and have developed substantially over the last year. We will also review progress since the workshop in October 2004, and present the almost-final FF Biodiversity Guidelines for Environmental Assessment.

Fynbos Forum Research Strategy

Mandy Barnett¹ and Julia Wood²

¹ *C.A.P.E. Private Bag X7, CLAREMONT 7735*

² *TMF, WWF-SA, Private Bag X2, DIE BOORD 7613*

At last year's Fynbos Forum AGM, a priority action was to draft a strategy for research in the Fynbos and adjacent marine area. Early this year, the Fynbos Forum secured US\$8 500 from CEPF to undertake this work. The draft research strategy was compiled by Ian MacDonald (as a result of questionnaires that we sent to researchers in the CFR) and reviewed by Richard Cowling. Both the strategy and review have been circulated to all members of the Forum and will be discussed at the workshop, which will be facilitated by Mandy Barnett and Julia Wood.

Paper Abstracts

01-05 August 2005

Fynbos and succulent karoo growth patterns on an elevational gradient – glimpses into a future of climate change

Key words drought, biome boundaries, reciprocal transplants

Lize Agenbag¹, Guy Midgley² and Karen Esler¹

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Climate change models predict that fynbos and the succulent karoo will be severely threatened by climate conditions much warmer and drier than currently associated with these biomes. How will the plants of fynbos and the succulent karoo, both hotspots of diversity, respond to altered climate conditions? We investigated this question using an elevational gradient with associated variation in temperature and moisture. This gradient on the north-facing slope of Jonaskop in the Riviersonderend mountains also represents a natural transition between fynbos and the succulent karoo. Growth was monitored at selected points along the gradient, in plants exposed to drought by rainout shelters and in reciprocally transplanted seedlings across the gradient. Regardless of their natural distributions, all species grow best in the middle of the gradient, where temperature and moisture is at an optimum. Drought conditions lead to reduced growth in established fynbos, but mortality was insignificant. Seedlings, however, are much more sensitive to drought, with high mortalities found during summer at the driest end of the gradient. The reciprocal transplant experiment also tested soil type as a barrier to biome distributions. Fynbos seedlings do not grow well on shale-derived soils of the succulent karoo, but karoo seedlings survive and grow well on sandstone-derived soils, normally associated with fynbos. This indicates that fires in fynbos followed by droughts could lead to fynbos failing to re-establish. Such areas could potentially be invaded by succulent karoo, especially if they occur near the boundary between the two biomes. Indications are also that drought related reduced growth in mature vegetation could lead to poor reproductive output, which further threatens the successful re-establishment of fynbos in post-fire conditions.

DNA-based research: A new generation of fynbos studies?

Key Words: genetic diversity, population processes, speciation

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Over the last decade, numerous DNA-based systematic studies on fynbos plant and animal taxa have been undertaken. Many of these have indicated that our taxonomic, and indeed biological, understanding of the fynbos biota are over-simplified or even seriously flawed, and have resulted in new insights into the evolutionary history of these organisms. While almost all of these studies have been at the inter-specific level (i.e. focusing on the relationships of species and genera), a new and growing field that examines population and speciation processes ("phylogeography") is yielding interesting results. Using examples of both plant and animal studies, this talk serves to indicate how molecular studies, and phylogeography in particular, is providing new evidence of environmental and biological factors that are driving diversity processes in the fynbos. Results from a phylogeographic study on the bitou bush (*Chrysanthemoides monilifera*) are presented that suggest that rainfall seasonality may be responsible for genetic isolation. Other studies in which similar genetic fragmentation has been found are also discussed. Similarly, an example from the cicada genus *Platypleura* is used to demonstrate that cryptic (or near-cryptic) speciation may be driven by host plant switching within the fynbos biome. Coincidentally (or not?), one of these host plants is *Chrysanthemoides monilifera*! The conservation and management implications of these results are also briefly discussed.

State of Rivers Report for Greater Cape Town's Rivers

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A State of Rivers report was recently produced based on river health assessments of Greater Cape Town's Rivers in the South Western Cape. This is the fourth report in a series of reports covering the ecological state of the Western Cape rivers. The assessment was carried out in 2004 and 2005 and looked at instream and riparian habitat, riparian vegetation, water quality, fish and macro-invertebrates. Development within greater Cape Town has modified most of these rivers, with only a few upper reaches still remaining in a natural or good ecological state. This paper presents the results of the river health assessment and attempts to address the challenges of managing rivers within urban areas.

Stewardship and Agro industries in conservation: Lessons from Brazil

Keywords: South Africa, Brazil, Stewardship

Mark Botha, *Botanical Society of South Africa, Conservation Unit, Private Bag X10, CLAREMONT 7735*

South Africa and Brazil share a number of similarities although their respective hotspots are very different ecologically. In particular, Brazil also has a high degree of private ownership, high rates of ecosystem loss, some creative conservation legislation, and large agro-industries that can and sometimes do significantly contribute to conserving biodiversity. This paper will look at similarities and challenges facing SA & Brazil in the fields of stewardship, monitoring effectiveness of private conservation management and biodiversity investment by agro-industries.

Pollination ecology of sympatric *Satyrium princeps* and *S. membranaceum* in the eastern extreme of the CFR

Key words: pollination ecology, adaptive radiation

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Satyrium princeps and *S. membranaceum* are two sister species with overlapping distributions in the eastern extreme of the CFR. Observations indicated that *S. princeps* is pollinated by Malachite sunbirds, while *S. membranaceum* is pollinated by hawkmoths. Pollen flow experiments indicated that bird pollinators reduce the incidence of selfing within an individual as well as increasing the range of pollen export to more than 75m that recorded for of the hawkmoth-mediated pollination. A phenotype of *S. membranaceum* that shows adaptations to bird pollination has been found along the Cape Recife headland (Port Elizabeth) and pollinator tracking indicated that it has diurnal pollination with the majority of pollination mediated by sunbirds. A morphometric analysis of floral parts placed the bird adapted phenotype between that of *S. princeps* and the purely hawkmoth pollinated *S. membranaceum*. The selective advantage of the adaptive radiation towards a dual pollinator attraction in this orchid might lie in the ability of bird pollinators to fly in the strong winds along the coast that accompany the cold fronts during the flowering season.

Why is it so hard to incorporate biodiversity issues into cultivation decisions?

Key words: cultivation, biodiversity priorities, decision-making

Verna Bowie & Charl de Villiers

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Much has been happening on the agriculture/biodiversity front over the last year. There are many amazing initiatives underway that aim to achieve a balance between the social, economic and ecological environments. The spatially explicit initiatives, such as area-wide planning and spatial development frameworks (informed by fine-scale biodiversity planning), add an exciting dimension to the issue. There is good quality biodiversity information available to inform land use decisions. Pressures from various sectors are resulting in co-operation between government departments.

Yet there are still unresolved problems. Red tape, limited capacity and the legal environment have been hampering progress. The legal and illegal cultivation of natural vegetation is continuing at an alarming rate and is going unchecked in some areas of the Western Cape. Biodiversity priorities are not always being incorporated into the decision-making process.

This presentation aims to highlight those issues that have been resolved over the last year, identify where major problems still exist and propose a way forward that will begin addressing these major problems.

Conservation Development Framework (CDF): A spatial planning tool for protected areas.

Key words: Spatial planning, visitor use, tourism facilities.

Paul E N Britton, South African National Parks P O Box 37 CONSTANTIA 7848

Conservation Agencies are under increasing pressure to deliver financial returns and societal benefits from conservation areas. The main source of such returns is tourism development and activities. These are often in conflict with the prime objective of biodiversity conservation. The Conservation Development framework (CDF) is a strategic spatial planning process informed by biophysical informants that is followed to determine the recreational and tourism uses of a conservation area. Underpinned by a thorough analysis of biophysical informants the CDF determines visitor uses, delineates the position and nature of tourism and management infrastructure, the routes and nature of roads, entry points and areas for special management. The paper will introduce the planning process.

The Sandveld Area Wide Planning Process

Key words: Potatoes, Development, Planning

Johan Burger, CapeNature, P.O. Box 26, Porterville, 6810

The Sandveld region represents the western section of the Greater Cederberg Biodiversity Corridor. Within the corridor the Sandveld region was identified as the area under greatest threat from agricultural development at a rate of approximately 2.7 ha per day. To get a handle on the rate and scale of development in the Sandveld region, a GIS exercise was done covering a 12-year period to map habitat transformation. Remote sensing can now also be used to police illegal agricultural developments.

An area wide planning process was identified for the Sandveld as the most appropriate vehicle to promote sustainable development and the corridor initiative through this highly agricultural driven landscape. The Sandveld Area Wide Planning process will follow a phased approach to identify willing landowners for CapeNature's Stewardship Programme, establish conservation nodes and creating a natural corridor between the coastline and Cederberg Mountain following a path of least resistance through this highly threatened landscape. The GIS exercise, area wide planning process and phased approach will be presented.

Paarl Mountain Nature Reserve Herbarium Project

Key words: Paarl Mountain, herbarium, renewal project

Gael Campbell-Young, 4 Jaques Street, Paarl, 7646

Paarl Mountain is an extremely valuable natural asset in the southwestern Cape. The Paarl Mountain Nature Reserve (PMNR), constituting 1910 ha of Paarl Mountain, is used for recreation, resource harvesting, education and scientific research. The mountain is also an important cultural site and tourist attraction. Paarl Mountain is geologically interesting as a granite intrusion and vegetation from three biomes is represented in the PMNR, i.e. karoo, fynbos (including renosterveld) and forest. The mountain is under threat from agricultural activity, alien plant invasion and urbanization.

In her vegetation survey of the PMNR, Milton (2003) made numerous recommendations for improving the state and management of the reserve. Milton (2003) suggested that the existing herbarium be expanded and upgraded, since it was not fully representative of the flora of the reserve. The Paarl Mountain Advisory Board Committee acted on the recommendations which resulted in the joint initiation of the PMNR Herbarium Project by the Winelands Branch of the Botanical Society and the Drakenstein Municipality. The aim of the project is to collect herbarium specimens of every species that exists on Paarl Mountain. Several collecting trips, mounting sessions and botanical rambles have taken place to achieve this objective.

The herbarium project has grown into the establishment of a "Friends of Paarl Mountain" group that undertakes community hacks, guided walks and botanical rambles in the PMNR. A large scale, long-term "Paarl Mountain Renewal Project" is also being considered that includes fund-raising for the institution of a major alien-clearing programme, an education outreach programme and education centre, resurfacing of some of the mountain roads, the establishment of longer hiking trails and the facilitation of tourist visits. These improvements aim to ensure the continued conservation of the natural assets of Paarl Mountain, boost environmental education in the community and promote eco-tourism in the Paarl Valley.

Translating research into action – maps as management tools
Key words: Systematic conservation plans, indicators, Agulhas Plain

Tertius Carinus, ABI Project Coordinator, SANParks, PO Box 120, L'Agulhas, 7287
Nancy Job, Conservation Unit (Botanical Society of South Africa), P. Bag X10, Claremont, 7735.

The Agulhas Plain is a place of widely recognized importance within the Cape Floristic Region and a significant amount of quality research has been undertaken in the area. Until recently, very little of this research has filtered through to the local land-owners, both private and public, many of whom are custodians of key biodiversity priority areas.

The Agulhas Biodiversity Initiative (ABI) works with a full suite of stakeholders, from municipal and agency officials through to local community members. A map, drawn from the research to date, showing priority areas where the ABI project must focus conservation action, both on public and private land, is therefore a very useful communication and management tool. The available GIS information is also being used to inform farm plans, municipal land-use planning and decision-making, and to spatially depict the indicators against which the project is reporting.

WETLAND RESTORATION: NUWEJAARS, HEUNINGNES, KARS AND RATEL WETLAND AND RIVER SYSTEMS: INFORMATION STATUS QUO REPORT AND RECOMMENDATIONS

Key words: Wetlands, wetland restoration, Agulhas Plain

Gail Cleaver, CapeNature, P.O. Box 594, Onrus River, 7201

The very low gradients in the south-eastern Agulhas Plain result in significant wetland development, and created the second largest lacustrine wetland in South Africa, Soetendalsvlei. The Agulhas region is unique in terms of the

twelve types of wetlands that occur within a relatively small area. Two Ramsar sites (De Hoop vlei and the De Mond estuary) are located on the Agulhas Plain.

The Agulhas Biodiversity Initiative (ABI) comprises one of three complementary Global Environment Facility (GEF) initiatives in support of CAPE aimed at strengthening systemic, institutional and individual capacities and establishing the know-how needed for conservation in different ecological and socio-economic conditions as needed to attain and sustain positive conservation outcomes. ABI identified four projects specifically designed to ensure the protection of wetland systems of the Agulhas Plain, one of these projects includes wetland restoration.

Landowners on the Agulhas Plain identified the need to collate all previous and current available information reports and research on the Nuwejaars, Heuningnes, Kars and Ratel River wetland systems. This project was funded by Department of Agriculture: **Western Cape**.

Detailed frog and bird surveys were carried at Soetendalsvlei, Voëlvlei and Waskraalsvlei between 8-11 March 2005. Baseline fish surveys were carried out at Soetendalsvlei. Potential threats to the Nuwejaars, Heuningnes, Kars and Ratel wetland and river systems were identified and alien mapping of the Heuningnes and Nuwejaars wetland and river systems was undertaken.

The information collated in this report will be used to assist landowners in drafting management plans for the Nuwejaars Special Management Area and the wetland restoration plan for ABI. Priority areas for wetland restoration and alien clearing can be determined.

Millennium Seed Bank Project South Africa- Fynbos Conservation through Seed Collection.

Key words: Seed, Fynbos, Conservation

Carly Cowell, *Millennium Seed Bank Project Cape Section, Kirstenbosch Botanical Garden, Private Bag X7, CLAREMONT, 7735.*

The International seed conservation program commenced in South Africa in 2000 and a Cape collecting team was formed in 2002. The aim of the MSBP (Millennium Seed Bank Project) is to collect and bank 24,000 species of dry land flowering plants world wide by 2010. As South Africa and the Cape Fynbos Biome is a high conservation priority both nationally and internationally the RSA was selected as one of the first countries to be partners with the MSBP. Seed banking is a long-term conservation tool which has more practical applications than DNA banking and greater longevity than living collections as seed storage is a more secure means of preserving the gene pool. The MSBP South Africa not only collects seed for banking but also assists in rehabilitation of disturbed areas and gives technical advice to landowners and other stakeholders. There are many success stories where the MSBP South Africa has been key in saving not only individual species but also whole ecosystems which are under threat. Working partnerships are constantly being formed with resources and benefits shared with the aim to conserving the unique Cape Floristic region.

Fynbos diversity and dynamics: looking west from the east

Key words: fire ecology, species diversity, summer rainfall

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The fynbos biome shows a clear gradient in decreasing proportion of winter rainfall and increasing soil fertility along a west-east gradient. For a given amount, winter rainfall is more reliable in the west while summer rainfall is more reliable in the east. This gradient is paralleled by one of decreasing diversity at the regional scale for individual taxa and entire assemblages. These differences are largely a consequence of a greater number of

range-restricted rare species in the west than the east. Eastern fynbos communities are also more biogeographically mixed in the east than in the west, and have a higher proportion of C4 (summer growing) grasses. A striking feature of extreme eastern landscapes is the relatively small extent of communities dominated by non-sprouting proteoid shrubs. We show that this is not a consequence of higher fire frequencies or competition between proteoid seedlings and grasses. Instead, the phenology of dominant proteoids makes them vulnerable to summer-autumn burns, a time when climatic conditions are most frequently suitable for wildfires. We conclude while some of the west-east differences are a consequence of the contemporary climate, most can be attributed to differences in Pleistocene climates, which influenced relative rates of speciation and extinction.

Phosphorus and biodiversity in Fynbos: causal link or misleading correlation?

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The Cape Floristic Region of (CFR) South Africa is a 'Global Biodiversity Hotspot' and occurs on some of the world's oldest, weathered and most nutrient-impooverished soils. The flora of the CFR derives from Gondwanan times more than 100 million years ago having been unglaciated since the Permian (ca. 250 million years ago). One common feature of biodiversity hotspots world-wide is that their soils are extremely nutrient poor. The remarkable floral diversity here and also in another biodiversity hotspot, the South West Botanical Province (SWBP) of Australia, are characteristically associated with soils particularly low in phosphorus (P) availability. In the SWBP of Australia, species richness is inversely related to, soil P; the same relationship appears to hold for the CFR of South Africa.

Surprisingly few species native to the P-impooverished regions of the CFR and the SWBP (i.e. Proteaceae, Cyperaceae and Restionaceae) form mycorrhizal associations between roots and fungi to facilitate interception of P. Instead, these species employ a 'P-mining' strategy in which short-lived, dense clusters of hairy rootlets termed 'root clusters' ('proteoid' in Proteaceae and 'dauciform' in Cyperaceae) chemically mobilise/extract P from sparingly soluble, mineral-bound (Fe, Ca and Al) resources. Some Restionaceae species are also reported to develop specialised root clusters called 'capillaroid' roots, but nothing is known about their physiology.

While it is widely accepted that oligotrophic conditions are driving forces for below-ground diversification of nutrient-acquisition strategies it is not clear whether the relationship between species richness and low soil fertility is causal or merely correlative. It seems reasonable that nutrient-impooverished soils have co-evolved with an ancient and biodiverse flora. For example, it has been suggested that chemical activities of 'proteoid' roots in the SWBP in Western Australia are instrumental in soil and landscape formation. This paper will address the question whether P-depauperate soils of the Cape floristic region, and possibly elsewhere in the world, are an example of powerful "niche construction".

The effects of habitat fragmentation on the Black Harrier *Circus maurus* in the lowlands of the Western Cape, South Africa

Keywords: black harrier, fragmentation, renosterveld

Odette E. Curtis, Robert E. Simmons, Andrew R. Jenkins & Philip A. Hockey,
PercyFitzPatrick Institute for African Ornithology, University of Cape Town, RONDEBOSCH

The Black Harrier is an endemic, globally threatened species with its core breeding range centered on the Fynbos Biome of the Western Cape, South Africa. Lowland habitats within this region have been severely fragmented and degraded by activities primarily associated with agriculture, to the point where less than 10% of the original lowland renosterveld habitat remains. We suspect that the Black Harrier may have lost as much as 50% of its preferred natural habitat due to these ongoing processes. In order to test his hypothesis, we examine i) the distribution of breeding pairs of harriers in relation to fragments of varying size and quality and ii) the use of lowland fragments by foraging harriers. We surveyed about 100 lowland fragments of varying size and quality in the Swartland and Overberg plains of southwestern South Africa. No breeding harriers were found in the lowlands of the Swartland, while only seven out of 45 surveyed fragments contained a breeding pair of harriers in the

Overberg. Harriers selected larger patches for breeding and these tended to be the more ecologically intact ones. In a radio-tracking study of two provisioning males at Bontebok National Park (a large, lowland fragment), both harriers hunted almost exclusively within the borders of the fragment and avoided the adjacent agricultural lands.

We conclude that Black Harriers have been severely impacted by habitat fragmentation and that historically, the species was dependent on, and abundant in, lowland habitats. In terms of our findings, out of almost 17 000 fragments left in the Overberg, only 0.6% are of sufficient size to support a breeding pair of harriers. Extrapolations of our data on fragments and harrier densities suggest that before land transformation, the lowlands may have supported up to 1500 pairs of Black Harriers in the Overberg region alone. Their world population is currently estimated 1000 – 2000 birds. These results have important conservation implications for the species, currently listed as only 'near-threatened' in the South Africa Red Data Book for birds.

URBAN CONSERVATION IN THE CFK

Keywords: Human ecology, Urban protected areas, Local Agenda 21

George Davis , SANBI, Kirstenbosch

In a workshop session at the 2004 Fynbos Forum in Langebaan, an open and enthusiastic discussion was held regarding some of the issues confronting biodiversity protection in urban environments. It was generally agreed that a coordinating structure would benefit the wide range of projects that address crucial issues that emerge at the interface between valuable biodiversity and development of the human environment. This session will once again accommodate open discussion, and will be preceded by a status report from the recently formed CAPE Task Team on Urban Conservation, covering: (a) Pursuant with Local Agenda 21, work towards Urban Nature 2006, a workshop linked to the ICLEI World Congress being hosted by the City of Cape Town in February next year; (b) Cape Town's initiative for a national network on biodiversity action; and (c) global connections such those with the IUCN's Task Force on Cities and Protected Areas, and UNESCO's reassessment of the biosphere reserve concept.

WESTERN CAPE WETLANDS

Keywords: Restoration, management, conservation, public works

George Davis , SANBI, Kirstenbosch

Wetlands are eco-systems that occur in a range of landscape types. Prior to the 2004 Fynbos Forum, a group of wetland practitioners, including conservationists, biologists, hydrologists, public works programme managers, and even urban planners, called for the establishment of a forum where issues of wetland conservation, management and rehabilitation could be addressed. The session at Fynbos Forum 2005 will once again comprise an open discussion of the most important wetland issues, and will include a report back from the now well established *Western Cape Wetland Forum*.

EnviroYouth – Encouraging Leadership for a Sustainable Future

Keywords: Leadership, Sustainable, Youth

John Davids, Tsofefelo Hlatywayo, Arnelle van Noie & Mandisa Mdala
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CapeNature's Boland Mountain Business Unit was declared part of a World Heritage Site in 2005. One of the key factors in managing these sites successfully is educating communities on conservation issues, nurturing those communities that have a love for their natural environment, creating awareness of threats to this environment and developing appropriate ways of managing this environment sustainably.

This poster will show how the Boland Mountain Business Unit has aimed at achieving this goal, by focusing on its youth and future leaders. It will illustrate several existing projects attempting to get the message across as well as initiatives run within the Business Unit.

An assessment of the tristylous breeding system of *O. purpurea* (Oxalidaceae) in South Africa

Key words: Heterostyly, self-incompatibility, morph morphology, Oxalis

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Heterostyly is a complex breeding system thought to promote out-crossing, and is well- documented in the Pontederiaceae, Lythraceae and Oxalidaceae. Tristyly, which is the more complex form of heterostyly, has been well-studied among American members of *Oxalis* (Oxalidaceae), and results reveal physiological and morphological breakdowns in the breeding system. The state of tristily expression is understudied among southern African (SA) *Oxalis* species. The incompatibility system, population structure and flower morphology, which comprise the particular characteristics of the tristylous syndrome, were therefore assessed for the SA species *O. purpurea* L. Results revealed various degrees of morphological deviations between populations as well as strong deviations from expected 1:1:1 morph frequency ratios. Although not significant, controlled pollination experiments revealed partial slippage in the incompatibility system, especially for the short morph. A model for tristily breakdown in this species is proposed, leading from flower morphological variations to self-incompatibility, deviations in the isoplethic equilibrium and ultimately dimorphy.

**Integrating Biodiversity in Spatial Development Frameworks:
Lessons and Challenges from the Western Cape Provincial SDF**

Key words: land-use planning, biodiversity planning, mainstreaming

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In mid-2004, the Western Cape Department of Environment Affairs and Development Planning (DEADP) embarked on the development of a Provincial Spatial Development Framework (PSDF), which was endorsed at the Western Cape Sustainable Development Conference in June 2005. BotSoc's Conservation Unit and SANBI's GIS unit were appointed to assist the PSDF team to incorporate spatial biodiversity information in the PSDF and develop related policy proposals. Selected layers from the National Spatial Biodiversity Assessment, published by SANBI in April 2005, were incorporated directly into the PSDF, and a network of provincial ecological corridors was developed based on C.A.P.E. and other biodiversity plans. The presentation explains how ecosystem status and ecological corridors were linked to the spatial planning categories used in the PSDF, highlights lessons learned over the course of the project, and discusses challenges that remain, especially in relation to ensuring implementation of the PSDF.

Conserving threatened plants in the CFR: CREW in action

Keywords – Civil society, CFR, Threatened plants, Red list

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The Custodians of Rare and Endangered Wildflowers Project (CREW) is two years into its implementation phase. After completing an intense fieldwork work season in 2004 we now have invaluable data that will be used in updating the national databases for threatened plant species occurring in the CFR. These data are being used by land-use-planning decision makers to determine which areas are too sensitive to be developed. The data collected are also being used to update the Red Data Book status of the CFR threatened species. Here we present some of the most interesting finds made since the start of this program and discuss trends in threatened plant population survival over the past decade. We will also present how much data civil society groups are contributing, how they are becoming involved in conservation of key sites and how the data they are collecting are being used for conserving threatened plants in the CFR.

Flowering phenology of South African *Oxalis* - possible indicators of climate change

Key words: endospermous, exendospermous, *Oxalis*, climate change, global change

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Oxalis is a large geophytic genus that has diversified extensively in the winter rainfall region of the Cape Flora, South Africa. Patterns of flowering within *Oxalis* were investigated at both a regional scale (focusing on timing of flowering of *Oxalis* species in the Cape Region) and a local scale in a single habitat, the JS Marais Park, Stellenbosch, over three years (11 species in 1999, 2003, and 2004). We found the active growth period of *Oxalis* to coincide with the peak rainfall period in the Cape Region. The start of flowering is dependant on both the onset of the first significant rains and a drop in average daily temperatures. Both at a regional and local scale endospermous species displayed an extended flowering season, while exendospermous species displayed flowering peaks early in the rainy season. This correlates well with seedling strategies, in that dormant seeds of endospermous species are less affected by the dry summer months, while seeds of exendospermous species lack dormancy, and must thus germinate and establish seedlings well-before the onset of the dry summer months. *Oxalis* species in the local study displayed sequential replacement of flowering onset over the growing season, although there was an overlap in peak flowering times. The flowering sensitivity to both a decline in temperature and the delayed onset of winter rains suggests that *Oxalis*, and more specifically exendospermous species of *Oxalis*, are potentially vulnerable to the patterns of climate change currently being experienced in the Cape Region of south Africa

The Table Mountain Fund Capacity Building Programme – two and a half years into the programme

Key words: Building Capacity, Black and or Women Managers, Cape Floristic Region

Rodney February, **Table Mountain Fund Capacity Building Programme, Private Bag X7, Die Boord, 7613**

The TMF-CBP intends to build the capacity of black and women managers within the conservation sector of the Cape Floristic Region (CFR). It is a four year programme that is two and a half years into the cycle. This presentation outlines the following regarding the programme: its objectives, what is supported, the application process, and concludes with what has happened to some of the candidates that have benefited from the programme.

Recovery of indigenous vegetation after clearing of alien invasive vegetation in the Albany district, Eastern Cape

Key words: invasion, disturbance, post-clearing recovery

Saskia Fourie, *Department of Environmental Science, Rhodes University, Grahamstown, 6140.*

The negative impacts of alien invasive plants have been well documented and have given rise to the National Working for Water (WfW) programme, which is aimed at eradicating alien invasive plants. However, where ecological thresholds have been exceeded, ecosystems do not recover after removing alien vegetation, and active

intervention in the form of manipulation or modification of the physical environment and/or the vegetation is required to prevent re-invasion or further degradation.

The degree of disturbance, in the form of initial invasion density and age, clearing methods, number of follow-up treatments and fire cycles, will determine whether a subsequent rehabilitation effort is needed for re-establishing an indigenous, self-sustaining vegetation. This study aims to determine the effect of alien invasion and clearing methods on the natural vegetation in terms of species composition and structure, focusing on riparian communities in the Albany WfW project area in the Eastern Cape. It sets out to determine the factors that limit the recovery of indigenous vegetation after clearing.

A total of 172 species were found in the study area, and preliminary results indicate that although cleared areas have a higher species richness than invaded areas, the species richness is still considerably lower than that of uninvaded areas. Many cleared areas also require numerous follow-up treatments.

Preliminary investigations into the recovery potential of an area based on the seed bank by means of seedling emergence studies indicate that the highest number of seeds are found in the upper 0-4 cm of soil, although significant numbers are also found in the 4-8cm layer. The main pioneer species after clearing include *Solanum nigrum*, *S. mauritianum*, *Conyza pinnata*, *C. scabrida* and *Helichrysum* spp. The germination of plants in the field after a fire and subsequent follow-up treatments will be monitored and compared against the seed bank study.

The use of Fire Protection Associations in reaching biodiversity targets outside protected areas - The Cederberg case study

Key words: Fire, Biodiversity and legislation

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Ecological (decrease of fire frequency and the large extend of wild fires) and financial (damage to infrastructure and high fire fighting cost) considerations were the motivation behind the establishment of the Greater Cederberg Fire Protection Association (GCFPA). The process to involve and inform all relevant role-players like landowners, communities, business and government department are a rather complex process, but the Cederberg model can now easily be rolled out to other regions.

The conservancy network and farmer associations are used as management units in the area that will later extended to all fynbos areas within the Greater Cederberg Biodiversity Corridor (GCBC). These management units will ensure that all members comply with the National Veld and Forest Fire Act (Act 101 of 1998).

The GCFPA will improve integrated fire management in the Greater Cederberg area and will address awareness, veld management, prevention and fire fighting. The GCFPA will be an effective tool to manage fynbos areas outside formal protected areas, thus having an important influence on biodiversity within the GCBC.

Biological control of *Hakea sericea*: Past successes revisited and present activities

Keywords: Biological control, *Hakea sericea*, *Erytenna consputa*

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Four biological control agents were introduced to control the alien invasive weed silky hakea, *Hakea sericea* between 1972 and 2001. The most effective agent was the hakea seed weevil, *Erytenna consputa* that attacks the green developing fruits of the weed. Recent studies show that the weevil reduces the seed production, on average, by more than 90%. The hakea seed moth, *Carposina autologa* that attacks the seeds in mature fruits of the plant has become established at a number of sites. The impact of this agent was intensively studied at two study sites between 1988 and 1991 and the moth was found to be responsible for a 64.2 % and 50.6% reduction

in the canopy-stored seeds. Recent follow up studies have shown similar levels of seed reduction but increased dispersal from release sites. These seed feeding insects continue to contribute to the biocontrol of *H. sericea* although their impact is constrained by several factors, notably fires and clearing operations. The weevil, *Cydmaea binotata*, that feeds on the succulent vegetative growth has spread rapidly but is having a negligible effect on both seedlings and mature plants. A stem-boring beetle, *Aphanasium australe* that tunnels extensively at the base of the plant and may kill plants subjected to drought or disease stress was introduced in 1992. This agent has now established at two sites but it is still too early to evaluate its effect on the weed in South Africa. To further accelerate the biological control effort it is anticipated that a bud-feeding weevil, *Dicomada rufa* will be introduced this year.

Protea Farming: Putting back what we take out - but how much?

Key words: Protea farming, N nutrition, P toxicity

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Deficiencies of nutrients, including the macronutrient nitrogen (N), may develop in Proteaceae after prolonged harvesting of flowering stems, if soil fertility is not managed by mulching or fertilizing. Alternatively, phosphate-sensitive Proteaceae become susceptible to phosphorus (P) toxicity following excessive P fertilization or planting on land previously fertilized for agriculture. To establish nutrition guidelines for Proteaceae, we determined the responses of growth, flowering quality, flowering time, soil pH and cluster root formation of Proteaceae to various levels and forms of N and P. *Leucadendron* 'Safari Sunset' and *Leucospermum* 'Succession' were fertigated on a sandy soil at Amelia Farms with Ca(NO₃)₂, (NH₄)₂SO₄, NH₄NO₃, and urea at concentrations of 0, 0.025, 0.1, 0.5 or 2.0 mM. Phosphate was supplied as KH₂PO₄ at concentrations of 0, 0.01, 0.05, 0.1 or 0.5 mM. Amelioration of P toxicity by AlSO₄, CaSO₄, Fe oxides, foliar micronutrient spray, and cover crops were tested for their efficacy in reducing P toxicity and restoring soil P to levels tolerated by *Protea* 'Sylvia' at Moltano Bros. farm. Relative growth rates, biomass accumulation and flowering quality were best when N was in the form of urea supplied at 0.1 mM. NO₃⁻ and NH₄⁺-N influenced soil pH, possibly allowing this to be used as a soil pH management tool. The best P concentrations tested were between 0.01 and 0.5 mM. Aluminium (AlSO₄) was effective as a soil ameliorative agent in reducing symptoms of P toxicity in *Protea* 'Sylvia', as shown by growth rates and x-ray microanalysis of leaves, and these trials are now being moved to a limited commercial scale. It is intended to use protea growth responses and foliar analyses to develop farm recommendations for nutrient replacement rates (as mulch, organic fertilizer or fertigation) after harvesting flowering stems.

Targets for ecosystem repair in fynbos riparian vegetation

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I present an overview of a three-year Working for Water research project that has now been running for one year. The project aims to review what is known about riparian invasions and alien clearing, conduct baseline studies and identify realistic targets for ecosystem repair. The final aim of the project is to identify protocols and develop management tools for ecosystem repair in riparian vegetation.

A review of the literature confirmed that riparian ecosystems are amongst the most degraded and invaded ecosystems globally. Disturbances such as flow regulation, cultivation, grazing and trampling may trigger or act in concert with invasion by alien plants. Riparian ecosystems are prone to invasion owing to their dynamic hydrology and ability to efficiently disperse alien propagules. In the fynbos biome, woody species are the most prominent invaders of riparian zones, with *Acacia mearnsii* being the most widespread invader.

Baseline studies are being conducted both in the Western and Eastern Cape provinces. These studies will include surveys of vegetation recovery in cleared, historically densely-invaded riparian sites with good management records, experimental studies to apply and monitor the effects of different clearing methods and seed bank studies to investigate the potential importance of soil-stored seeds in riparian vegetation recovery. A workshop with managers and researchers highlighted the importance of assessing different alien clearing methods, for example felling versus frilling, various stacking and burning strategies and follow-up control methods. Where possible these variables are being included in the research design. However, we are unlikely to cover all the possible questions and variables during this project and would welcome collaborations from other interested parties.

Current and proposed piscicide operations in the CFR: Status, lessons learnt and stakeholder involvement

Keywords: alien fish management

Dean Impson, Western Cape Nature Conservation Board

About 15 species of freshwater fishes are invasive in the Cape Floristic Region. They prey on and compete with indigenous biota, especially fishes. Sixteen of the 19 indigenous freshwater fish species of the CFR are endemic and listed as threatened, including nine endangered species. Apart from this severe impact, species such as carp degrade aquatic habitats and can cause clear inland waters to become turbid. This has both ecological and socio-economic consequences.

There is great scope for eradicating fish from dams and from sections of rivers above natural or artificial barriers using piscicides. This practice is common in the U.S.A. and has been successfully applied several times for conservation and fisheries management purposes. Conservation organizations, land-owners and anglers in the CFR are increasingly enthusiastic and willing to support and carry out alien fish eradication operations. Two successful piscicide operations at Paardevlei, Somerset-West and De Ood, Bergvlei were carried out in 2005 and several are proposed in the next six months.

Biological control of Australian *Acacia* species in South Africa: a seedy affair.

Key words: Biocontrol, *Acacia*, seed-reducing agents

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Since 1982 there has been an active biological control programme against Australian *Acacia* species. Despite the programme being restrained to some extent by conflicts of interest, eight of the most invasive *Acacia* species and *Paraserianthes lophantha*, a closely-related species, now all have one or more biological control agents that have been introduced against them. Control efforts have probably escalated over recent years due to the recognition of the detrimental effects of this group of weeds on limited water supplies. However due to the economic importance of some of the species, the choice of agents has been for the most part, and still is, limited to agents that reduce seed or flower production. This paper gives an overview of the biological control programme, with particular reference to a suite of seed-feeding weevils in the genus *Melanterius* that have been released to date against the Australian acacias.

STEWARDSHIP PARTNERSHIPS IN ACTION

Key Words: Stewardship, Partnerships, Capacity Building

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Stewardship is a result of partnerships with landowners on private land encouraging the wise use, management and protection of what which has been entrusted to them.

The partnerships in the implementation of Stewardship are also key to its existence. The Table Mountain Fund has joined hands with CapeNature in funding a capacity building post to get the field work done, especially in the Paarl Mountain area.

Reginald Jantjies who fills this post is a top candidate from the Youth Service Programme (YSP) that is managed by CapeNature in partnership with the Umsobomvu Youth Fund. Reginald envisages more co-operation between Stewardship and YSP in the future.

Total evaporation from a mature stand of *Protea*-dominated Fynbos

Keywords: Total evaporation, scintillometer, fynbos

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Knowledge on the water use of baseline vegetation types like fynbos are important where the hydrological impacts of alien invasives and other plantation forestry are assessed. A changes in land use, e.g. from indigenous vegetation to alien vegetation, can result in increased total evaporation rates, and a reduction in the streamflow and therefore the availability of water to downstream users.

The spatially averaged total evaporation (ET) of a mature stand of *Protea*-dominated fynbos was measured during an 8 month period (29 August 2004 to 28 April 2005). The stand consisted of a combination of *Protea repens* and *Protea neriifolia*. A large aperture scintillometer was used to obtain four window periods of ET.

Seasonal variations in the total evaporation are shown and are associated with changes in climatic conditions and soil moisture conditions. The daily total evaporation of this mature fynbos stand, showed a quick response to rainfall, associated with an increase in soil water availability. Rainfall events resulted in periods of increased total evaporation, approaching the reference evapotranspiration rates. These periods were generally of short duration.

To obtain an annual estimate of total evaporation, the WAVES (Water, Atmosphere, Vegetation, Energy and Solutes) model was parameterised for this fynbos stand. Results from the ET predictions are shown and compared to the measured data set used to verify these results.

Putting Biodiversity Plans to Work for Local Municipalities.

Key words: Spatial Development Frameworks, Municipal Biodiversity Summary Map

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Putting Biodiversity Plans to Work (PBPTW) is a two-year project undertaken by the Conservation Unit of the Botanical Society of South Africa, in partnership with the Conservation Planning Unit of the Western Cape Nature Conservation Board. The project is funded by the Critical Ecosystem Partnership Fund as part of the C.A.P.E. programme, and aims to mainstream the use of systematic conservation plans in the land-use planning and decision-making system in the Western Cape province.

One of the focus areas of the project includes incorporating the outputs of the Cape Lowlands Renosterveld Project into biodiversity priority maps that can be included in the local municipal Spatial Development Framework of four pilot municipal areas (Drakenstein, Swartland, Cape Agulhas, and Theewaterskloof). This paper presents some of the challenges and lessons learnt from piloting the use of biodiversity plans in the four local municipalities and presents some of the key practical considerations we have identified thus far.

The challenge of consilience: why the knowledge of all stakeholder groups is equally essential, and valid, for sustainable land management.

Keywords: conservation planning, stakeholder collaboration, social learning institutions

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Landscapes are typically managed by, and of importance to, a broad range of interest groups. Residents of communal lands, agricultural farmers, game farmers, urban residents, government officials, and scientists and

consultants all have a stake in ensuring the sustainable utilisation and conservation of natural resources. The people comprising these diverse interest groups have different experiences, values and goals, and hence different mental models of how landscapes function, and how they can, and should be, managed. As a result, multiple realities and vastly different types of knowledge influence land management¹. Despite these multiple realities, when you scratch below the surface, common goals exist – a healthy environment, a strong economy, and a functional society. These common goals are embodied in bioregional strategies, such as the STEP Implementation Strategy².

Consilience is the process of unifying different types of knowledge towards a common understanding³. Consilience is essential for ensuring the sustainable utilisation and conservation of landscapes, because a highly diverse group of interests are responsible for its management, and different types of knowledge are effective at solving different land management problems. Recognising the potential contributions others can make is the starting point for consilience, because nobody knows everything. We can all learn from each other. The knowledge of farmers and the rural poor is as valid as that of government officials and scientists. Establishing a social context in which consilience can flourish requires strong networks of people, social learning institutions, emotional intelligence, respect and trust. These take time and commitment from individual people to establish and harness. The Fynbos Forum is an important social learning institution for promoting consilience.

Translating regional conservation priorities to local “conservation opportunities”: designing rural futures with stakeholders in the Fish River catchment, Eastern Cape.

Keywords: systematic assessment, conservation planning, stakeholder collaboration

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The values land managers place upon natural resources and their vision for their personal futures define the ways they manage landscapes. So people's values have implications for bioregional programmes and conservation initiatives. However, systematic conservation assessments, a cornerstone of bioregional programmes in South Africa, rarely manifest land managers values for natural resources. This absence of a more representative range of stakeholder values marginalizes the experiential knowledge of non-scientists, and fails to empower land managers to drive the conservation agenda. This has implications for the effectiveness of: 1) scheduling implementation action; 2) the approaches adopted for mainstreaming systematic assessment outputs; 3) the characteristics of enabling (capacity building) activities; 4) and the types of implementation activities undertaken.

Using a suite of tools, we have begun to locally enact a bioregional programme (the STEP Programme 1) by providing local land managers a process for voicing their opinions, gathering their knowledge of land management, and aligning their values for natural resources in the Fish River catchment, Eastern Cape. Interactive dynamic systems modelling provides a visioning process for exploring sustainable rural futures, participatory rural appraisal techniques empower land managers to voice their values, spatial optimization techniques provides a scheduling tool, and facilitated workshop sessions aim to provide fora for synthesizing the results into a coherent Action Plan. “Conservation opportunities” as opposed to “conservation priorities” can then be mapped and implemented.

Revealed patterns of establishment of an introduced *Leucospermum cordifolium* (Proteaceae) – implications for ant-plant mutualism

Keywords: Plant-ant mutualism, seed dispersal, *Leucospermum cordifolium*

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Leucospermum cordifolium is a large-seeded, elaiosome-bearing Proteaceae of the southwestern Cape that is generally considered to be an obligate ant-dispersed species. The mutualistic relationship between indigenous ants and large elaiosome-bearing seeds is thought to have evolved as a mechanism to escape seed-predation by rodents and post-dispersal damage by the regular fires that characterize the Fynbos Biome. The successful introduction and establishment of the Argentine Ant (*Linepithema humile*), which does not remove the seeds to its nest but only re-moves the elaiosome in situ, has caused concern for the long-term survival of large-seeded ant-dispersed species, including many rare and restricted groups such as *Mimetes chrysanthus*. Bond and Slingsby (1984) postulated that, in the presence of *L. humile*, these mutualistic relationships would be compromised and lead to the local extinction of such species. In this paper we describe the patterns of establishment of a varietal form of *L. cordifolium* introduced to Fernkloof Nature Reserve, Hermanus. Seeds of *L. cordifolium* were sown in a highly localized part of the reserve some 30 years ago and have since spread and established into six distinct and clearly separated sub-populations more than 1 km away from the introduction site. Since ant-dispersal restricts seed movement to a few metres, and *L. cordifolium* is considered to establish only after fires and from seed, the observed establishment patterns found contradict ants being the only dispersal agents for *L. cordifolium*. We postulate alternate dispersal mechanisms that could explain the observed patterns of this introduced *L. cordifolium* population.

Bridging the educational divide using eLearning: Implications for all courseware development and instruction.

Keywords: eLearning, invasion biology, workplace skills

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As our government seeks to improve its efficiency and provide greater transparency in its operation, more demands are being made on the skills in the workplace that in turn requires more information management based training. The National Information Society Learnership is an initiative funded by the Department of Science and Technology to address this issue, and within this programme a need for training in Ecological Informatics (NISL-EI) was identified and with CSIR is managing this sub-programme. The actual courses of NISL-EI are developed by CSIR, UWC and government departments, and are currently delivered and certified through UWC. Learnerships are defined as concurrent "workplace experience" and formal training. The NISL-EI is a level 8 qualification (fourth year/Honours), is inter-disciplinary and registered in the Faculty of Natural Sciences at UWC. The subject areas of the NISL-EI range from Information-Management including GIS and Remote-Sensing through to Environmental Management (IEM, Conservation Planning, and Environmental Resource Economics) and include societal issues such as Climate Change, Sustainable Livelihoods and Invasive Species. I will use this last course to illustrate how it was developed, delivered and administered to distance learners without face to face instruction. The identical course was also delivered to UWC full-time-students with opportunities for face to face communication. Contrary to expectations better course participation and performance was experienced for the distance learners suggesting that the eLearning in combination with the practice of a Learnership is the more effective means for developing skills needed in the workplace. This paper analyses this experience and identifies how an eLearning approach can improve instruction for all course material, irrespective of whether they are distance learners or full-time day/resident students attending an academic institution.

The effect of habitat fragmentation on species distribution in lowland fynbos: a case study in the Sand Plain Fynbos of the Riverlands Nature Reserve and its environs

Keywords: Fragmentation, Cape lowlands, Fynbos, Renosterveld, Strandveld, Plant diversity

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The Cape lowlands composed mainly of Fynbos, Renosterveld and Strandveld vegetation types is found mostly within the heavily transformed coastal lowlands and the interior valleys of the biodiversity-rich Cape Floristic Region. Biodiversity in the region is therefore seriously threatened by habitat fragmentation due to urbanisation, agricultural transformation, mining, and invasions by mainly alien woody species. Though the impacts of habitat fragmentation are

known to disrupt vital ecological processes such as dispersal and pollination, the precise implications for the maintenance of biodiversity in remaining remnants of natural vegetation in the Cape lowlands are largely unknown. This study is an integral part of the Biodiversity Monitoring Transect Analysis in Africa (BIOTA) Southern Africa project, an interdisciplinary research programme set up to develop a predictive understanding of the impact of land use and climate change on biodiversity. The aim of the study is to understand how human-induced habitat fragmentation has shaped plant species and functional diversities observed in the natural vegetations of the Cape lowlands in order to generate suitable knowledge for biodiversity conservation and sustainable land use. This will be achieved by investigating how fragmentation affects the distribution patterns of plant species through species inventory and also testing whether differences in patch occupancy patterns could be explained in terms of life history traits related to species persistence capacity at the individual, population, community and the landscape-scales by screening for plant functional traits according to the BIOTA standardised monitoring and transect analyses methodology. Three "mainlands" representing the three main vegetation types namely: Riverlands N.R. (Sand Plain Fynbos), Roscherpan N.R. (Langebaan Dune Strandveld) and Tygerberg N.R. (Swartland Shale Renosterveld) have been selected, each complemented by three fragments of the same broad vegetation type. Preliminary results of species distribution patterns for Riverlands and its complementary sites (one of the trinity) are presented and discussed.

Trials and tribulations of the Greater Harmony Flats Reserve: making a corridor work

Key Words: Corridor, fragments, development pressure

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The existing Harmony Flats Nature Reserve is one of the City of Cape Town's Core Flora Conservation sites and is home to a unique and resilient flora. However, its lack of size (only 9ha) and lack of connectivity could contribute to the loss of fitness and subsequent local extinction of all but its hardiest plants. The reserve contains Lourensford Shale Fynbos (LSF), which is one of South Africa's most endangered vegetation types. In 2003, Nick Helme initiated the idea of a Greater Harmony Flats Corridor Park incorporating a range of privately owned properties to the south and east that had a significant remnant of LSF (13.5 ha), thus more than doubling the available area. The owners of the properties were notified of the status of the highly threatened vegetation on their properties in 2004. Some of the owners reacted by clearing their plots before (and after) conducting the specialist botanical studies required before a rezoning application could be submitted. The rehabilitation of damaged erven is now a prerequisite placed on the owners prior to the consideration of any development. However, with negotiations, owners are being given the option of limited development if they agree to the addition of the rest of their erven into a combined contractual reserve and contribute financially to the management of this reserve. Here we explore the process involved and hope this example would be useful for others in similar situations.

Small mammal assemblages and populations in fragmented habitats of the Western Cape Lowlands

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Due to extensive transformation due to agriculture and urbanisation, the once extensive lowland vegetation of the Western Cape has been reduced to scattered remnants. The effects of fragmentation on the ecological processes in these vegetation types, namely Renosterveld and Lowland Fynbos, have only recently come into focus of research. Small mammal populations are affected by habitat transformation in a number of ways (e.g. loss of suitable habitat, reduction in food supply, limited genetic exchange between subpopulations), and the survival of these populations depends on refuge or surrogate habitats, which are often suboptimal.

Aim of this study is to determine which small species occur in natural vegetation remnants surrounded by agricultural areas, and which factors determine their population dynamics.

Mineral nutrition of geographically restricted and widespread species of the Proteaceae in Western Australia

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Proteaceae (e.g., *Banksia*, *Grevillea* and *Hakea*) are a dominant floristic component of the extremely biodiverse South-Western Botanical Province of Western Australia. The species are sclerophyllous evergreen trees and shrubs that produce root clusters (specialised 'proteoid' or 'cluster' roots) that aid in acquisition of nutrients, especially phosphorus, from some of the most infertile, heavily leached soils on Earth. The low levels of phosphorus are mostly mineral-bound and accessible only to species adapted to these conditions. Paradoxically, most species of Proteaceae are non-mycorrhizal; however, they exude large amounts of carboxylates (e.g., citrate, malate) from their cluster roots to enhance the acquisition of phosphorus and micronutrients (1). Our aim was to determine whether rare and widespread Proteaceous species differ in key aspects of their mineral nutrition. Assuming that qualitative and quantitative differences in nutrient acquisition are important in adaptation to specific edaphic conditions, the contrasting distribution ranges of widespread and rare species might be explained by a great or restricted genetic (intraspecific) diversity or phenotypic plasticity in these traits.

Firstly, we assessed whether the roots of 50 *Banksia* species from south-western Australia showed species-specific carboxylate-exudation patterns, correlating with properties of the soils on which they occur naturally. When grown in a standard substrate (sand/potting mix), such differences do not exist, and the rhizospheres of widespread and rare species have similar amounts and composition of carboxylates, as well as similar pH. It is concluded that if nutrient-uptake patterns differ among *Banksia* species, this is likely due to nutrient-uptake mechanisms, e.g., the regulation of specific transporters.

Secondly, we compared the mineral nutrition of nine *Banksia* species grown in soil collected from their natural habitat, and in five other representative soils from nearby regions also inhabited by *Banksia* species. Six species have a restricted habitat range (i.e. *B. burdettii*, *B. chamaephyton*, *B. hookeriana*, *B. lanata*, *B. laricina*, *B. scabrella*), while the other three are co-occurring widespread species (i.e. *B. attenuata*, *B. menziesii*, *B. prionotes*). All soils collected were acid sands with very low total [P] (12–40 µg P g⁻¹ soil). Multivariate analysis indicated species-specific patterns of leaf nutrient concentrations. There were significant differences in leaf [P] among species and soils, but these were not related to geographical distribution. Phosphorus and aluminium concentrations in mature leaves were strongly and positively correlated in most species, indicative of plants accessing soil P complexed with Al. Al concentrations in leaves differed amongst species: *B. laricina* was an Al accumulator, whereas *B. chamaephyton* was an Al excluder. We suggest that *B. laricina* suffered from iron toxicity in soils that contained the highest iron concentrations, and other *Banksia* species may similarly suffer from toxicity due to accumulation of other ions, when grown in soil collected outside their native habitat. Rhizosphere pH was reduced compared with that of the bulk soil for all *Banksia* species. Species differences in leaf [P] were not correlated with either the type of carboxylate exuded or rhizosphere pH. Our data suggest that the habitat range of some of the narrowly distributed *Banksia* species may be restricted because of ionic differences when compared with widespread species: the well developed ability to extract those nutrients that are the most severely limiting in their own habitat leads to excess uptake of these nutrients, causing toxicity, in other habitats.

Finally, we compared the widespread *Hakea prostrata*, occurring on severely nutrient-impoverished soils, and the closely related, less widespread *Grevillea crithmifolia*, occurring on slightly less impoverished soils over limestone. We found that *H. prostrata* exhibits symptoms of severe P toxicity when the P concentration in soil is slightly enhanced (2). This is associated with a very low capacity to down-regulate the P-uptake in this species (3). *G. crithmifolia* never shows any P-toxicity symptoms when grown under the same conditions and this species does down-regulate its P-uptake capacity (M.W. Shane & H. Lambers, submitted). It is concluded that *H. prostrata* does not occur in the habitat occupied by *G. crithmifolia* because of the observed ionic differences: P toxicity outside its severely nutrient-impoverished habitat.

The impact of invasive fish on foothill river ecosystems in the Cape Floristic Region.

Keywords: Invasive fish, freshwater invertebrates, trophic dynamics

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The freshwater biota of the Cape Floristic Region of South Africa is characterised by high levels of endemism. Invasive fish are widespread in the rivers of the region and represent major threats to indigenous communities. We investigated macroinvertebrate assemblages, algae and fish in two cobble-bed foothill rivers (Rondegat and Witte Rivers) that had been invaded by smallmouth bass, *Micropterus dolomieu*, up to a waterfall barrier.

The invertebrate taxa and temporal dynamics of algae growth differed between the two rivers. The invertebrate assemblages of both rivers were, however, greatly altered between uninvaded and invaded sites. On the Rondegat River there were consistently increased numbers of most invertebrate taxa and decreased fish biomass at bass-invaded sites. On the Witte River, many invertebrate taxa initially increased in abundance at bass-invaded sites. As the season progressed there was a large increase of filamentous algae at uninvaded sites and a concomitant increase in many invertebrate taxa in excess of those at invaded sites. After the first two heavy rainfalls the system was 'reset' and little difference in either algae or invertebrate assemblages was noted.

We propose that invasion by *M. dolomieu* affects foothill river ecosystems by removing key indigenous predators (native fish) thereby reducing predation on the macroinvertebrate prey. The resulting increase in prey taxa may influence the level of primary production (algae) in the river and remove the natural dynamics of the system. The nature and human activities within the catchment and the level of primary production in the river appears to determine the impact of invasion by *M. dolomieu*.

Comprehensive Assessment of the Ecological Water Requirements of the Olifants/Doring River Catchment

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A Comprehensive Assessment of the Ecological Water Requirements (EWR) for the Olifants/Doring River was initiated and funded by the Department of Water Affairs and Forestry: Directorate Resource Directed Measures. Six EWR sites were selected in Olifants/Doring catchment. Specialist areas included: hydrology, geomorphology, water quality, vegetation, macroinvertebrates and fish. The activities undertaken comprised assessment of the Present Ecological Status (PES) of the river reaches represented by the EWR sites; provision of the information (data collection and literature reviews) on which the specialists could base their EWR deliberations; generation of the relevant hydrological information and application of DRIFT methodology to arrive at an estimate of the EWRs for the rivers.

This paper will concentrate on the latter two activities, viz. application of DRIFT and an analysis of the results achieved for the EWR assessments, at two key sites in the catchment. The implications of these results for water resource management in the catchment will also be addressed briefly.

A case for delisting Category 1 invasive as a catalyst for eradication: The Spanish Reed hypothesis

Keywords: *Arundo donax*, biological invasives, natural resource

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Arundo donax (Spanish Reed) is a C₃ grass, with unusually high photosynthetic activity. It has an optimal growth rate of 60 – 100 mm per day, and reaches maturity in three growing seasons. Its preferred habitat is moist places

(ditches, streams, and riverbanks) – growing best in well drained soils where abundant moisture is available. It is a Category 1 invasive riparian weed in South Africa and occurs in almost every major river system.

A. donax is, however, a plant with a wide variety of uses, which accounts for its global distribution. Internationally *A. donax* has applications ranging from basketry to rayon production. Given its high growth rate, quick maturation and capacity for regrowth, it is seen as an ideal natural renewable resource the world over. It is no different locally: *A. donax* has been present in South Africa for at least 300 years, and has become part of the economic and cultural landscape in the Klein Karoo. It is an important resource for building and other farming practices, and has also become a livelihood provider for various sectors of the community, and there is definite potential for industry expansion.

For all practical purposes *A. donax* is already a Category 2 invasive. Delisting it would legalise most activities, whilst not compromising the legal protection afforded to riparian ecosystems and river corridors. Currently there are no projects addressing *A. donax* eradication, and no projects are likely to occur in the near future, but preliminary research suggests that harvesting is an acceptable form of control which also yields economic and ecological benefits. However, given lessons learned from other problem plants the question is: "*Would it be wise to encourage commercial utilization of this invasive?*"

"Stewardship - Catalyst for Landowner Investment in Biodiversity"

Keywords: landowner investment, biodiversity, private land

Chris Martens, CapeNature, Walker Bay Nature Reserve, 16 17th Avenue, Voëlklip, Hermanus, 7200; ph: 028-314 0185; chriscip@maxitec.co.za

CapeNature's Stewardship Program was launched in November 2003. Substantial investment has been made in developing the mechanisms and tools for conservation of biodiversity on private land in the Cape Floristic Region.

The Stewardship Program is briefly reviewed and discussed in terms of its effect on reaching biodiversity targets and catalyzing landowner investment in biodiversity on private land.

A phone call, a fax, a visit.....and don't forget the follow up.

Key words: Urban conservation, community, practicalities

Charline Mckie and Lewine Walters

Cape Flats Nature / City of Cape Town, Strandfontein depot, Weltevreden Rd, Mitchell's Plain

Cape Flats Nature works in a people centred way that involves and benefits the communities surrounding our four pilot sites.

This presentation will examine how we work with individuals and structures from different communities around conservation issues and activities. We will look at the day to day practicalities of building and maintaining these relationships and what effective communications with community partners really means for a nature conservator and for nature conservation management.

Building People Building Parks

Xola Mkefe, SANParks, Table Mountain National Park, Tokai

The Expanded Public Works Programme of Table Mountain National Park aims to develop 445 previously unemployed individuals while building and renovating 350 km's of foot paths, over a three year period, about 40 SMME's will be developed. This is a case study of how Biodiversity Conservation can be used as a vehicle for making poverty history and providing sustainable employment, driven by communities.

Are we loving our small reserves to death?
Keywords: disturbance, fragmentation, management

Eugene Moll, ***Biodiversity and Conservation Biology Department, University of the Western Cape, Private Bag X17, Bellville 7535***

In the highly fragmented lowland areas of the Cape Town UniCity area the only way of conserving terrestrial biodiversity has been to maintain small relic patches of once continuous ecosystems. Over the last few decades a number of key sites have been identified, and managers have done their utmost to protect these areas from further land-clearing and degradation. In some cases their efforts have been so successful that we now face a situation where these fragments are in grave danger of losing much of their ecological integrity.

This raises the question of why is management failing? My view is that in the medium term simple protection is not enough, and that it is imperative that these remnants are exposed to the natural disturbance regimes under which they evolved. Fortunately these systems are resilient, thus it is not too late to take remedial action. However, the contemporary operational environment is not conducive to allowing managers to better manage the reserves, always assuming that they know what is required. My contention is that modern humans are so dislocated from their natural environment that they are incapable of understanding what is meant by natural disturbance regimes over evolutionary time. The mega-herbivores that one can argue were the keystone species in Renosterveld and Sub-tropical Thicket are now locally extinct, and it would be impractical to re-introduce them into such small areas. Also fire is considered either dangerous or damaging, thus fire management is avoided because of public pressure - and the municipal fire services are extremely efficient quickly extinguishing every fire.

What is required is an innovative approach to this new management crisis, whereby small reserves can be appropriately and actively disturbed to simulate natural regimes. I have some suggestions that will be explored at the Fynbos Forum.

Private Sector Funding of Biodiversity Projects: Are they Interested? - Preliminary results of a Masters in Business Administration Dissertation.

Key words: Economics, Funding, Management Research.

Augustine Morkel, ***South African National Biodiversity Institute, Private Bag X7, Claremont, 7735,***

The aim of this research is to explore the attractiveness of biodiversity projects to the private sector to be long-term investment projects and the criteria required for the biodiversity projects to become more attractive for such investment. The lack of interest by the private sector to provide sustainable long-term finance to the Biodiversity sector suggests that there are gaps in the relationship between the private sectors requirements from long-term investment projects defining the unattractiveness of the Biodiversity sector and the Biodiversity projects' ability to meet these requirements. The preliminary results from the survey will be presented. The objective is to present the responses of the private sector to the investment proposals and obtain feedback on the responses.

The need to monitor biodiversity in the City of Cape Town
Keywords: Biodiversity, monitoring, Geographic Information System (GIS)

Mr. G. A. Moses, Mr. G. Oelofse and Ms. T. Katzschner
Directorate: Planning and Environment, City of Cape Town, P O Box 16548 Vlaeberg, 8018

A number of scientists, ecologists, conservationists and others are currently engaged in monitoring biodiversity on an independent manner in various regions of the City. Currently, no city-wide approach is implemented. There is a need for a city-wide monitoring programme to be integrated into a complete monitoring system. The value of such

a system to the City of Cape Town is to: a) measure and record biodiversity, b) provide feedback on how biodiversity is being managed, c) provide adequate and reliable information to decision-makers, d) create general awareness and public support. Notwithstanding the requirements of initial efforts and continuous maintenance of a centralized database, long-term monitoring must provide trends, patterns and predictions. The development of indicators to monitor biodiversity on spatial and temporal scales is an important issue that requires consultation with various parties. A set of high-level indicators is applied to monitor the whole city, whereas reserve managers will apply another set of indicators to specified regions. All the collected information will be stored in a central database. This paper presents an overview of the biodiversity monitoring programme that is being developed and implemented by the City. It is intended that the programme long-term measure levels of biodiversity changes and trends within the City.

Grass invasion in Renosterveld: Influence of adjacent landuse on soil variable gradients

Key words: alien, edaphic, Poaceae, seed bank

Sara Muhl, Karen Esler and Sue Milton

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Alien invasive grasses are problematic in renosterveld ecosystems as they out-compete indigenous and threatened annual and geophyte species. This could ultimately result in loss of many endemic species. The causes of grass invasion and their continued spread are multifaceted, from characteristics of the invader species to the characteristics of the invaded system. The facet of interest in this study is the role of microclimate, particularly soil variables, in the spread of invasive alien grasses in renosterveld. Aspects of soil variable gradients include chemical, physical, hydraulic and surface condition as well as small-scale disturbance. The broad study area is West coast renosterveld and initial study sites are at Jan Briers Louw Geometric Tortoise reserve and Elandsberg reserve. Soils are sampled across a gradient from cultivated or grazing pastures into renosterveld where an edge effect is observed. Soils are analyzed for nutrient and physical characteristics. Soil surface condition is also considered in terms of infiltration, crusting tendency and other visual characteristics such as animal disturbance. These results are compared to vegetation composition and characteristics including functional type, species number and cover as well as the transient and permanent grass seedbank across this gradient. This research will contribute to explanations of invasion processes and add to the database of information supporting efforts to control/contain and manage invasive grass species.

The Table Mountain National Park - Progress and lessons in striding towards the goal of being recognised as the world's leading urban national park by 2010.

Brett Myrdal, *Manager, Table Mountain National Park, P O Box 37, CONSTANTIA, 7848*

The Table Mountain National Park - Progress and lessons in striding towards the goal of being recognised as the world's leading urban national park by 2010. The examination of the implementation record will focus on lessons extracted from the five areas of core business; fire management, alien clearing, visitor management, marine management and path-building and maintenance. The financial performance of the TMNP especially the role of the park in the urban and regional economy, and its strategy to both be financially viable and to be affordable will be covered in detail. Lessons learnt from the completion of the 5 year GEF programme and the year and half experience to date in the 35 million expanded public works programme will also be covered. Relevance to neighbors in terms of benefits beyond boundaries will be explored. Finally the spirit of the park, as embodied in the users of the mountain and sea, the TMNP staff and management team and the guides and hikers of the four Hoerikwaggo Trails.

Fynbos, Butterflies and Little People

The Children and Julie Carlisle

Nature's Valley Trust, PO Box 230, The Craggs, 6602

The Nature's Valley Trust, among other projects, has focussed on establishing Nature's Valley as an outdoor classroom. This presentation, seen through the eyes of the Grade 8 pupils of Craggs Primary, pertains to the Fynbos Reserve where a reintroduction of Brenton Blue butterflies will take place this year.

ECOLOGICAL STATE OF THE DIEP RIVER CATCHMENT

Tovhowani Ndiitwani, Department of Water Affairs and Forestry, Western Cape Region (SA) Private Bag X16, SANLAMHOF, 7532

The paper illustrates the ecological integrity of the Diep River system, based on the river health assessment using the South African Scoring System (SASS) conducted from 2000 to 2003 and the water quality data conducted from 1996 to 2002. The current level of water abstraction, effluent disposal, and solid waste dumping in the Diep River Catchment has had a major impact on the ecological integrity of the river. Indications are that land-use practices such as wineries, crop farming, stock farming, abattoirs, quarries, waste sites and wastewater treatment works have resulted in a significant deterioration of the Diep River system.

The effect of soil type and climate on the growth and survival of *A. saligna* and *A. cyclops* seedlings on a mountain gradient in Villiersdorp, South Africa.

Key Words: climate change, reciprocal transplant, invasive species

Karin Neethling¹, Karen Esler¹ & Guy Midgley²

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²Climate Change Research Group, Ecology and Conservation, National Botanical Institute, Private Bag X7, Claremont, 7735, South Africa

Few studies have simultaneously considered the effect of climate change and invasive species on ecosystems, and there is a great need for research in this field. Considered in isolation, climate change, invasive species and habitat destruction are the greatest threats to ecosystem functioning. It is believed that by causing disturbances in ecosystems (creating niches and lowering community resistance), climate change may increase the invasive ability of alien species. The purpose of this study is to ascertain the effects of soil type, (shale and sandstone) and climate (changes altitudinally) on the growth and survival of reciprocally transplanted *Acacia cyclops* and *A. saligna* seedlings on a mountain gradient near Villiersdorp (known as Jonnaskop). The H₀ is that soil type does not affect the growth and survival of the seedlings. The second H₀ is that climate has no effect on the growth and survival of seedlings. This study is important as we need to determine which areas are vulnerable to invasion or which areas may become vulnerable in the future. Identifying these dangers ahead of time can help with the management and protection of these susceptible areas. This study aims to determine which combination/s of factors makes an area vulnerable i.e. a specific soil type (nutrients, water availability) and climate combination may be more vulnerable than another. A better understanding of the mechanisms aiding invasion is vital to protecting the integrity of the Fynbos Biome.

The Nuking of Die Oog – a fishy tale

Key Words: Eradication, Exotic Fish, Rotenone

Natalie Newman ¹ and Justin Miller ²

¹City of Cape Town, South Peninsula Region .Environmental Management, Private Bag x5 Plumstead 7800

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Die Oog is a water body in the middle of a quiet suburb in Bergvliet. It is fed by a spring that provides water throughout the year. Over the last few years the water quality has deteriorated extensively resulting in negative impacts on the aquatic ecosystem.

Not only is the water body and surrounding open space important to the local fauna and flora, but the community and other visitors use the area for various forms of recreation and as a place of solitude.

On investigation it was found that one of the main contributors to the poor water quality was the occurrence of exotic fish species, specifically carp and tilapia. The City of Cape Town and the Friends of Die Oog embarked on a plan to eradicate the exotic fish species from the system and with the help of the Table Mountain Fund this project was initiated. This is the tale of what has happened.

Fire, rain, and the evolution of seeder and resprouter forms in fynbos *Erica*s

Key words: *Erica*, fire-recruiting, life-history evolution

Fernando Ojeda, Fernando G. Brun & Juan J. Vergara

Dpto. de Biología, CASEM, Universidad de Cádiz, Campus Río San Pedro, 11510-Puerto Real, Spain

Several Cape species of the genus *Erica*, such as *E. coccinea* or *E. calycina*, are known to include both seeder and resprouter life-histories, and this phenotypic variation seems to have genetic basis. This genus, thus, provides ideal model systems for elucidating the evolution of nonsprouter (or *seeder*), and *resprouter* life-histories in woody, fire-recruiting plant species. A simple simulation model using Stella Research® 7.0.1 software has been developed to identify, under life-history optimality, which ecological conditions (*viz.* rainfall conditions and fire frequency) confer a selective advantage to the seeder phenotype over the resprouter in a given Cape *Erica* species. The model illustrates that only under a mild mediterranean climate, with short, moderate summer droughts, the seeder life-history is able to invade and replace a resprouter population. This simulation approach will also contribute to a better understanding of the biogeographic pattern of seeder and resprouter lineages of one of the paradigmatic fynbos woody taxa throughout Cape floristic region.

C.A.P.E. Partners' Conference 2005: Key lessons, insights and recommendations

Key words: C.A.P.E.; people, conservation

Azisa Parker, **C.A.P.E. Co-ordination Unit, SANBI, Private Bag X7, Claremont, 7735**

The C.A.P.E. Partners' Conference 2005, themed "Fynbos Fynmense", literally set the stage for more than thirty community groups and organisations to tell their stories in the way they saw fit. In a marked departure from the first C.A.P.E. Partners' Conference in 2004; presenters used song, story telling, and drama to convey the message of communities and ordinary people's involvement in conservation action. This process has provided the C.A.P.E. programme with a range of lessons and insights on the role community stakeholders can play in protecting the biodiversity of the Cape Floristic Region, and has resulted in key recommendations for the further involvement of stakeholders and communities across the CFR.

Communication for Conservation

Key words: Communication, Strategy, Conservation

Zwai Peter and Lewine Walters

Cape Flats Nature, Edith Stephens Wetland Park, Lansdowne Road, Philippi and Cape Flats Nature / City of Cape Town, Strandfontein Depot, Weltevreden Road, Mitchell's Plain.

Cape Flats Nature is a multi-partner project that builds good practise in sustainable management of City nature conservation sites, in a people-centred way that develops local leadership in conservation and benefits the surrounding communities, particularly areas where incomes are low and living conditions poor.

In this presentation the Communication Manager of Cape Flats Nature will share his experience and challenges in developing and implementing a communication strategy that will build a strong and recognisable identity for the

project on the Cape Flats and more broadly. The communications strategy is intended to raise Cape Flats Nature's profile in a way that contributes to the project's ability to scale up successful work at its pilot sites to more of the City's biodiversity network.

Lewine Walters, a Nature Conservator in Macassar Dunes will share her experiences, of working in an urban context with extreme social barriers, and how she has communicated with influential community members around her site to build support for combatting the threats to the precious Cape Flats biodiversity.

PRELIMINARY RESULTS OF RIVER HEALTH ASSESSMENTS CONDUCTED ON RIVERS OF THE OVERBERG REGION, SOUTHWESTERN CAPE.

Keywords: River health, SASS5, habitat integrity

Chantel Petersen, Western Cape Nature Conservation Board: Scientific Services, Private Bag x 5014, Stellenbosch, 7600.

The study area extends from the Bot River in the west to the Breede River in the east. The Overberg Region is bordered by the Indian Ocean in the south while the northern boundary is the Riviersonderend and Langeberg mountains. Sites were chosen on 14 major river systems stretching from the Bot River to the Sout River on the eastern Overberg. The results presented are preliminary based on biomonitoring surveys conducted as part of the River Health Programme (RHP) in the Western Cape. The sites were assessed using the indices of the RHP, which included the South African Scoring System (SASS version 5), which uses macroinvertebrates to assess water quality, Geomorphological Index, Index of Habitat Integrity and the Riparian Vegetation Index. The SASS5 surveys were conducted on a seasonal basis from July 2004 to May 2005. The results show deterioration in water at a majority of the sites assessed with mostly pollution tolerant invertebrates found. However, habitat destruction (anthropogenic and floods in April 2005) also occurred and the rivers were mostly lowland rivers with naturally low habitat diversity. Limited data exists for some of the rivers that were assessed and the present study will provide important information for the management of these systems.

Insect diversity in fynbos and neighbouring biomes

Key words: insect diversity, plant diversity

Serban Proches, **Centre for Invasion Biology, Stellenbosch University, Private Bag X1, Matieland 7602**
Richard M. Cowling, *Botany Department and Terrestrial Ecology Research Unit, Nelson Mandela Metropolitan University, Port Elizabeth 6031*

Fynbos is generally considered to be poor in insect species, presumably in relation to low productivity and high chemical repellent content. Here, sweep samples from fynbos, grassland, subtropical thicket and Nama-karoo are compared in terms of insect species richness. At the 10 x 10 m plot scale, no significant differences are found between fynbos, grassland and subtropical thicket, while Nama-karoo is significantly species-poorer. Across all spatial scales considered in the study (from 10m to biome-wide), there was a strong relationship between plant diversity and insect diversity, especially at genus level. While insect diversification in fynbos may not fully mirror recent plant diversification at the species level, fynbos is certainly not unusually insect-poor.

The Red Data List of Proteas

Proteaceae, Red Data List, Threats, Orange List, Conservation status

T. Rebelo, *Protea Atlas Project, SANBI*

The Red Data List of African Proteaceae has been produced from the Protea Atlas data. Using the 2001 IUCN criteria to generate a computer-derived Red Data List provided the fuel for a two one-day workshop, to which all interested parties were invited, to refine and debate the status of our Protea taxa (species and subspecies). After many months of heated discussion the findings are ready for publication. The new IUCN criteria offer a standardised means of evaluated threatened status that are uniform worldwide. For the first time we are in a situation to compare this standardization with a plant family in the Cape Flora. The situation is bleak! Some 15% of our proteas are Critically Endangered, 20% are Endangered, 20% are Vulnerable: therefore 55% of our Proteaceae are "threatened". And a further 21% are eligible for the "Orange List" of taxa that should be monitored because they are almost threatened. Only 31% of our Proteaceae are "safe." The situation is dire compared to the first evaluation in 1982 when some 22% of our proteas were "threatened" and a further 22% were "naturally rare", leaving 50% as "safe".

What are the causes of this predicament? Where are we failing? Are our conservation efforts worthwhile? What have been the surprises of the Protea Atlas data? Come find out, before it is too late

River health monitoring in the Garden Route Illustrating the effects of changing land-use on water quality

Cecilé C. Reed¹ and Ian A. Russell²

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²*South African National Parks, P.O. Box 176, Sedgefield, 6573*

Increasing development together with consistently changing climatic conditions have progressively influenced biological processes in the sensitive river- and wetland systems of the Garden Route. In recognition of the urgent need for sustainable utilisation of these rivers, a bio-monitoring programme was initiated in 2004 forming part of a national initiative designed by the Department of Water Affairs and Forestry (DWAF), the River Health Programme (RHP). Currently twenty-three sites are being monitored between Wilderness- and Tsitsikamma National Parks and to date four seasonal SASS5 (South African Scoring System) assessments have been conducted. Most river catchments in the area comprise different land-uses, ranging from pristine indigenous forests, Mountain Fynbos, rehabilitating and existing plantations, irrigated pastures, dairy farms, urban and rural settlements, polo-fields and golf estate developments. The SASS5 results have predominantly shown the associated cumulative anthropogenic effects on these rivers. For example, SASS5 results from three sites along the Groot-Wolwe River, which originates within a rehabilitating plantation area and passes through an agricultural region, clearly illustrate deteriorating water quality. The SASS scores from the upper site average around 200, with ASPT's (Average Score Per Taxon) of seven and above, indicating excellent water quality and habitat availability. The SASS scores at the lowest site average around 100 with ASPT's of around five, indicating deterioration in water quality. The SASS5 results from the Klien-Wolwe River, which originates within the agricultural region provided the lowest scores of all the rivers being assessed in this programme, with SASS scores ranging between 54 and 56 and ASPT's averaging around 4, indicating serious deterioration in water quality and habitat availability. These preliminary results have clearly shown the impacts of various land-uses along the rivers and continued monitoring through the RHP is empirical to allow for improved decision-making regarding the sustainable use and protection of these very unique systems.

The role of life history and species mobility in determining the distribution of two proteas

Keywords: Conservation planning, species distribution modelling, proteas, life history

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Niche-based species distribution modelling is often used as a surrogate in conservation planning and invasion biology where data on the current distribution is limited. A number of factors affect the accuracy of such models, some of which can be taken into account, but many cannot. In addition to anthropogenic influences, historical and evolutionary events may affect the current distributions of a species. Since most distribution models predict potential rather than realised niches for a species, actual distributions may differ significantly from models.

The life history of a plant may play an important role in realisation of the species potential niche. Proteas, as a fire-adapted family, display two major responses to post-fire conditions: either resprouting from fire-resistant root stock, or regrowing from seed. Furthermore, reseeders may have their seeds distributed by primarily by insects or wind. It is hypothesized that this response may affect the mobility of the species, its ability to capitalize on fire-cleared open ground, and hence its ability to fully realise the potential distribution.

Models of the potential distribution of several species of reseeding and resprouting species of proteas are derived from a suite of environmental factors. These models, correct for recent anthropogenic influences, are then compared to the current known distributions of the relevant species. The hypothesis that life history affects the extent of niche realisation is then tested by comparison of the degree to which species with different life histories have occupied their theoretical optimal niche.

Creating and managing a multiple landowner conservation initiative that contributes to target achievement: a case study of the St Francis Conservancy

Keywords: private landowner conservation, conservancies, alien plant eradication

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We need a greater emphasis on private landowner conservation to achieve the targets of South Africa's conservation plans. In order to effectively conserve ecosystems that span property boundaries, it may be easier to work with an organised collection of landowners than it is to work with a number of individual landowners. Research should therefore be directed at promoting and understanding multiple landowner co-operation for conservation. With this in mind, the St Francis Conservancy was created, as part of a two-year project, by uniting the landowners of 73 properties. The project focussed on the development of the institutional structures of the Conservancy and the subsequent management of the area for biodiversity conservation. The latter component consisted mainly of the development of a defensible system to allocate resources within the Conservancy towards alien vegetation eradication. The Conservancy provides landowners with a structure for initiating collective action. The resource allocation system enables participants to agree to invest in the management priorities of the Conservancy (i.e. the collective property) rather than maintaining a focus within their own individual property boundaries. Our experience of this case study indicates that multiple landowner co-operation has emerging potential to be included as a tool for conservation target achievement.

Fynbos Fynmense: people in the mainstream of C.A.P.E.

Key words: C.A.P.E.; people, conservation, sustainable development

Trevor Sandwith, *C.A.P.E. Co-ordination Unit, SANBI, Private Bag X7, Claremont, 7735*

The C.A.P.E. programme is based on a 20 –year strategy to conserve the Cape Floristic Region and the adjacent marine environment. Work over the past three years has focused on mobilizing every aspect of the C.A.P.E. strategy, but it is of course the people from all walks of life that turn strategy into reality. Brett Myrdal and Xola Mkefe coined the phrase, Fynbos Fynmense to describe the age-old links between the diversity of people in this region and the astonishingly diverse natural ecosystems in which they live and work. With the sustainability of these links at risk, it is to people that we must turn to act at every level to restore the fundamental relationships between people and the environment, between natural capital and human capital. In so doing we discover not only that the whole is more than the sum of its parts, but that the reconciliation of people and nature underpins and adds value to the social and economic development of the region.

Organic amendments: A recipe for the restoration of *Acacia* invaded fynbos?Keywords: Fynbos restoration, organic-amendments

Alexander Schutz, *Botany Department, University of Cape Town, Private Bag, Rondebosch, 7701, Cape Town*

It was hypothesized that high soil nitrogen levels found under *Acacia saligna* (Port Jackson) stands could hamper restoration efforts after the *Acacias* are cleared. The high nitrogen levels in these soils could potentially inhibit the re-establishment of fynbos in the cleared stands by promoting a secondary invasion of weedy grasses, e.g. *Ehrharta calycina*. It has been suggested that a mulch with a high C:N ratio be added to the soil to overcome the problem of high soil nitrogen in stands recently cleared. The mulch would have the effect of increasing soil microbial activity and the subsequent immobilization of plant available nitrogen. This study attempted to test whether such action would be successful through a glass-house bioassay, in which five different fynbos species were planted in soil taken from an old *Acacia saligna* stand and treated with different organic amendments,

namely sugar, bark and charcoal. The bioassay showed that firstly competition between seedlings of fynbos plants and invading weedy grasses was likely to hamper restoration efforts as *E. calycina* plants grown in untreated soil grew more vigorously than the other species in the untreated soil. Secondly the addition of bark chips to the soil could potentially facilitate restoration efforts as *E. calycina* grown in bark amended soil produced fewer shoots and had slower growth rates than *E. calycina* plants grown in untreated soil, whereas the bark did not have a negative effect on the health of *P. repens*, *L. salicifolium* or *P. ericoides*.

General assessment of the reproductive and pollination biology of *Oxalis* in SA

Key words: *Oxalis*, flower morphology, habitat disturbance.

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Oxalis, *Biophytum* and *Averrhoa* are the only three Oxalidaceous genera that exhibit heterostyly, with tristily restricted to *Oxalis*. Tristily includes a combination of reciprocal herkogamy (reciprocal arrangement of stigma and anther heights) and a diallelic incompatibility system. Flowers of the same species present three different morphs: Long, Mid and Short, based on their stigma heights. When tristily is fully expressed, morphs are presented in a 1:1:1 frequency ratio (isoplethic equilibrium) within a population, but breakdowns on this system are known to occur. The aim of this study is to evaluate the morphological expression of the tristylous breeding system of a wide range of southern African *Oxalis* species from different localities, populations and habitats. At least 100 flowers of each population were collected during peak flowering and floral morph types were recorded. All populations were also coarsely graded from very disturbed to natural in terms of habitat. Morph frequencies were compared by a G test for goodness-of-fit (Sokal and Rohlf 1995) to the isoplethic (1:1:1) equilibrium. Pooled goodness-of-fit tests were conducted to determine whether there was a consistent trend in the data. G tests of heterogeneity were also performed to determine levels of heterogeneity among populations, while the G total was calculated as indication of the overall measure of departure from isoplethy of all the populations surveyed together. Measurements were performed on 20 randomly chosen flowers of each morph per species from the different populations examined. Stigma and anther heights were measured from the base of the ovary using a calliper. Irregular floral morphs were documented. Deviations in the morph frequency ratios were correlated with the different levels of habitat disturbance experienced by the specific population.

Carbohydrates, gene expression and flowering in *Protea* spp

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The dependence of floral transition and floral bud development on current photosynthate from subtending leaves and surrounding shoots and the effect of sugars, as both signalling and metabolisable compounds, were studied in the *Protea* hybrids 'Carnival' and 'Sylvia'. The effect of benzyladenine (BA, 6-benzylaminopurine) application on the expression of a homologue of the *Arabidopsis thaliana* 'floral-integrator' gene *LEAFY* in Proteaceae (*PROFL*, *PROTEA FLORICAULA LEAFY*) was investigated. Photosynthesis and respiration were measured by infra-red gas analysis and carbon allocation followed using both ¹³C and ¹⁴C enriched CO₂ as tracers. The $\delta^{13}\text{C}$ tracer experiments provided evidence for the translocation of up to 33% of incorporated carbon to neighbouring shoots carrying developing flowers. The growth flush subtending the flower had the greatest photosynthetic capacity and dually translocated the largest amount of carbon to developing and dormant meristems. BA application led to an earlier increase in *PROFL* expression which characterized the transition to flowering. The expression of *PROFL* was determined using the Reverse Transcriptase-Polymerase Chain Reaction and the expression of the gene could be found in a range of Proteaceae. The expression of other genes involved in the flowering pathway of *Arabidopsis thaliana* (eg. *CONSTANS*, *APETALA1* and *SOC1*) may provide more insight into the control of flowering in *Protea*. The large size of *Protea* flowers, that can weigh up to 80 g in fresh weight, as well as the associated construction and maintenance costs consumes carbon from both subtending shoots and neighbouring shoots. It is believed that carbohydrates will therefore play a vital role in floral transition and that the response might be elicited through interaction with key genes involved in the flowering pathway.

The relationship between riparian vegetation, channel discharge and channel morphology in the Lourens River, Western Cape, South Africa

Key words: Riparian vegetation, flooding effects, channel discharge

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The Lourens River catchment has been degraded to a great extent by forestry, agricultural activities, and a mixture of residential, industrial, urban and recreational developments that replaced the natural vegetation. These activities have led to the invasion of alien plants, poor water quality, channel morphological changes and reduced aquatic and riparian biodiversity. This study was conducted to determine whether channel discharge and riparian vegetation changes have an influence on the channel morphology in the Lourens River. Three different parameters were sampled, drawn or measured. Cross-sectional data were obtained through surveying. The same cross-profiles were also used as vegetation transects describing the riparian vegetation distribution and composition. Discharge data were collected and related to channel and riparian vegetation changes. The results indicated that the cumulative effect of the wide range of intermediate discharges experienced in winter 2001 created high velocities that resulted in channel changes in primarily the upper section of the study reach. The lower section (cross-sections 1.6-1.9) showed very little change in bed and bank profiles. Aquatic habitats were strongly influenced by flood waters that reworked and redistributed substrates and completely removed an in-channel island. The largest floods observed were between 1 to 8 July 2001 when average velocities ranged between 0.286 m s⁻¹ and 0.961 m s⁻¹. Cross-sections 1.2 to 1.5 showed evidence of bed (increased depth of 0.3m) and bank erosion, channel widening (between 5m-7m) and narrowing, in-channel deposition, bar formation (0.5m was deposited) and channel migration. The results indicated that the vegetation at the reach consisted of herbaceous species, mostly weeds including both indigenous and mostly alien plants. These species (e.g. *Salix babylonica*) were unable to withstand flood flows and resulted in bank erosion and local distortion. It was concluded that channel morphology was influenced by channel discharge and riparian vegetation changes.

Soil bacteria associated with Proteaceae plants

Keywords: Soil microbiology, Proteaceae, Biodiversity

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Soil bacteria are known to affect plant health, development and environmental adaptation; both beneficially and detrimentally. To study the soil microbiology essential for fynbos ecosystems we analyzed the soil bacteria using modern molecular biology techniques of genetic fingerprinting and molecular taxonomy. This has revealed hundreds of bacterial species per gram of Fynbos soil and the discovery of entirely new bacterial genera and species. We identified bacteria closely associated with plant roots and specific to certain Proteaceae plant members (*Leucadendron* and *Leucospermum* sp) that may be important for nutrient acquisition from these infertile soils. This approach is also being explored as a tool to study the effects of land-use patterns and climate change on Fynbos ecosystems and will provide a clearer understanding of fynbos soil ecology that is essential for fynbos biodiversity conservation and rehabilitation.

SUPPORTING LAND-USE PLANNERS AND DECISION-MAKERS TO ENSURE A SUSTAINABLE LAND-USE LEGACY

Key words: land-use, planning, decision-making, capacity building, training

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The incorporation of biodiversity issues into land-use planning, management and administration was identified by both the Cape Action for People and the Environment (C.A.P.E.) and Subtropical Thicket Ecosystem Planning (STEP) Implementation Programmes as a key need within local municipalities, relevant provincial government departments, NGOs, and their service providers. In response to this need, the South African National Biodiversity Institute (SANBI), in partnership with the WESSA Biodiversity Conservation Unit, the Development Bank of Southern African and the Mazda Wildlife Fund, has initiated the **Mainstreaming Biodiversity into Planning and Development: Capacity Building Project for Eastern Cape Land-use Planners and Decision-makers** in order to begin addressing the constraints to this important issue in the Eastern Cape province.

This project, a key initiative of the STEP implementation process, which is being facilitated by SANBI, is providing land-use planners and decision-makers in selected agencies with one-on-one situated support using the STEP Handbook and Mapbooks, supplementary planning and decision-support tools and awareness raising materials, and training and education via a formal programme. These approaches collectively seek to facilitate the incorporation of biodiversity issues into this sector via the development of the knowledge, skills and reflective competence (applied understanding) of key stakeholders in this field.

A capacity assessment to identify the current opportunities and constraints to the meaningful incorporation of biodiversity issues into land-use planning, management and administration was completed for a number of pilot agencies in the Eastern Cape in early 2005. The findings of this assessment, the key lessons emanating from the implementation of the project, and consequent recommendations and future actions of the project will be presented. The implications of these findings for the relevant agencies will also be discussed.

CONSERVATION IN URBAN COMMUNITIES: A CASE STUDY IN THE NELSON MANDELA METROPOLITAN MUNICIPALITY

Keywords: urban conservation; biodiversity threats; municipal buy-in

Eldrid Uithaler, *Wildlife and Environment Society of South Africa - Biodiversity Conservation Unit, Port Elizabeth*

Conservation historically focused on rural environments at the expense of urban landscapes. The role and potential of local communities in conservation, especially those bordering natural areas in cities, has always been under-emphasized. Hence, the continued pressure from these peoples on their local natural environment.

The Van der Kampsloof–Parsonsvlei area in the Nelson Mandela Metropole consists of natural valleys covered with valley thicket and plateau areas with fynbos. It forms part of the Cape Floral Kingdom, a biodiversity hotspot and recently declared World Heritage site. Van der Kampsloof–Parsonsvlei was identified as a priority area through a fine-scale conservation planning exercise. The biodiversity of the area is currently threatened by a range of human activities, including poaching of flora and fauna and over burning. The area's natural assets will likely be lost if these threats are not addressed in the short to medium term. Through a community participatory process, guidelines to manage the area as a Nature Reserve have been developed. This includes an ecological management plan that will specifically focus on alien plant eradication and fire management. This initiative will support the conservation of the biodiversity of the area and assist with the provision of social, educational, recreational and small-scale economic opportunities for the residents of the area.

The implementation of this project is however hampered by a lack of commitment in the municipality to see this project through. Environment and related issues are still not as high a priority in many municipalities given the excellent legislation that currently exists in our country. A huge challenge for Municipalities therefore remain to collaboratively establish through their different departments, priorities in conservation-worthy areas, and develop in their SDF's and IDP's a unified action plan so as to reduce subsequent friction and frustration from agencies mandated to do work on their behalf.

Towards the sustainable harvesting of *Bulbine latifolia* in the southern Cape

Key words: *Bulbine latifolia*, sustainable harvesting, population dynamics

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Bulbine latifolia, locally known as "Rooiwortel", is harvested for medicinal use in the southern Cape, by especially the Rastafarian community. It grows in dry scrub forest but is particularly abundant in the dry forest-fynbos ecotone. The big demand for the Rooiwortel resulted in the illegal, uncontrolled harvesting and overexploitation of the species, especially in the more accessible areas. The National Forests Act (Act No. 84 of 1998) makes provision for access by local communities to plant resources for domestic use, subject to sustainable management principles.

This paper gives an overview of a study project initiated to develop a yield regulation system and management prescriptions for the sustainable harvesting of *B. latifolia*. Information on the population dynamics of the species were gathered by way of belt transect surveys through the forest-fynbos ecotone. Monitoring plots were established to obtain information on recruitment, growth rate and phenology of the species. A phytosociological classification of dry scrub Forest and floristic surveys of the forest-fynbos ecotone were undertaken to aid with the mapping of *B. latifolia* populations and the identification of possible harvest sites. The preliminary results on population dynamics and plant demography are presented and discussed within the context of sustainable harvesting of the species.

The Role of SANBI Botanic Gardens in Bio-diversity Conservation Management

Keywords Partnerships, bio-diversity, conservation

Werner Voigt SANBI, Kirstenbosch NBG, Private bag X7, Claremont, 7735

One of the most essential elements of successful bio-diversity conservation is maintaining sound partnerships between conservation bodies, landowners and communities. It is important that each of the bodies fully understand the nature of the various partners operations and the potential value that each of the partners brings to the table when dealing with bio-diversity projects. In the Cape floristic region there are a number of threatened habitats, which needs the urgent intervention from conservators and the general public at large. By targeting these habitats as key conservation areas, botanic gardens of the SANBI are collecting and cultivating plants as part of their regional threatened plants program. Plants are cultivated for purposes of ex-situ conservation and vegetation restoration in damaged habitats. The information gathered from field collections and subsequent cultivation is invaluable not only to maintaining healthy living collections, but also aids conservation planning, and research projects. It is in establishing constructive working relationships that is based on the sharing of past experiences, resources, knowledge and skills, that we will be able to achieve more favorable results from our conservation initiatives. While we may have relatively different objectives, we all function and contribute to the overall cause of sound ecosystem management.

WESSA presents Eco-Schools

WESSA, E Cape

(Co-ordinator Bethelsdorp Eco-Schools Node
WESSA-EP, 2(b) Lawrence Street, Centrahill, Port Elizabeth, 6001

What is the role of the Eco-Schools programme in the conservation and environmental education in the Bethelsdorp/Van der Kemps Kloof Area and specifically what role does it play in conserving Fynbos.

In the Bethelsdorp Area there are 9(nine) schools who have registered for the Eco-School programme 2005. These schools are striving to make each learner more environmentally conscious and by extension, also the people in the community aware of the heritage and their environment.

Van Der Kemps Kloof is in the Bethelsdorp Area - this is where our focus lies. Schools are encouraged to start with projects in and around the Van Der Kemps Kloof Area to conserve their heritage. In order to achieve this goal each school in the Eco-Schools programme have to choose at least 3(three) Focus Areas.

Each Focus area needs to address an environmental issue at the school or in the Van Der Kemps Kloof Area. With these focus areas in mind the schools plan environmental projects and work out lesson plans which will be relative to the Environment and Van Der Kemps Kloof. These projects and lesson plans have to be adhere to the

curriculum and OBE based, and also be able to be applied in all learning areas at schools. Projects and lessons should be a whole school effort.

Reconciliation Ecology – Going Forward To Nature

Key words: positive futures, urban conservation, emerging ecosystems

Adam Welz, **Botany Department, University of Cape Town, Private Bag, Rondebosch, 7701**

The science of conserving wild species in the areas that humans live, work and play is termed *Reconciliation Ecology*. Although many of its current methods are not novel, the framing of the concept has enormous potential to inspire meaningful conservation action in many sectors across society. Using basic species-area theory in addition to recent studies on the progression of extinction in isolated habitat fragments, proponents of reconciliation ecology argue that many wild species will not survive into the near future unless we actively find ways to share 'our' space with them. A basic conceptual framework for reconciliation ecologists is proposed, and a practical proposal for a reconciliation project in metropolitan Cape Town is put forward.

Greenwashing or real benefits for biodiversity? – perspectives from the Biodiversity & Wine Initiative

Key words: business, biodiversity, marketing benefits

Sue Winter, **Biodiversity & Wine Initiative, c/o SAWB, P O Box 7055, Stellenbosch, 7599**

Launched in April 2004, the Biodiversity & Wine Initiative is a partnership between the South African wine industry and the conservation sector to minimise the further loss of threatened habitat and contribute to sustainable wine production with benefits for both biodiversity conservation and the wine industry. While aiming to achieve this goal, a number of interesting challenges have arisen while working with large, wine industry marketing organizations, influential CEO's of wine companies and wine farmers intent on maximizing farm productivity and profit. But is biodiversity on wine farms actually benefiting, or is the new selling point for biodiversity just a form of greenwashing? Real examples will be presented of conservation activities taking place on wine farms and new advertising campaigns, while the audience left to be the judge.

Success of the gall rust fungus *Uromycladium tepperianum* in controlling *Acacia saligna*

Keywords: Biological control, *Uromycladium tepperianum*, *Acacia saligna*, long-term population monitoring.

Alan R. Wood, **ARC-PPRI, P. Bag X5017, Stellenbosch, 7599.**

Ten sites were set up in 1991 to monitor the impact of the gall rust fungus, *Uromycladium tepperianum*, on populations of the invasive tree *Acacia saligna* in the Western Cape. In 2005 the density of plants at all surviving sites had been reduced by 67-97%, compared to the initial density. This is despite fires at several sites which saw a post-fire increase in plant density. Additional data has been collected by destructive sampling of trees at 18 sites during 2004 and 2005. The total leaf dry weight of plants is generally less in comparison to data published in 1981, indicating that the canopies are less dense for comparable tree sizes. The average age of trees at these sites range from 3 to 6 years, indicating that the population dynamics of the plant has changed since introduction of the gall rust. Also total tree pod production at 4 sites was determined, and 52% of trees have 70% less pods than expected in comparison to similar sites that were sampled in 1989.

TABLE MOUNTAIN FUND Past, Present & Future

Julia Wood, Zohra Parkar-Salie & Rodney February, **TMF, WWF-SA**

The Table Mountain Fund (TMF), an associated trust of WWF-SA has been operating since 1998. This programme has run over 70 successful projects in the Cape Floristic Region aligned to C.A.P.E.'s strategic plan. In May of this year, the new Strategic Plan for the next 5 years was approved by the Board of Trustees.

Botanical Gardens' role in ecosystem conservation: The Betty's Bay approach

Key words: ecosystems, botanical gardens, development in ecosystems

Toni Xaba, Harold *Porter National Botanical Garden, PO Box 35, Betty's Bay, 7141*

Betty's Bay, a coastal town within the Kogelberg Biosphere Reserve, boasts coastal and marine ecosystems with mountain fynbos, afro-montane forest patches, rare lowland fynbos communities, vleilands and milkwood forests but in many instances these ecosystems are threatened by ever-increasing developments and clearing of vast areas of local vegetation as building sites increase. The Botanical Garden, in response to this has begun developing demonstration gardens along a four ecosystems walk to interpret the significance and biodiversity that exists on their properties within these ecosystems. Our aim is to create greater awareness of these systems and to encourage locals and property owners with holiday homes to play an active role in protecting ecosystems from complete destruction. Through the displays in the Garden we offer guidelines to minimise impact of development in our local area as we have realised that there is no stopping development. Partnerships with the local government and conservation authorities and estate agents will play a crucial role in supporting this initiative. The presentation will provide an overview of our efforts thus far.

An assessment of the reproductive biology and ecology of selected rare and endangered *Oxalis* species

Key words: *Oxalis*, tristylous, rarity

Johlene Zietsman¹, Dr. Léanne L. Dreyer¹ & Prof. Karen J. Esler²

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Oxalis is the seventh largest genus in the Cape Floristic Region, yet an estimated 53 of the 211 southern African *Oxalis* species are rare/endorsed and highly localized. Small populations are especially vulnerable to extinction (inbreeding, low genetic variation, stochastic events, disrupted biological interactions, etc.). Moreover *Oxalis* displays tristylous, which is a restrictive breeding system that includes a strong self-incompatibility component that promotes out-crossing between different floral morphs within populations. As it requires equal availability of three floral morphs as well as effective pollinators for seed production, this breeding system can be a further threat to small populations when fully expressed. Breakdown of the tristylous breeding system may significantly alter reproductive assurance and thus future survival of rare species. Potential factors that may contribute towards rarity in *Oxalis* are being investigated by focusing on the reproductive biology and ecology of two widespread and eight rare/highly localized *Oxalis* species. The three aspects of tristylous (self-incompatibility, population structure and flower morphology) are assessed. Natural seed production, pollinator availability and extent of clonality are also assessed for the selected rare and common species. In addition, several abiotic features of the selected species are explored, including habitat preference, specificity and availability, geographical distribution, extent of fragmentation/disturbance, recent climate fluctuations, and population size and density. Comparisons of results of different rare species together with comparisons between rare and related common species are presented to reveal the most likely threats to specific populations. Identification of current and possible future threats will aid future conservation planning for each of the selected rare/endorsed species.

Poster Abstracts

01-05 August 2005

Present status and freshwater requirements of the macrophytes of the Olifants Estuary, South Africa

Janine Adams, Tom Bornman and Chantel Bezuidenhout

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The Olifants Estuary is located approximately 250 km north of Cape Town. It occurs in the cool temperate geographical region and receives low winter rainfall. The mouth of the estuary is permanently open and the estuary is tidal for 32 km upstream. The Olifants is ranked third in terms of conservation importance of all estuaries in South Africa. It has the largest supratidal (143 ha) and floodplain (797.1 ha) salt marshes in the country. Intertidal salt marsh covers 91.94 ha, reeds and sedges 60.05 ha and the submerged macrophyte, *Zostera capensis*, 47.72 ha. Dams and water abstraction in the catchment have reduced freshwater input to the estuary. Low flow periods (<5 m³/s) have increased from 4 months (December – March) under the natural condition to 7 months (November – May) under the present state. Water residence time in the upper reaches has increased from 1-4 weeks to greater than 4 weeks. These stagnant waters in addition to nutrient rich agricultural return flow have increased the growth of macroalgae and submerged macrophytes. There has been an increase in saline intrusion particularly during the dry summer months, which would impact the brackish salt marsh, reeds, sedges and pondweed, *Potamogeton pectinatus*. A single salt marsh species, *Sarcocornia pillansii*, is dominant in the supratidal and floodplain areas. This plant cannot grow in the hypersaline surface soils present during the dry period of the year (> 8 months) and utilizes the saline (< 50 ppt) groundwater to survive. A future threat is further reduction in freshwater input and an increase in water column salinity which would increase groundwater salinity. *Sarcocornia pillansii* is possibly the only plant adapted to grow in this harsh environment and its loss would lead to the formation of bare, dry salt pans as has occurred at the Orange River mouth.

Re-survey of woody alien vegetation on Table Mountain, South Africa – 40 years on

Key-words: Table Mountain, alien vegetation, comparative data

Zohra Boltman and Eugene Moll

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During 1959/1960 Hall conducted an extensive survey on the distribution of woody alien species in the northern parts of mountains of the Cape Peninsula. During this study in he permanently marked 87 plots with stone cairns. The total study area was some 102 km² and was selected at the intersections of the thousand yard grid lines of the 1951 Trigonometrical Survey Map (1" to the mile). Only those points above the 500 ft (152 m) contour, and not within plantations, were examined. At each site altitude, soil type, moisture, aspect, post-burn age, numerically and physiognomically dominant indigenous species, average cover, height and density of the community was recorded. (McLachlan *et al.*, 1980). Alien plants were recorded in terms of their density within a radius of 200 yards (183 m) of the sample point.

In 1976 the plots were re-located by McLachlan *et al.* using the Trigonometrical Survey Map and original site photos taken by Hall. The data was collected in the same way as done by Hall in 1959/1960 with the addition of information such as observation on clearing and the effects of fire (McLachlan *et al.*, 1980). Moll and Trinder-Smith repeated the survey in 1989/1990 and added four new sites, which were previously in plantations. Chronological comparisons of the surveys revealed a significant increase in frequency of *Pinus radiata* and *Acacia cyclops*; both species had previously not been considered aggressive invaders in the Peninsula mountains. Eradication programs seemed effective for *Hakea sericea* and *Acacia longifolia* (Moll and Trinder-Smith, 1992).

The survey will be repeated during 2005 using the same plots as defined by Hall (1961). Data collection will be as described in Moll and Trinder-Smith, 1980. Data comparisons between the four surveys will be done and effectiveness of control and eradication programs will be made.

Walking towards the future

Key words: Community, Youth, Urban conservation

Elzanne Burger, *Cape Flats Nature / City of Cape Town, Helderberg Nature Reserve, P O Box 19, Somerset West, 7129*

The poster will give information regarding Harmony Flats, a nine hectare nature reserve situated between Strand and Gordons Bay, within the municipal boundaries of the City of Cape Town. This reserve has been identified as a core botanical site to protect its rare and unique vegetation. The vegetation on the reserve consists of Renosterveld, which is dominant, Sand plain fynbos, and Strandveld and is also a refuge for small reptiles and mammals.

This poster will examine issues around urban conservation, community involvement, incentives and environmental education of the community, primarily the youth. It highlights the needs and challenges on the reserve at present and looks at possible solutions.

An active community working group is involved in maintaining Harmony Flats. The poster will illustrate how this partnership with the local community contributes to conservation.

Alien Infestation vis Chemical Contamination: A glimpse at the Bitou and Keuabooms Rivers

Buthelezi, S.N.P.

*CapeNature, RCU: Aquatic Scientist (RHP), 4th Floor, York Park Building; York Str.
P/ Bag X6546; George, 6530; SA*

Over the past decades, chemicals have been produced for different uses. In the same production process, some byproducts are also created. Amongst other uses, these chemicals are used for controlling pest species (**pesticides**), enhancement of production (**fertilizers**), etc. Both chemicals and their byproducts can have a major impact on the biota and their habitat, especially when used in an uncontrolled manner.

Whilst this is the case with chemicals, **alien species** (both plants and animals) were introduced for different reasons, social and/or economic upliftment, such as angling and wood production, respectively.

This comparative study focused on the use of different indices (**SASS, Fish Index, RVI, Index of Habitat Integrity, Geomorphological Index**) in the assessment of these two rivers, before they confluence forming one systems, which are affected by totally different impacts; the **Bitou River** subjected to **chemical pollution**, and the **Keuabooms** having **alien species** as a major threat.

Threatened species of the Cape Floristic Region: the story thus far

Key words: Threatened species, Western Cape, assessments

Fahiema Daniels, SANBI, Private Bag X101, Pretoria, 0001

The Cape Floristic Region (CFR) is one of the global hotspots of plant diversity, with over 9000 plant taxa concentrated in an area of only 78 555 km². The CFR houses five of South Africa's twelve endemic plant families, 160 endemic genera with more than 70% of the flora being endemic to the region only. The flora of the CFR is under serious threat from numerous factors that include urbanization, farming and land transformation and invasive alien plants. There are 4312 taxa in the threatened species database and approximately 55% of these occur within the Western Cape. A total number of 1353 taxa have been assessed, while the rest of the assessments should be completed by October 2005. Of the plants 380 are in the threatened categories (vulnerable, endangered or critically endangered), 91 are near threatened, 743 are of least concern and 139 have been assessed as being data deficient. All taxa were assessed according to the IUCN's criteria version 3.1 so that the assessments can be compliant with world standards. Once completed the red list statuses of plants will be used in producing and implementing management plans for the plants that are most threatened.

EnviroYouth – Encouraging Leadership for a Sustainable Future

Keywords: Leadership, Sustainable, Youth

John Davids, Tsofefelo Hlatwayo, Arnelle van Noie & Mandisa Mdala
CapeNature, Boland Mountain Business Unit, Limietberg Nature Reserve, P/Bag X 14, Paarl, 7620

CapeNature, Boland Mountain Business Unit Office, P O Box 1981, Somerset West, 7129

CapeNature's Boland Mountain Business Unit was declared part of a World Heritage Site in 2005. One of the key factors in managing these sites successfully is educating communities on conservation issues, nurturing those communities that have a love for their natural environment, creating awareness of threats to this environment and developing appropriate ways of managing this environment sustainably.

This poster will show how the Boland Mountain Business Unit has aimed at achieving this goal, by focusing on its youth and future leaders. It will illustrate several existing projects attempting to get the message across as well as initiatives run within the Business Unit.

Education for Biodiversity and Sustainable Living

Roleen Ellman, *Gold Fields Environmental Education Centre, Kirstenbosch National Botanical Garden, South African National Biodiversity Institute (SANBI)*

SANBI has received Lottery funding to conduct a three -year 'Education for Biodiversity and Sustainable Living ' garden-based school programme with educators and learners from disadvantaged areas.

This poster depicts the results of an extensive environmental audit conducted with the Cape Town schools, the outcomes of Teacher Professional Development Workshops on the topic and an evaluation of the activities and learning experiences of the garden-based school programme in the Kirstenbosch Garden.

Long-term vegetation monitoring - a 30-year record from Table Mountain

Keywords: Vegetation change, trampling, paths

Paul Emms and Eugene Moll

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In 1976 a study to monitor the long-term effects of humans on the vegetation of the Western Table of Table Mountain was initiated by Coley. This utilised 12 permanent plots arranged in three groups at increasing distance from the Upper Cable Station (UCS). Field observations in 1976 revealed that the Mountain Fynbos vegetation was heavily impacted by Cableway Tourists. Furthermore the vegetation was most damaged closest to the UCS with a sharp decrease in damage with increasing distance from the station.

To monitor this impact four permanent plots (2 x 4 m) were placed some 75 m from the UCS where the vegetation was most heavily impacted (one of these plots was fenced to prevent further damage). Another four plots were placed in the intermediately damaged fynbos some 40 m further from the UCS – again four plots with one enclosure. One further enclosure on an informal pathway was also set up between these first two sites. Finally three more plots were established some 165 m from the UCS in an area of minimal impact.

In order to monitor the vegetation change Coley used photographs so that visual comparisons of species composition and canopy cover could be made over time. The vegetation was then monitored in terms of percentage cover, and percentage damaged for each plot. This study marks the fourth time data will be collected since Coley (1976), and shows that there has been a marked improvement in vegetation quality owing to the construction of well-defined paths to reduce the impacts of trampling. Also there is a concerted effort by managers to ensure tourists do not leave the paths. It is hoped that the results this study will prompt similar actions to reduce human impacts by trampling in other high impact sites.

A practical field procedure for identification and delineation of wetlands and riparian areas – final draft.

Key words: wetland, riparian, delineation

Compiled by: Forestry Industry, National Government, Provincial Nature Conservation Boards and Wetland NGO's.

Naomi Fourie, **Department of Water Affairs and Forestry, Private Bag X16, Sanlamhof, 7532**

Delineation is the act of determining the boundary of a wetland or riparian habitat based on natural, scientific field indicators. Water is the primary driving force of these habitats but the guideline make use of indicators of prolonged saturation i.e. hydrophytes and hydromorphic/ alluvial soils to classify the area as a watercourse. The changing frequency of saturation in a wetland gives rise to three different zones in a wetland namely the permanent, seasonal and temporary zones. Terrain unit, soil form, soil wetness and vegetation, with soil wetness as the primary indicator, are the indicators used to determine the outer edge of a wetland. Vegetation indicators for wetlands in the Cape Floristic region should be identified. Riparian delineation requires the following aspects to be taken into account:- topography associated with the watercourse, vegetation and alluvial soils and deposited material, with vegetation as the primary indicator. The aim of this guideline is to determine the natural edge of watercourses in order to exclude it from development or protect it against negative impacts. The poster portrays the methodology of this guideline and the importance of the use thereof.

Spearheading the biodiversity and wine initiative in the Schapenberg wine region

Key words: Schapenberg, Biodiversity Wine Initiative

Andreas Groenewald, Heather Epstein, Dianne Marais

Schapenberg-Sir Lowry's Conservancy, Box 246, Sir Lowry's Pass, Cape 7133

The Biodiversity and Wine Initiative (BWI) is a partnership between the South African wine industry and the conservation sector to minimise the further loss of threatened natural habitat, and to contribute to sustainable wine production, through the adoption of biodiversity guidelines by the South African wine industry. The BWI aims to incorporate biodiversity into Brand South Africa, thus giving South Africa a competitive marketing advantage in the global wine market. The industry can then differentiate itself from other wine producing countries, based on the unique attributes of the scenery and biodiversity of the Cape Floral Kingdom, a recently listed World Heritage Site. The BWI will build on the fact that South Africa's complex terroir, unique in the world, results in complex biodiversity and complex wines.

Two wine farms, Waterkloof and Onderkloof, of the >10 vine/wine farms within the Schapenberg-Sir Lowry's Conservancy are spearheading the BWI in the area. A Conservation Plan, in line with the BWI guidelines, will be presented as an illustrative model to be used by commercial farming businesses that are aiming to balance conservation with commercial farming in the Schapenberg and Sir Lowry's Pass area. A pictorial record of areas on Waterkloof and Onderkloof worthy of conservation will also be depicted with views of areas of fynbos rehabilitation and alien vegetation clearing by locals and previously disadvantaged contractors. Incentives such as securing a marketing edge for their wines, rates rebates, land management and assistance with alien vegetation clearing should entice other land owners in the area to follow suite. Indeed, this could be the commencement of the Schapenberg Biodiversity Wine route.

Impacts of the invasive species *Arundo donax* (giant reed) on biodiversity at the community-ecosystem level

Key words: *Arundo donax*, biodiversity, community-ecosystem

Gené Guthrie, Richard Knight and Brian van Wilgen

Biodiversity and Conservation Biology Department, University of the Western Cape, Private Bag X17, Bellville 7535

Arundo donax is an invasive alien reed in many parts of the world. In California, *A. donax* causes flooding and fires, and displaces indigenous plants. Both South Africa and California have a Mediterranean-type climate, thus the impacts on ecosystems are likely to be similar. In South Africa, *A. donax* has been classified as a category 1 invader (declared weed), meaning that its destructive potential has already been realised. The impacts of *A. donax* on biodiversity have not been assessed in the Western Cape, South Africa.

The impacts of invasive alien plants on biodiversity have been and are difficult to quantify because of the range of definitions of biodiversity. In this study we use a characterization of biodiversity as used by Noss (1990). Accordingly, biodiversity can be divided into different components: composition, structure and functioning of ecosystems. *Composition* has to do with the identity and variety of elements in a collection; *structure* is the

physical organization or pattern of a system; and *function* involves evolutionary and ecological processes, including disturbances and nutrient cycling. Noss (1990) also divides the approach into different levels: genetic, population-species, community-ecosystem, and regional-landscape. We assess the impacts on biodiversity at the community-ecosystem level.

The study will assess these components by looking at plant and aquatic invertebrate diversity, fuel models, decomposition of *A. donax* and other material, and growth rates of mature *A. donax* plants under various treatments. We hypothesize that riparian habitats of rivers dominated by *A. donax* have (1) suppressed indigenous plant and aquatic invertebrate diversity, and (2) altered soil nutrient status and fire regimes.

Re-introduction of Klipspringer (*Oreotragus oreotragus*) into the Table Mountain National Park

Key Words: Klipspringer, Table Mountain National Park, Monitoring

AntoinetteJini, Gavin Bell

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Klipspringers were hunted to extinction on the Cape Peninsula around 1930. The Table Mountain National Park has been working on a re-introduction program following the removal of the Himalayan Tahr. In 1999 & 2000 as well as 2004 a total of 59 klipspringers were released. A monitoring programme and a master research study is underway to determine the success of the release, determine other suitable habitat on the peninsula and to monitor natural recruitment. Preliminary results from the monitoring and future introductions will be highlighted.

Putting Biodiversity Plans to Work for Local Municipalities.

Key words: Spatial Development Frameworks, Municipal Biodiversity Summary Map

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Putting Biodiversity Plans to Work (PBPTW) is a two-year project undertaken by the Conservation Unit of the Botanical Society of South Africa, in partnership with the Conservation Planning Unit of the Western Cape Nature Conservation Board. The project is funded by the Critical Ecosystem Partnership Fund as part of the C.A.P.E. programme, and aims to mainstream the use of systematic conservation plans in the land-use planning and decision-making system in the Western Cape province.

One of the focus areas of the project includes incorporating the outputs of the Cape Lowlands Renosterveld Project into biodiversity priority maps that can be included in the local municipal Spatial Development Framework of four pilot municipal areas (Drakenstein, Swartland, Cape Agulhas, and Theewaterskloof). This paper presents some of the challenges and lessons learnt from piloting the use of biodiversity plans in the four local municipalities and presents some of the key practical considerations we have identified thus far.

Hands on environmental education about medicinal plants on the Cape Flats

Key words: Medicinal, Cape Flats, Education

Zithobile Lembethe, ***Cape Flats Nature / City of Cape Town, Edith Stephens Wetland Park, Lansdowne Road, Philippi***

This poster will illustrate a way of educating communities on how to use medicinal plants of our Cape Floral Kingdom as a precious gift and a renewable resource. The approach, implemented at the Edith Stephens Wetland Park, gives participants hand on propagation skills for repopulating the Cape Flats medicinal plant community, in order to enrich nature not just within the reserve but also in their own backyards.

Medicinal plants of the Cape Flats

Key words: Medicinal, Urban, Cape Flats

Marx-Lenin Nagan, Cape Flats Nature / City of Cape Town, Strandfontein Depot, Weltevreden Road, Mitchells Plain

A major natural resource of the Cape Flats is the vegetation. The vegetation along the False Bay coast on the Cape Flats consists mostly of Strandveld and coastal fynbos, which has a rich variety of medicinal plants such as sour figs (*Carpobrotus edulus*), wilde dagga (*Leonotis leonorus*), and dune sage (*Salvia lutea-africana*).

The present rate of destruction through urbanisation will deplete this vegetation, destroying species that may have undiscovered uses as cures for diseases such as cancer and HIV/AIDS or those of the future.

This poster will illustrate the importance of medicinal plants found on the Cape Flats, how they are used and the need for sustainable use to be encouraged through environmental education.

Private Protected Areas and their role in conservation – the Little Karoo

Keywords: game farmers, private land, protected areas

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Private sector conservation plays a crucial role in meeting national and international conservation objectives, and is often viewed as a cost-effective means of achieving sustainable use of natural resources, particularly in developing countries. Privately-provided protected areas in South Africa vary enormously in their ecological, institutional and sociological characteristics. This diversity has not previously been examined in any systematic way. To address this need, research is in progress to investigate private nature reserves, game farms and conservancies in the Little Karoo region. Research focuses on the motivations, values and roles of private protected areas, and their delivery on conservation management objectives. An integrated framework of research methods drawing from both the social and natural sciences is presented, and expected outcomes of research are discussed.

The Vegetation of South Africa: The Fynbos
Vegetation, Conservation Status, Transformation Status, Endemicity

T. Rebelo, *Protea Atlas Project, SANBI*

The Vegetation Map of South Africa is due out in June. The descriptions of the vegetation units will be published during the new year. We summarize the numerical results of the vegetation types: their conservation status, their degree of transformation and threatened status and patterns of endemism. We compare biogeographic, upland-lowland and geomorphologic patterns.

<I want to put more in here Wendy – but I will only be working on it on Friday this week>

Specialised 'dauciform' roots of Cyperaceae exhibit convergent physiology with 'proteoid' roots of Proteaceae to challenge phosphate-poor environments

Key words: plant nutrition, citrate exudation, root clusters

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There are about 5,000 species of 'grass-like' sedges (Cyperaceae) commonly associated with almost every terrestrial habitat world-wide; they are often prominent on severely nutrient-impoorished sites. Some sedge species

develop specialised 'dauciform' roots (Shane *et al.*, 2005). Dauciform roots are short (ca. 2 to 10 mm) and 'carrot-shaped', and produce remarkably large numbers (ca. 1,000 per mm axis) of long (up to 4 mm) root hairs (Davies *et al.*, 1973; Lamont, 1974; Shane *et al.*, 2005). The development of dauciform roots is stimulated at low phosphorus supply (Shane *et al.*, 2005). It has been proposed that dauciform roots function to enhance P uptake from nutrient-poor, P-fixing soils in a manner similar to that of 'proteoid' roots, but no evidence has been presented to substantiate this contention. In an attempt to elucidate the ecophysiological role of dauciform roots we have stimulated dauciform-root growth in the south-western Australian sedge *Schoenus unispiculatus* Benth. (Cyperaceae) by growing plants in nutrient solutions with extremely low [P] ($\leq 1.0 \mu\text{M}$).

We found that citrate (and malate) were released from dauciform roots in an 'exudative burst' corresponding with a particular stage of root development which is similar to what is known for 'cluster roots' of Proteaceae (e.g., *Hakea* spp., Dinkelaker *et al.*, 1997; Shane *et al.*, 2004) and white lupin (Neumann and Römheld, 1999; Watt and Evans, 1999). Mature dauciform roots (i.e. 6 to 8 days old) exuded citrate at rates (i.e. $1.7 \text{ nmol citrate g}^{-1} \text{ FM s}^{-1}$) that were approximately three-fold faster than those reported for roots of most other species, but were similar to those from mature cluster roots of Proteaceae. Carboxylates exuded from mature dauciform roots are likely to solubilise mineral-bound soil nutrients (e.g., P and micronutrients) in the rhizosphere (Gardner *et al.*, 1983), and dense numbers of long root hairs associated with mature dauciform roots, whether or not involved in exudation, would provide for efficient nutrient uptake. Our current investigations of South African Cyperaceae revealed that dauciform-root development occurs in several 'Fynbos sedges' that are particularly well adapted to growing in habitats of extremely low nutrient availability. Thus, species from phylogenetically distant families have produced remarkably convergent root structures and root physiologies (carboxylate exudation from 'cluster roots' of the Proteaceae and 'dauciform roots' of the Cyperaceae) to mobilize P from insoluble mineral-bound P-sources.

ADDRESSES

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