PRESENCE
Workshop Booklet

11th – 13th November, 2007
Zandvlakte, Baviaanskloof (SA)

The companion booklet to the PRESENCE Workshop.
Contains: 1. Programme Schedule and
2. Supporting Document with frameworks, research themes and other background information.

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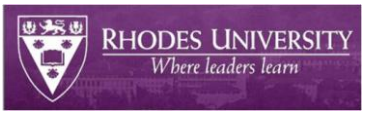

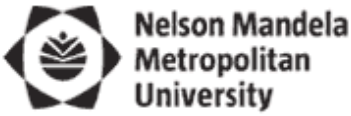

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1 PRESENCE Workshop

We warmly welcome you to the workshop of the research programme titled:
Participatory Restoration of Ecosystem SErvices & Natural Capital in the Eastern Cape (SA).

This is the first PRESENCE workshop held and the first occasion in which related partners, collaborators, expert advisors and implementers are meeting to discuss PRESENCE priorities. The workshop and work to date ('seed phase') is jointly financed through **Wageningen University & Research Centre's Interdisciplinary Research & Education Fund (INREF)** and by the South African **Department of Water Affairs & Forestry (DWAF).**

Seed Phase
Identifying expertise and current knowledge gaps in developing a future research proposal which can support landscape restoration as an ecologically and socio-economically sustainable land-use.

"Planting PRESENCE: the seed phase"

The workshop is the culmination of work commencing late 2006 to identify opportunities for 'up-scaling' restoration through national and international research collaboration; and, for example, in creating opportunities for South African and other international students to undertake their (post-) graduate studies in this field. In early 2007, PRESENCE – as a transdisciplinary[1] research proposal – was prepared by EarthCollective in collaboration with WUR, Rhodes Restoration Research Group (R3G), Rhodes University, Nelson Mandela Metropolitan University (NMMU) and Department of Water And Forestry. PRESENCE aims to build upon and integrate the large body of work already undertaken by these organisations and others through collaborative initiatives (such as the STEP) undertaken in recent years.

Since PRESENCE also supports and cooperates with the **Subtropical Thicket Restoration Programme (STRP),** the PRESENCE Workshop is combined with the **STRP Annual Review Meeting** and will be held on Monday morning 12th November, 2007.

We trust you will enjoy a fruitful three days of learning, brainstorming and planning for the future of restoration research in the Eastern Cape wherein foundations for long-term and mutually beneficial partnerships will be laid.

[1]Builds on 'interdisciplinary' by acknowledging **stakeholder involvement in the research agenda.**

1.1 Workshop Objectives

Our purpose at this workshop is to collectively pinpoint the research priorities and capacity needed to guide and effect the broad-scale mainstreaming and implementation of restoration.

Specifically, we have identified the following workshop objectives from a research perspective:

What needs to be investigated as a matter of priority across the six different Research Themes?
Why is this important for guiding restoration implementation/mainstreaming/up-scaling?
When should this research be carried out (what time frames are possible/optimal/desirable?)?
How can we undertake the identified research in the most effective, efficient and integrated way (what synergies can we develop between disciplines)?
Who needs to be involved to carry out the research, to build long-term capacity and contribute to building mutually beneficial partnerships (desirable institutions and programmes)?

...to make restoration really work.

1.2 Programme

The STRP/PRESENCE workshop will informally start on Sunday morning 11th November at 10.30am with a guided tour through the Kouga Dam nursery. Hereafter, the field trip continues through Baviaanskloof with several on-site presentations with final destination the Sandvlakte venue where the workshop will officially open.

The workshop is divided into two components: the STRP Annual Review Meeting held on Monday morning 12th November; and the PRESENCE workshop which formally commences Monday afternoon and concludes Tuesday evening 13th November and consists of presentations, brainstorm sessions and concluding words. Certain sessions are scheduled for PRESENCE's 'seed phase' partners to discuss steps forward and strategic planning for the 'growth phase'.

A detailed programme will be available in the printed version of this booklet, which will be provided to you when arriving at the Sandvlakte venue after Sunday's fieldtrip.

1.3 Follow-up activities

The results of the workshop will be used by the current PRESENCE Core Group to formulate an expanded strategic research implementation plan, which include (new) key partners and their role, future steps, final goals and research questions. This will finalise the 'seed' phase of PRESENCE - scheduled for April 2008 – and provide the springboard for launching the subsequent 'growth' phase. Just as in the 'seed' phase, thorough coordinated expertise is needed to successfully complete every stage of the 'growth' phase.

The workshop will provide a platform to determine and secure new collaboration. The participants will be given the opportunity to indicate their willingness to be involved and/or support PRESENCE's future steps. The workshop attendees, if interested, will be kept well-informed of plans and progress towards finalising the 'seed' phase and launching the 'growth' phase in 2008.

2 Introduction to PRESENCE

The Millennium Ecosystem Assessment (MA, 2005) highlighted the fact that the transformation of ecosystems through human activity not only compromises biodiversity and ecological integrity, but also ultimately affects the well-being of people who directly and indirectly depend on the benefits derived from them (i.e. ecosystem services).

The implications of such a scenario are clearly apparent in South Africa's biologically diverse Eastern Cape where impaired ecosystem functioning is eroding natural capital and the prospect of achieving sustainable livelihoods.

In response, the South African Government and partners are developing national programmes to investigate options for restoring the region's valuable and globally significant biomes to meet both socio-economic needs and ecological objectives. However, to achieve these ambitious aims, additional research is required in order to build knowledge and improve understanding of the dynamics of restoration.

In this context, PRESENCE is being proposed as a collaborative 'North-South' effort for building capacity in applied research and addressing critical knowledge gaps in ecosystem restoration. With improved understanding of ecosystem processes and human dependence on related natural resources, PRESENCE will provide a solid platform for building resilience in natural (reinstating biodiversity) and social systems (securing regional livelihoods).

2.1 PRESENCE Objectives

PRESENCE aims to adopt a rigorous transdisciplinary research approach that will guide programmes to restore degraded landscapes whilst supporting poverty alleviation within the Eastern Cape, South Africa. The project will undertake empirical research to address key scientific knowledge gaps and to ensure that restoration of degraded areas within South Africa's Eastern Cape is:

- **stakeholder-driven** and recognises trade-offs in restoring desired ecosystem services;
- **socio-economically** acceptable in supporting livelihoods and cultural traditions;
- **ecologically sound** and maximises ecosystem integrity and biodiversity outcomes;
- **financially sustainable** through the development of innovative financing mechanisms for ecosystem management (e.g. carbon credits, water credits, biodiversity credits);
- **institutionally feasible** through good governance arrangements, effective learning organisations and social change processes.

The intended long-term outcome of PRESENCE is the development of optimal spatial restoration strategies which factor ecological processes and socio-economic dynamics in implementation management and planning.

Objectives will build on the research already undertaken through various programmes (e.g. STEP, STRP). However, knowledge deficiencies remain and existing information from various disciplines is **not yet integrated into one coherent approach** for addressing restoration research. This will impede implementation of ecologically sound, socially supported and economically viable restoration for the Eastern Cape's key biomes: an initial focus is on subtropical thicket but linkages are already being made with other biomes such as fynbos and riparian ecosystems.

PRESENCE's proposed North-South interdisciplinary research partnership intends **to support participatory research approaches** that will answer critical scientific questions in order to restore ecosystem services and natural capital for biodiversity conservation and livelihood improvement.

The original PRESENCE proposal identified four interdisciplinary research objectives:

1. **Assess and value ecosystem functions and services** in terms of the use, perceived importance and contribution of natural resources to livelihoods and well-being
2. **Define baselines** (how, when, where, why and what) for improving understanding of restoration ecology and the underlying variables influencing long-term success.
3. **Monitor and track changes** in ecosystem functions as a result of restoration activities in terms of its contribution to socio-economic and ecological objectives.
4. **Investigate financing mechanisms** – to determine if and how they can be employed as a way of supporting and rewarding landscape level restoration

Whilst these research objectives may still have relevance, we already feel that they can - and should - be improved and refined or additional objectives added. This is where you, as experts with diverse backgrounds and fields of interest, are strongly encouraged to contribute during the coming days.

2.2 PRESENCE Framework

This section will outline a proposed research (and implementation) framework for PRESENCE.

Frameworks can be either highly useful or terribly tiresome in terms of trying to capture a complex 'reality'. They may enlighten the research context in terms of providing a clear understanding of how all the pieces fit together or they may become a source of confusion that leads project partners into a downward spiral of discussion! Obviously, our objective here is to arrive at **a conceptual framework that has practical meaning** and relevance for all involved.

As project facilitator, EarthCollective has taken the opportunity to propose and present three interrelated frameworks that are deemed relevant to the anticipated PRESENCE research and the eventual implementation effort. Rather than beginning 'from scratch', the purpose here is to put forward **suggestions which may generate constructive workshop discussion** in formulating a suitable (clear, logical and inclusive) restoration framework which is flexible and adaptive over time.

The three frameworks presented here are:

1. Operational model for mainstreaming ecosystem services (§ 2.2.1)
2. Transdisciplinary Assessment and Implementation Framework (TAIF) (§ 2.2.2)
3. Ecosystem Approach (Principles and five steps in implementation) (§ 2.2.3)

All of the above frameworks deal with research and implementation; therefore it is important for us to delineate within this PRESENCE workshop that the current focus is on the research component (of these frameworks); although we all acknowledge that research must be embedded within the final goal of implementation.

Your ideas and feedback are needed to see how the various frameworks presented can be adapted to better match the diverse research and implementation priorities of restoration. Research needs and requirements may be present within - and overlap between - several components of a framework (e.g. TAIF); it is therefore necessary to understand how various framework components (PRESENCE themes) interrelate and feed into each other in the broader context.

2.2.1 Operational model for mainstreaming ecosystem services[2]

The model proposed by Cowling *et al.* (*in press*) (See Appendix A) incorporates four interrelated elements highly relevant to restoration: Project Phase; Spatial Scale; Stakeholder Collaboration; and Status of the Socio-ecological system. Together they illustrate the integrated and interactive relationships between humans and ecosystem services – it paints the 'bigger picture'.

The model is valuable in the sense that it views research assessment as part of a multi-dimensional process with clear goals in mind. It seeks to mainstream ecosystem services research in the context of land-use planning, adaptive management and learning organisations whereby

[2] A detailed breakdown and discussion of the phases and components of the Operational Model can be found in Cowling *et al.* (in press): *An operational model for mainstreaming ecosystem services for implementation.*

local stakeholders are sufficiently empowered to drive on-ground implementation. Ultimately, this aims to build 'resilient' social-ecological systems which can absorb shocks, surprises and are flexible in adapting to change.

The model's Project Phase trajectory has three phases: Assessment, Planning and Management. Specifically relevant to the initial stages of PRESENCE (and this workshop) are the Assessment and, to a lesser extent, the Planning Phase. These phases lay the foundations for Management (and thus Implementation).

The Assessment Phase is a structured process, which builds knowledge useful for policy and anticipated management. As transdisciplinary research, it should answer our key questions and address bottlenecks to planning and implementation. Three phases of Assessment are identified: social, biophysical and their respective valuation whereby social research is considered critical as the first step for identifying the owners and beneficiaries of the ecological functions that actually deliver the services.

The **TAIF** framework below dissects this Operational Model by delineating the Assessment types (social, biophysical and valuation) in terms of outlining the concrete research themes to be discussed during this workshop.

2.2.2 Transdisciplinary Assessment & Implementation Framework (TAIF)

TAIF (See Appendix A) has been developed as a means to provide strategic coordination and integration of the many disciplines and processes involved with understanding the science as well as the practical approaches needed to achieve restoration.

TAIF is a framework that provides a conceptual 'space' for all stakeholders involved (scientists, implementers, etc.) to determine what research, actions and contributions are required to effect restoration. TAIF is intended to support strategic analysis, planning and negotiation to aid effective transdisciplinary research and stakeholder communication. Whilst it is represented as a step-by-step linear framework we recognize that in reality many elements of the framework will need to be considered simultaneously. Flexibility and adaptability are critical.

The six research themes identified and to be presented and discussed at this workshop, are represented in the TAIF framework as follows:

Research Themes		TAIF Categories
Theme 1	⇔	Ecosystem Functioning & Biophysical Processes
Theme 2	⇔	Ecosystem Goods Services & Valuation
Theme 3	⇔	Stakeholders, Livelihoods & Networks Scoping (& Preferences)
Theme 4	⇔	Policy & Institutional Arrangements (& Measures)
Theme 5	⇔	Financing, Payments & Reward Mechanisms
Theme 6	⇔	Remote Sensing & Geo-Information Systems

TAIF has been developed based on various integrated assessment approaches commonly used in environmental systems analysis and regional management. TAIF has therefore made use of other existing frameworks and models such as those of Cowling et al. (in press), De Groot et al. (2003) and the MA (2005) and combined key components. TAIF should be seen as adaptive to eventual PRESENCE restoration research priorities and strategic direction as required.

2.2.3 Ecosystem Approach

The Ecosystem Approach is based on the idea that ecosystem health and integrity is central to natural resource management decision-making. It was put forward as a highly appropriate framework for delivering the objectives of the Convention on Biological Diversity (CBD).

Subsequently, the Ecosystem Approach was developed and can be defined as:
A strategy for management of land, water and living resources that promotes conservation and sustainable use in an equitable way (Smith and Maltby, 2003).

Relevance to restoration
The decision to include the Ecosystem Approach as a possible supporting approach for PRESENCE is both strategic and functional. It is strategic in the sense that the Ecosystem Approach is a guiding principle of the CBD to which South Africa is a signatory; it may therefore enhance PRESENCE's appeal in attracting funding and institutional support. In addition, it seeks to balance the CBD objectives of conservation, sustainable use and equitable benefit of resources. It places people at the centre of biodiversity management by engaging the widest range of sectoral interests (Smith and Maltby, 2003). The Ecosystem Approach is functional in the sense that **it provides a simple operational checklist for guiding research** to support restoration and implementation.

The Ecosystem Approach is based on 12 principles (see Appendix A) and since been operationalised into five clear steps for realising implementation:

STEP A: Determining the main stakeholders, defining the ecosystem area, and developing the relationship between them (relating to Principles 1, 7, 11, 12);

STEP B: Characterising the structure and function of the ecosystem, and setting in place mechanisms to manage and monitor it (relating to Principles 2, 5, 6, 10);

STEP C: Identifying the important economic issues that will affect the ecosystem and its inhabitants (relating to Principle 4);

STEP D: Determining the likely impact of the ecosystem (management) on adjacent ecosystems (adaptive management over space) (relating to Principles 3, 7);

STEP E: Deciding on long-term goals, and flexible ways of reaching them ecosystems (adaptive management over time) (relating to Principles 7, 8, 9).

These steps have close linkages to the Operational Model (§ 2.2.1) and the TAIF (§ 2.2.2) above; for example, Step A would have its roots in a social and biophysical research assessments and stakeholder analysis whilst Step D incorporates implementation in advocating adaptive management and organisational learning.

The current evolution of the Ecosystem Approach is said to put people and their natural resource use practices squarely at the centre of the decision-making framework (Smith and Maltby, 2003) and to be used in seeking "an appropriate balance between the conservation and use of biological diversity in areas where there are both multiple resources users and important natural values" (Shepherd, 2004). Such areas are indeed found all over the world; however, the potential applicability to restoration in South Africa is immediately apparent. [3]

Shepherd (2004) outlines a number of tools that can be used in identifying the characteristics of ecosystem structure and function that are needed to deliver key ecosystem services. As Shepherd (2004) highlights, the most effective move forward is scientists and local community working together. Useful tools include: joint mapping, ground-truthing, transect walks and natural resource-oriented Participatory Resource Assessment (PRA) – and "monitoring exercises that measure change against base-line activities [and] build a two-way flow of knowledge and trust at the same time". A particular statement of relevance - and something to remind ourselves of repeatedly when referring to our restoration knowledge base - is that:

It is important to understand that knowledge will inevitably be incomplete at the beginning but that it will grow over time if harmonious working methods are set in place from the start. The Ecosystem Approach demands realism: often **we must settle for what is possible, not what is theoretically ideal** (Shepherd, 2004).

It should be noted that even though the Ecosystem Approach has been increasingly placed as a guiding principle for many management approaches, evidence suggests that, in many cases, it has not gone much further than that. However, there are also showcase examples where the approach has worked well and whilst there are various contributing factors, an 'enabling' environment with whole-of-government support is critical.

PRESENCE will only succeed if it is adaptive: responsive to stakeholder preferences, responsive to implementer's needs and constraints; and responsive to improved scientific understanding. Relationships between these groups must be founded on mutual respect and understanding - virtues which will build long-term trust and effective working relationships between partners.

[3] Before PRESENCE was formulated, EarthCollective proposed **EASTCARE** (**E**cosystem **A**pproach for **S**ubtropical **T**hicket **C**onservation **A**nd **R**estoration in the **E**astern Cape) as a guiding research-implementation programme for subtropical thicket restoration in the Eastern Cape (with an initial focus on the Great Fish River region). Whilst the EASTCARE proposal is temporarily on hold until PRESENCE defines the research priorities and takes shape, we envisage that the strategy behind EASTCARE will remain highly relevant in the following phases.

3 PRESENCE Workshop Themes

In this section, each of the six workshop Research Themes are introduced with a summary prepared by the theme presenter [Introduction]. This is followed by the themes' overarching "Research Objective(s)" and a short statement relating to the "Implementation Relevance". A cross-table indicating how the various Research Themes interact with each other is also included [Thematic Interactions]. This table assists in interdisciplinary thinking and is intended to stimulate integration among the research themes. Finally, selected "Comments and Insights" are included as received from various contributors who gave earlier feedback on potential knowledge gaps.

In Appendix C, a preliminary 'brainstorm' list of research questions is listed according to feedback received from various experts (workshop participants).

The main goal of the information included within this section is to provide a basis for discussion and strategic planning. The research objectives and questions stated are not yet fixed.

3.1 Theme 1: Ecology: Ecosystem Functioning & Biophysical Processes

Presenter:
Prof. Richard Cowling
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3.1.1 Introduction

Into the thick of it: new perspectives on the ecology and evolution of subtropical thicket

The ecology and evolution of South Africa's subtropical thicket vegetation, which is concentrated in the south-eastern coastal region of the country, has been poorly studied and understood. The initiation in the early 2000s of the Global Environment Facility-funded Subtropical Thicket Ecosystem Planning (STEP) and Conservation Farming projects, led to a spurt of research that greatly enhanced our knowledge of this system. I summarise some of the new findings in this presentation, especially those relevant for restoration.

We now have an expanded concept of thicket in south-eastern South Africa that encompasses the mosaics that it forms with vegetation associated with other biomes. We also have a hierarchical classification of thicket for this region that recognises four major types (Thicket, Valley Thicket, Xeric Thicket and Dune Thicket), subdivided according to biogeographic locality and grain (solid vs mosaic). We are beginning to appreciate that thicket is part of a global biome of an ancient, early Tertiary formation that preceded fire-prone savannas, grasslands and sclerophyllous shrublands. Thus, the earlier concepts of thicket as a relatively young vegetation type, comprising and admixture of species derived from adjacent biomes, appears to be erroneous. We also now know – as has been hypothesised - that at the ecosystem level, thicket functioning is more similar to that of a rainforest than a semi-arid shrubland.

Much progress has been made in understanding the role of mammalian herbivores, especially megaherbivores, as drivers of ecological patterns and processes in thicket. More light has been shed on the enigma of plant recruitment in thicket: while ramet recruitment predominates in the Xeric and Valley Thicket types, seedling recruitment may be significant in the Thicket and some Dune Thicket types. We also have a better picture of the extent of degradation of thicket, and have gained important insights on constraints and opportunities for restoring it, at least to a functional state. The STEP Project has provided a rigorous and defensible assessment of conservation priorities as well as a tractable strategy for implementing these.

Finally, some progress has been made with identifying – in addition to fodder for livestock - the services that thicket provides for humans, notably its potential for sustaining rural livelihoods, carbon sequestration, ecotourism, and wildlife ventures. However, much research remains to be done if we are to convince stakeholders of the value of using thicket in a sustainable way, both ecologically and economically. We need to test the notion of thicket as the "mother of all South African vegetation" through comprehensive phylogenetic and phylogeographical analyses of its component plant and animal lineages. This will provide a charisma that is currently lacking for this vegetation type. More research is required on ecosystem processes, especially with regard to nutrient and carbon dynamics. The population and community dynamics of Xeric and Valley Thicket remains an enigma: much more needs to be done. Of great importance is the role of fire in maintaining thicket boundaries and the composition of thicket clumps in mosaic formations.

Given that thicket supports hugely more herbivore biomass than vegetation at equivalent latitudes elsewhere in the world, we need to know why this is so and what are the requirements to maintain this biomass. The massive rise in the wildlife industry, often involving extralimital[4] species, challenges us to understand the impacts of these species on biodiversity and ecological processes. While there is some appreciation of stocking rates for both domestic and indigenous livestock, a much finer-scale assessment is required. How do we monitor thicket – what are the benchmarks and indicators of change? We also need a better understanding of the many services, both direct and indirect, that intact thicket provides for the humans who live in its midst.

Finally, and most importantly, we require a much better appreciation of the ways in which humans view thicket and the choices they would make regarding its use or abuse. Without these insights we are unlikely to be in a position to mainstream the sustainable use of thicket into sectors traditionally seen as adversaries of conservation, namely agriculture, subsistence use and infrastructure development.

[4] Species do not historically occur in the area.

3.1.2 Research Objective

Improve understanding of ecology and biophysical processes in relation to (effects and impacts of) restoration strategies, e.g. ecosystem dynamics, plant-herbivore interactions, plant-people **perceptions.**

An important inclusion within this Theme – but not an explicit focus at this workshop - is the sub-section on **horticulture** and propagation of plant species to be used in restoration. A related objective suggested here is: **to improve understanding on (horticultural) propagation techniques and survivorship of species used in restoration implementation.**

3.1.3 Implementation Relevance

Define strategies (how, when, where, why and what) for successful restoration over time/space; Ability to quantify and monitor effects of restoration, e.g. impact assessments perceptions.

3.1.4 Thematic Interactions

Table 1 below provides an indication of how **Theme 1** can contribute to - and will interact with - the other Research Themes (from a research perspective) (See also Appendix B).

Table 1

Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)	Theme 6 (Remote Sensing & Geo-information System)
Establishes link between ecosystem functions and potential services derived; provides understanding for identifying, quantifying, describing and defining ecosystem services (e.g. biodiversity or ecosystem processes needed to maintain a service).	Provides basis for strengthening socio-ecological relationships; ecological characteristics underpin/contribute to stakeholder livelihoods. e.g. relevance of species & species composition for developing options for socially acceptable multi-functional land-use.	Enrich guidance for establishing baselines, indicators and priorities for organisational learning and policy/regulation for land management to maintain ecological integrity, functioning and ecosystem resilience (carrying capacity).	Indirect link: Underpins indicators for monitoring overall effectiveness of (financial) incentives for land management in restoring ecosystem processes & integrity.	Collation of baseline data (e.g. biomass, carbon stock, geomorphology) to test and develop methodologies to derive spatially and temporally explicit information.

3.2 Theme 2: Ecosystem Goods, Services & Valuation

Presenter:
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3.2.1 Introduction

The Millennium Ecosystem Assessment (MA, 2005) highlighted the fact that degradation of ecosystems not only compromises biodiversity and ecological integrity, but also diminishes human well-being through the loss of ecosystem services (i.e. natural capital) and the benefits people receive from them (MA, 2005).

The rural poor and others dependent on nature's services are often worst affected by this trend; both the loss of services and the depletion of natural resources intensifies the struggle to fulfil all their requirements (Cocks and Wiersum, 2003). Local communities can be hurt directly in terms of physical hardship (e.g. through the loss of water quantity and quality) or indirectly through higher costs (e.g. services previously provided by ecosystems are replaced with costly infrastructure) and increased vulnerability to adversity (De Groot *et al.*, 2006).

Critical ecosystem functions and services provided by subtropical thicket:

Provisioning:
- Supply of material for horticultural activities
- Resource harvest (medicinal plants, fuel, wood)
- Supports commercial & subsistence pastoralism

Cultural:
- Wildlife-based tourism, hunting & recreation
- Cultural & spiritual activities(biocultural diversity)
- Contribution to economic diversification

Regulating:
- Erosion & sedimentation control
- Climate regulation (provision of clean air)
- Sustaining water quality (purification)

Supporting:
- Provision of habitat (biodiversity)
- Maintenance of nutrient, carbon & water cycles
- Soil formation & retention

Source: Adapted from STEP, 2006; De Groot *et al.*, 2006; Wiersum and Shackleton, 2005; following MA, 2005.

Understanding the value and importance of ecosystem services to livelihoods is critical for defining the role of (landscape) restoration in effective (participatory) natural resource management.

Integrated assessments such as ecosystem service analysis will, in drawing on local knowledge, provide a solid basis for identifying ecosystem benefits, uses, values and perceptions of the thicket biome across stakeholder groups. It aims to assess the diverse opinions held by various groups regarding the extent and implications of degradation and which land-use features should be rehabilitated as a priority. Results may be coupled with spatial analysis through use of geo-information systems to aid restoration planning, management and monitoring.

The introductory presentation to this session will:

- Explain how to link ecosystem structure, process and functioning (= theme 1) with ecosystem goods & services and give a few examples of the main services from (thicket)-ecosystem(s);
- Give a brief overview of the many values (ecological, social and economic) of (thicket)-ecosystem services;
- Conclude with a reflection on how information on ecosystem services and values can contribute to more awareness about the (economic) benefits of ecosystem restoration (which are usually higher than the costs) and thus how it can contribute to livelihood-improvement (= theme 3) and sustainable financing mechanisms (= theme 5).

References and further information:

The above introductory text is extracted from the PRESENCE Proposal submitted to WUR-INREF in January 2007. Complementary information on ecosystem services and valuation can be found at *naturevaluation.org* & *maweb.org*

3.2.2 Research Objectives

Refine and develop methodology: e.g. identify participatory methods for valuing ecosystem services 'meaningful' to stakeholders; and linking ecosystem services to landscape character;
to
Assess and value ecosystem goods and services (socio-ecological, socio-economic, socio-cultural) in terms of their use, perceived importance and contribution to well-being across different scales (local, regional, national, global).

3.2.3 Implementation Relevance

To build a strong case for mainstreaming thicket restoration and conservation by better understanding the value of services provided by (restored) thicket to livelihoods and well-being;
To identify spatial priorities for restoration and conservation based on perceived importance/value of goods and 'services';
To provide additional justification and basis for developing mechanisms for financing and rewarding ecosystem management.

3.2.4 Thematic Interactions

Table 2 below provides an indication of how **Theme 2** can contribute to - and will interact with - the other Research Themes (from a research perspective) (See also Appendix B).

Table 2

Theme 1 (Ecology: Ecosystem Functioning & Biophysical Processes)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)	Theme 6 (Remote Sensing & Geo-information Systems)
Prioritises and provides context for ecological research and understanding by providing feedback on the use and perceived importance of specific ecosystem functions/services.	Provides information on the use, value and perceived importance of services to stakeholder livelihoods and identifies competing claims & trade-offs.	Prioritises and provides context for policy research aimed at restoring and safeguarding ecosystem services, values and benefits.	Provides information on ecosystem goods, services and values which can potentially be traded and used for equitable compensation schemes.	Provides information on ecosystem values to be mapped and weighted into GIS layers/analysis.

3.2.5 Comments and Insights

"We do need additional research on valuation, we should focus on those functions that deliver tangible benefits and those for which markets exist – in other words, we need to focus on thicket's ecosystem services. These need to be identified in the social assessment."

3.3 Theme 3: Stakeholders, Livelihoods & Social Assessment

Presenter:
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3.3.1 Introduction

The presentation will give an overview of the importance of understanding how stakeholders' value nature from a livelihood and cultural significance perspective and how these relate to their images of nature. This will be followed by highlighting the relevance that such an understanding has for restoration and natural resource management strategies.

Research conducted in the Eastern Cape has revealed that natural resources gathered from the environment fulfil a range of livelihood (Shackleton *et al*. 2002, Hebinck and Lent 2007) and cultural needs (Cocks 2006) among local indigenous communities. The use of natural resources for cultural needs remains important across the wealth and the level of education of the household head. These findings are obviously in contradiction to current thinking, which largely portrays natural resources as only contributing to rural households' subsistence livelihood and 'safety-net' needs (Cavendish 2000; Wunder 2001; Shackleton *et al*. 2002). Thus, the use of natural resources is not solely restricted to representing a poor man's activity but that they also fulfil a very important cultural role in peoples' lives and provide an important sense of well-being. We therefore need to give more attention to the social processes impacting on the use of natural resource products (Cocks 2006) from each identified stakeholders perspective.

Cultural values are attached also to areas or units of vegetation, such as sacred forests, rainmaking sites, land marks (Posey 1999; Goebel *et al*. 2000). Thus cultural values of the natural environment may take on several manifestations which relate not only to the religious roles of forests but also to individual species harvested to fulfil cultural needs (Cocks 2006). The reciprocal relation between cultural diversity and biological diversity has been portrayed as a potential tool to promote biodiversity conservation (Laird 1999; McNeely 2000, Cocks 2006). Cultural diversity has been noted as sustaining a wide variety of use and conservation practices of biodiversity (Dasmann 1991; Posey 1999; McNeely 2000).

It is also necessary to identify and acknowledge the different dominant images of nature that stakeholders perceive. Images of nature have been identified as a powerful tool to formulate and develop appropriate goals and strategies for natural resource management. Empirical research has consistently shown that individuals, beliefs and value orientations are important influences on nature-related perceptions, attitudes and behaviour (Buijs 2007). To date this type of research has largely been conducted in first world countries such as The Netherlands (Buijs 2007, Jacobs 2006) and very little in developing countries, which contain a diverse range of stakeholders differing along race lines, cultural orientations, wealth and levels of education.

Three types of cognitions which have been identified as constituting one's image of nature, a) *beliefs*, b) *norms or values* and 3) *aesthetics valuation criteria* and the relationship between these should be understood (Buijs 2007). The practical value of understanding local peoples' images of nature is that they can be used to show the heterogeneity of values, beliefs and value orientations amongst different groups and this can aid planners, managers and policy makers in understanding the diversity of local people's opinions of natural resource management. Consequently, ensuring more effective strategies for restoration and natural resource management strategies are implemented.

3.3.2 Research Objective

Understanding, assessing and making spatially explicit the importance and influence of livelihoods and stakeholder networks in relation to mainstreaming restoration strategies, e.g. willingness to participate, burnout and cooperative arrangements.
Understanding what different stakeholders' values of nature (thicket) are from a livelihood, cultural significance perspective and how these relate to their images of nature.
Determine the significance of the above for restoration strategies & natural resource management.

3.3.3 Implementation Relevance

To support participatory restoration and create an 'enabling' environment by recognising:

- different stakeholders' images of nature, livelihood and cultural needs,
- trade-offs between restoring desired ecosystem services and sustaining socio-economic activity for restoration strategies and natural resource management.

3.3.4 Thematic Interactions

Table 3 below provides an indication of how **Theme 3** can contribute to - and will interact with - the other Research Themes (from a research perspective) (See also Appendix B).

Table 3

Theme 1 (Ecology: Ecosystem Functioning & Biophysical Processes)	Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)	Theme 6 (Remote Sensing & Geo-information Systems)
Indicates which species and ecosystem processes are of importance for setting research priorities in terms of their relevance to stakeholder livelihoods and social preferences.	Signals most important use and non-use values in order to determine which ecosystem goods and services are linked closest to - and supported by - restoration activity from a social perspective.	Identifies opportunities and impediments within current processes in terms of the potential for creating an enabling, environment for stakeholders' to effectively engage in restoration.	Identifies stakeholder preferred incentives for maintaining or improving livelihoods and networks whilst participating in restoration.	Provides information for visualising stakeholder relationships, interactions, networks and social preferences in terms of their spatial relevance.

3.3.5 Comments and Insights

"How do stakeholders perceive and value the different goods and services provided by thicket and degraded landscapes, and what they consider their future relationship with these ought to be?

- This must be done systematically so as to assess how values are distributed over different categories of local people.
- Determine what the features of an thicket and degraded landscapes are, in terms of species richness and abundance;
- Determine trends in the change of floristic composition of agro ecosystems landscapes in relation to land transformation;

Furthermore, strategies for disseminating the information learnt according to the needs of different stakeholders needs to be explored, i.e. policy makers, managers, planners, and researchers in the field of nature conservation, as so often this not taken into consideration.

These two approaches we believe are needed to determine the significance of culturally-valued landscape elements for biodiversity conservation both, from an ecological perspective and a local use /conservation perspective, so as to determine if these values can contribute towards biodiversity conservation/improve management in the area. If found to exist, one needs to develop socially responsive and ecologically appropriate policies for the conservation and restoration of natural landscapes in the area."

"The Xhosas like having their cattle and goats. By entering the carbon market the potential for grazing will effectively decrease while the livelihood options/potential will increase if our results are correct. How do we marry stock farming and the culture around it with the restoration of thicket and accessing the carbon market? We will never convince them to get rid of their cattle. What is the middle road that will work for both parties?**"**

3.4 Theme 4: Policy, Institutions & Governance

Presenter:
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3.4.1 Introduction

This presentation gives an overview of policy and governance research related to environment, development and climate change. To encourage discussion the main focus will be on the interplay between centralised government control and networked governance arrangements that: 1) are inclusive of a wide group of actors to ensure more timely and inclusive decision making; 2) introduce mechanisms that efficiently and equitably facilitate payments for ecosystems services; and 3) require novel institutional arrangements to ensure trust and compliance.

The shift to more inclusive conservation techniques, recognising existing land and resource patterns brings with it the need for more inclusive techniques for representing the interests and values of a diverse set of actors beyond government authorities and departments. Experience tells that these arrangements should be flexible and adaptive enough to respond to incorporate the capability of resource users to cope with external economic and political pressures and internal social, ecological and cultural change. These mechanisms reorient the authoritative role of the state to compliment the consensus based rules and norms of resource users. However, key questions remain as to what mechanisms can steer the empowerment of resources users, thereby ensuring greater compliance with conservation measures in the Eastern Cape.

Carbon funding mechanisms, such as Clean Development Mechanism (CDM) and voluntary carbon offset projects, provide a new opportunities for financing conservation. The global nature of these mechanisms requires new institutional arrangements to ensure that 'carbon for conservation and livelihoods' is a trusted and therefore legitimised policy programme. A range of questions remain. How can trust be built over carbon 'additionality' measurements? How can conservation ensure both the security of local livelihoods and sequestered carbon? How can national and provincial government institutions provide support to local actors to secure carbon and conservation while also fostering their capacity to diversify livelihoods?

Given the novelty of combining conservation and global funding mechanisms, questions also remain over how government can most efficiently and effectively organise and manage resources. Attention is often given to the role of government in ensuring efficient acquisition of funding from sources such as the CDM, but before this can happen the responsibilities of different Ministries, departments and agencies for carbon and conservation need to defined and allocated. In the case of the Eastern Cape, this may be of particular concern given the incorporation of a land based resource under the various jurisdictions of conservation, agriculture, livestock and forestry. Who is responsible for these resources? Are responsibilities well-defined? And is there coherence between policy and legislation from various departments and Ministries and authorities?

3.4.2 Research Objective

Evaluate existing arrangements and potential options for policy, institutions and governance at global and regional levels which support or limit restoration strategies (e.g. CDM, poverty reduction).

3.4.3 Implementation Relevance

To understand what policy and institutional (learning/change) processes are needed to provide an enabling environment and enhance the potential success of restoration strategies.

3.4.4 Thematic Interactions

Table 4 below provides an indication of how **Theme 4** can contribute to - and will interact with - the other Research Themes (from a research perspective) (See also Appendix B).

Table 4

Theme 1 (Ecology: Ecosystem Functioning & Biophysical Processes)	**Theme 2 (Ecosystem Goods, Services & Valuation)**	**Theme 3 (Stakeholders, Livelihoods & Social Assessment)**	**Theme 5 (Financing, Payments & Reward Mechanisms)**	**Theme 6 *(Remote Sensing & Geo-information Systems)***
Identifies policy and institutional boundaries which may be instrumental in driving restoration and thereby helping to define and prioritise related ecological research. Provides impetus to reassess present arrangements.	Identifies opportunities for integrating ecosystem services assessment and valuation in policy and decision-making processes – and giving outcomes greater policy relevance.	Provides information for understanding the institutional arrangements and circumstances under which the social assessment can be carried out (e.g. opportunities and constraints for collective stakeholder agreements).	Uses an understanding of governance arrangements to identify opportunities for financial instruments and arrangements for restoring natural capital. Indicates bottlenecks in current policy and institutional frameworks for financing long-term restoration.	Provides additional layers to spatial understanding of the complex systems by providing information on socio-political constraints affecting restoration.

Comments and Insights

"How should policy change within organizations to ensure that restoration projects are funded via the carbon industry? A number of institutions are keen but they do not seem to have the policies or institutional frameworks in place to take advantage of the situation."

"We need to envisage the restoration project as a social process. Seeing our project as a process will enable us to identify priority actions in a more strategic way. The big gaps lie in the social assessment, "Stakeholders, Livelihoods, etc" and "Policy, Institutions and Governance". Without understanding our socio-economic and governance contexts, we are bound to make mistakes. [There is a] need to establish an effective learning organisation that can respond to feedback from the field (social and ecological), ensure that interventions are designed as action research, and make sure that lessons are disseminated."

3.5 Theme 5: Financing, Payments & Reward Mechanisms

Presenter:
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3.5.1 Introduction

This presentation has four sections starting with the question what is the Restoration of Natural Capital (RNC), followed by sections covering valuing restoration, mechanisms for financing restoration and then, lastly, a conclusion. The lion's share of the presentation will deal with ways of valuing restoration and I elaborate on this issue here.

The common way to estimate the value of natural capital is to either use market prices, or to estimate the discounted net present value of the sum of the future income stream derived from such a stock (United Nations 2003). Both market values - because they are not available - nor the net present value method is appropriate to value the restoration of natural capital since natural capital and its restoration has completely different properties than that of manufactured capital. Various studies have therefore resorted to use replacement cost as a direct proxy, this is a method endorsed by the Systems of Natural Resource Accounting fraternity as documented by the UN (United Nations 2003:272):

If there are no market prices and it is not possible to calculate the net present value of an asset, then the cost of producing it may be used as a lower bound on its value.

This statement deserves our full attention for a while. First, by focussing on the replacement cost of natural capital in the context of restoration, natural capital will have to be valued so as to reflect its increasing scarcity value over time. Also, one will have to consider the increasing difficulty to restore a system that is undergoing continual degradation over time. Simply put, restoration today costs less than restoration tomorrow, and in some event we simply cannot afford not to restore today! Second, by valuing the asset based on its replacement cost one couples the act of restoration to the value of the resource and thereby one is not commodifying the asset by linking the asset's value to the flows, but rather indicating that natural capital has value, that restoration costs money, and that it is likely to cost increasingly more over time, rather than less.

One is also focussing on the system as a whole and not on individual processes or functions that are either impossible or very hard to measure and quantify, let alone value. Further, should one only focus on maximising the sum of the flows of individual processes one could come to perverse conclusions such as which to maximise carbon sequestration in an area what used to be a wetland or grassland by planting an exotic species with a high carbon sequestering capacity, or to maximise water runoff by removing all riparian vegetation.

Third, valuing the asset this way is also in line with the method prescribed when determining the value of the consumption of fixed capital stock. Which, in effect, is what we're dealing with when

considering the restoration of natural capital. Degradation is the consumption of natural capital, but to make provision for its replacement, i.e. restoration, the asset to be restored should be valued at its appropriate replacement cost.

Fourth, the System of Environmental and Economic Accounting (SEEA) make the statement that replacement cost is likely to underestimate the value of the asset by rendering a lower bound value. This might be true for most assets, but in the case of natural capital restoration, it is not necessarily the case since restoration could take a long time, cost a large sum of money, and renders services whose values are not easily quantifiable. The replacement costs of either species or system, natural capital, is also likely to increase exponentially as the natural capital approaches its limit function, i.e. approaching thresholds of critical natural capital. The value will be infinite at the limit, and zero beyond the limit, i.e. at extinction of species. This relationship is indicated here in Figure 1 below.

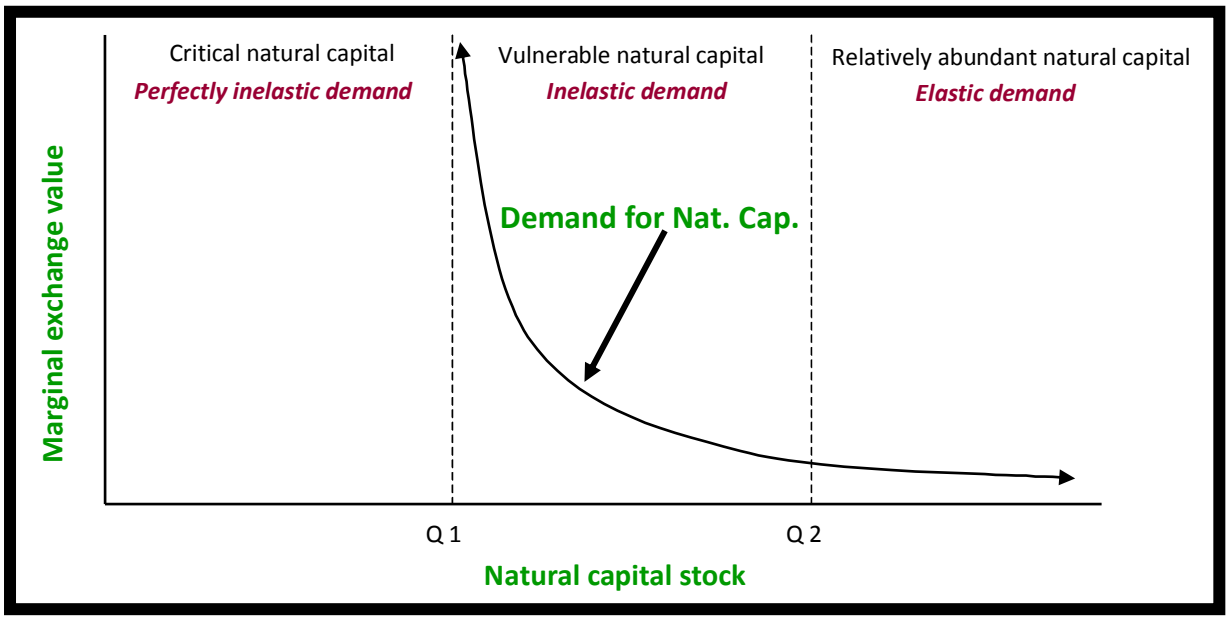

Figure 1: The inverse relationship between the level of the natural capital stock and its marginal exchange value. When natural capital is relatively abundant its value is low and the unitary change in such is low (demand elasticity <1), once natural capital becomes more vulnerable its value rises and the unitary changes is high (>1) and approaches infinity (at levels of critical natural capital).

Modified from Farley & Gaddis 2007.

The United Nations document cited above (United Nations 2003:272) states that the benefits of reproducing the asset should at least be equal the costs of producing it. In other words; the cost of replacing or restoring the natural capital should not exceed the benefits derived from it. A few qualifications to this statement are, however, required. First, this qualification can only be deemed appropriate when one do not consider critical natural capital. When systems do approach such threshold levels one has to apply the precautionary principle and restore the system. That is the price society is paying today for living beyond its means yesterday.

Only a few studies have tried to calculate the economic benefits of restoration and all of them did so by calculating the beneficiaries' willingness-to-pay through contingent valuation studies, which is a method to capture the use value of the resource or natural capital. These studies indicated, among others, the exponential rise in the demand for ecosystem goods and services as provided by restoration as the natural system becomes more intact. In others words, the more a system is being restored, the more people benefit from it and the more they are demanding services from the restored natural capital. This inverse demand function is Jevons' paradox applied to natural capital and restoration. The technology, restoration, is improving the efficiency of the capital stock so that the capital stock produces more goods and services and more efficiently so than before restoration. The demand for both natural capital and its goods and services increases exponentially as restoration increases, i.e. the use or application of the new technology. It should be noted that by applying positive discount rates to estimate the net present value of ecosystem goods and services assumes a reduced future value of such ecosystem goods and services, further proof that such a measure is inappropriate.

A more complete way of dealing with the matter is to consider the benefit of restoring natural capital as the opportunity cost of not restoring. This implies that the benefit of restoration is equal to:

- the sum of the future flows provided by the restored system using a discount rate that would reflect the increasing cost of replacement if such restoration was not done, plus
- the cost avoided by the restoration activity, which includes both the mitigation and adaptation cost that will be required if the system is not restored, plus
- any other additional benefit such as training, job creation (the value of which could approach the total wage bill in conditions of high unemployment) and cultural and other intrinsic values.

3.5.2 Research Objectives

Investigate (the economics behind) equitable financing, payment and compensation mechanisms that mainstream restoration, support dynamic rural livelihoods and reward sustainable land management.

3.5.3 Implementation Relevance

To develop restoration as a financially viable alternative land-use over time (long-term) and space;
To mainstream restoration strategies through equitable incentive and reward arrangements.

3.5.4 Thematic Relevance

Table 5 below provides an indication of how **Theme 5** can contribute to - and will interact with - the other Research Themes (from a research perspective) (See also Appendix B).

Table 5

Theme 1 (Ecosystem Structure & Biophysical Processes	Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 6 *(Remote Sensing & Geo-information Systems)*
Identifies key ecological indicators and benchmarks for restoration against which financing schemes will need to be monitored and measured. Establishes ecological research criteria needed to guide financing schemes for rewarding restoration.	Prioritizes ecosystem services research by linking values to financing schemes which offer the greatest potential uptake. Harmonises ecosystem services valuation research with actual willingness to buy, sell, reward or compensate services delivered/preserved through restoration.	Financing schemes may influence livelihood analysis, options and scenarios and the networks or arrangement within which stakeholders operate. Recognises the complex and highly dynamic stakeholder relationships that set the context for any system of compensation or rewards.	Identifies opportunities and constraints in current policies and institutional frameworks for establishing incentives relevant to restoration financing whilst ensuring equity and benefit-sharing.	Provides information for spatial analysis, assessment and scenario-building of how financing schemes may influence – or affected by- biophysical processes, stakeholder preferences and interactions, socio-economic factors and governance arrangements over time and space. Provides linkages between 'buyers and sellers' of ecosystem services.

3.5.5 Comments and Insights

"I'd also caution against too much focus on carbon credits. The restoration initiative needs to be based on more than just carbon sequestration. Basic back of the envelope calculations tell us that biological carbon sequestration alone cannot reduce carbon emissions by much. Apparently if all ecosystems in the world were at climax (i.e. max carbon storage) we'd only sequester less than 10% of our expected emissions over the next 30 years.

Economists have run with the idea of carbon credits and turned it into a profitable market and we should take advantage of that, BUT as with all markets it will only last so long and when it collapses the restoration initiative needs to have something else it can stand on. IE: take advantage of carbon credit initiatives now, but don't bet on them in the long term!"

"It is important for us to get a handle on how the dividends of carbon sequestration (the cash) will be distributed among the communities in the communal areas without causing problems (some people losing out and others gaining)."

3.6 Theme 6: Remote Sensing & Geo-Information Systems

Presenter:
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3.6.1 Introduction

To be included within printed Workshop Booklet

3.6.2 Research Objective

To stimulate acquisition of data, development of methodologies and approaches to support spatial understanding and integration of the transdisciplinary research required to guide restoration.

3.6.3 Implementation Relevance

To provide spatially explicit information and scenarios for improving effectiveness of restoration strategies.
To support monitoring, planning and tracking of socio-ecological changes over space and time.
To visualise spatial data, information and restoration scenarios for diverse stakeholders.

3.6.4 Thematic Interactions

Table 6 below provides an indication of how **Theme 6** can contribute to - and will interact with - the other Research Themes (from a research perspective) (See also Appendix B).

Table 6

Theme 1 (Ecosystem Structure & Biophysical Processes)	Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)
Identifies spatial and temporal patterns and processes which can be validated with on-ground baseline data to feed into the testing and development of methodologies to derive spatially and temporally explicit information. Characterises the inter-relationships between biophysical processes over time and space.	Enables research on ecosystem services and values to be modelled over time and space and linked to landscape character. Assists in standardising accurate methodology for identifying and valuing ecosystem services to derive spatially and temporally explicit information in relation to stakeholders, conservation and restoration efforts.	Provides information for visualising stakeholder relationships, interactions, networks and social preferences relevant to conservation and restoration issues in an interdisciplinary, multi-functional spatial representation. Maps and evaluates spatial interaction of human activities and natural resource use.	Visualises interrelated and complex processes at diverse spatial and temporal scales in order to support decision-making processes at policy, institutional and governance levels. Enhances communication between stakeholders based on different scenarios and options. Monitors the impact of policies in the ecosystem and provides insights on cost-benefits analysis of different strategies.	Assesses and presents opportunities for stakeholders to engage in innovative financing schemes in relation to spatially expressed restoration options. Represents and models the flux of natural capital.

3.6.5 Comments and Insights

"[We could] use remotely-sensed data for rapid assessments of carbon stocks. This component will need to be tamed by realism. We will also need to figure out how to monitor and evaluate the social impacts of the research."

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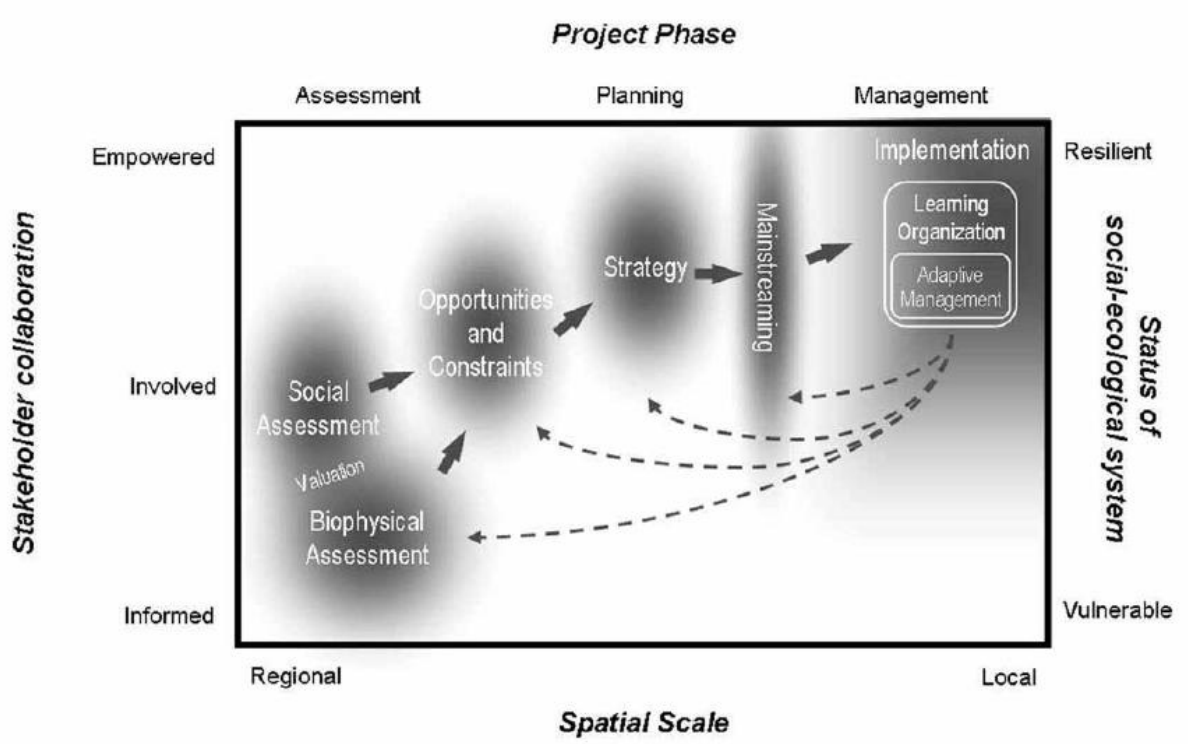
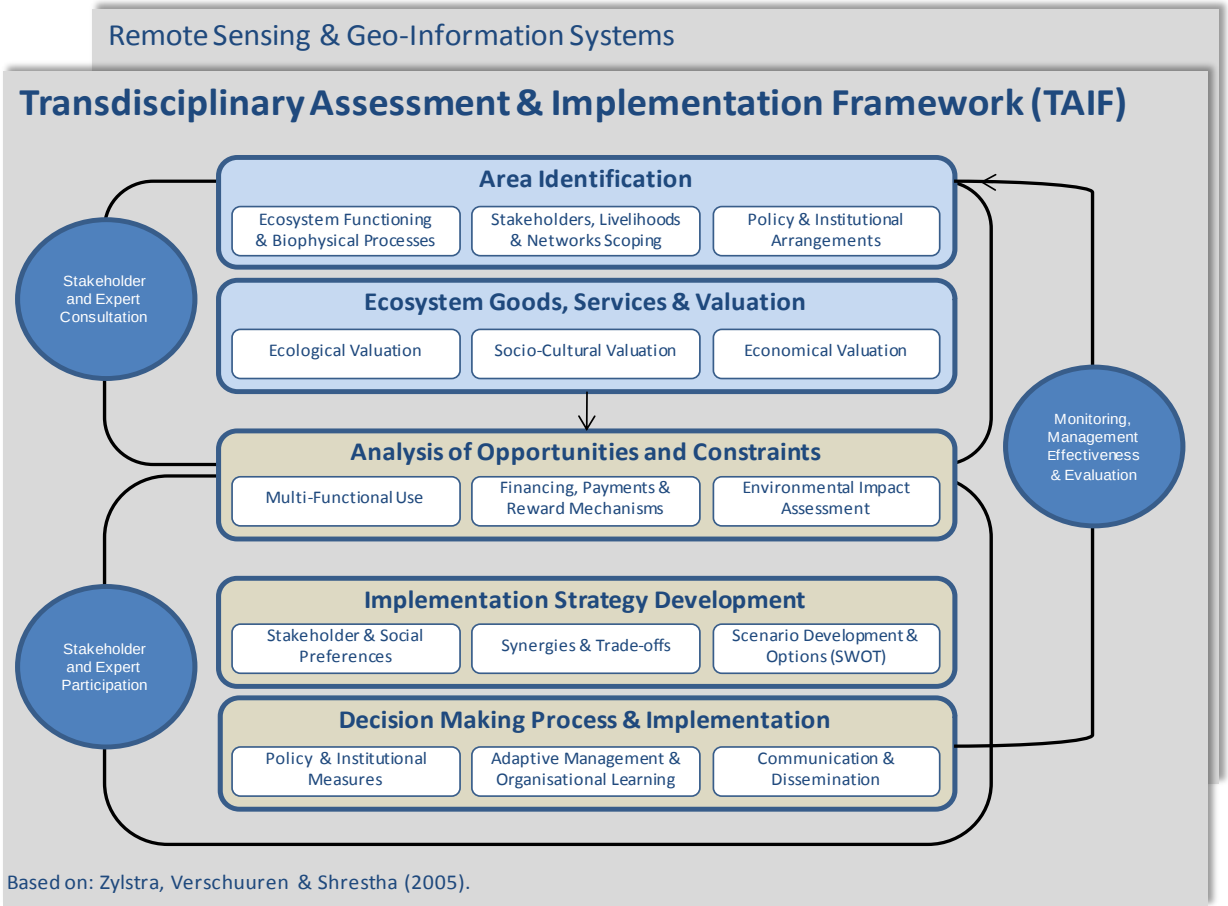
Appendix A: Proposed Frameworks

1. OPERATIONAL MODEL FOR MAINSTREAMING ECOSYSTEM SERVICES Cowling *et al.*(in press)



2. TRANSDISCIPLINARY ASSESSMENT & IMPLEMENTATION FRAMEWORK (TAIF)



Source: EarthCollective (2007)

3. THE 12 PRINCIPLES OF THE ECOSYSTEM APPROACH

Principle	Description
Principle 1:	The objectives of management of land, water and living resources are a matter of societal choices.
Principle 2:	Management should be decentralized to the lowest appropriate level.
Principle 3:	Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
Principle 4:	Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should: a) Reduce those market distortions that adversely affect biological diversity; b) Align incentives to promote biodiversity conservation and sustainable use; c) Internalize costs and benefits in the given ecosystem to the extent feasible.
Principle 5:	Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
Principle 6:	Ecosystem must be managed within the limits of their functioning.
Principle 7:	The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
Principle 8:	Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
Principle 9:	Management must recognize the change is inevitable.
Principle 10:	The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
Principle 11:	The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
Principle 12:	The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Source: Convention on Biological Diversity:
http://www.biodiv.org/programmes/cross-cutting/ecosystem/principles.asp

Appendix B: Cross Tabular Thematic Interactions

	Theme 1 (Ecology: Ecosystem Functioning & Biophysical Processes)	Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)	Theme 6 (Remote Sensing & Geo-information Systems)
Theme 1		Establishes link between ecosystem functions and potential services derived; provides understanding for identifying, quantifying, describing and defining ecosystem services (e.g. biodiversity or ecosystem processes needed to maintain a service)	Provides basis for strengthening socio-ecological relationships; ecological characteristics underpin/contribute to stakeholder livelihoods. e.g. relevance of species & species composition for developing options for socially acceptable multi-functional land-use	Enrich guidance for establishing baselines, indicators and priorities for organisational learning and policy/regulation for land management to maintain ecological integrity, functioning and ecosystem resilience (carrying capacity).	Indirect link: Underpins indicators for monitoring overall effectiveness of (financial) incentives for land management in restoring ecosystem processes & integrity.	Collation of baseline data (e.g. biomass, carbon stock, geomorphology) to test and develop methodologies to derive spatially and temporally explicit information.
Theme 2	Prioritizes and provides context for ecological research and understanding by providing feedback on the use and perceived importance of specific ecosystem functions/services		Provides information on the use, value and perceived importance of services to stakeholder livelihoods and identifies competing claims and trade-offs.	Prioritizes and provides context for policy research aimed at restoring and safeguarding ecosystem values and benefits.	Provides information on ecosystem goods, services and values which can potentially be traded and used for equitable compensation schemes.	Provides information on ecosystem values to be mapped and weighted into GIS layers/analysis.
Theme 3	Indicates which species and ecosystem processes are of importance for setting research priorities in terms of their relevance to stakeholder livelihoods and objectives	Signals most important use and non use values in order to determine which ecosystem goods and services need to be supported by restoration		Identifies opportunities and impediments in current policy/institutional arrangements in terms of creating an enabling, facilitating environment for stakeholders' to effectively engage in restoration.	Identifies stakeholder preferred incentives for maintaining or improving livelihoods and networks whilst participating in restoration.	Provides information for visualising stakeholder relationships, interactions, networks and social preferences in terms of their spatial relevance.

	Theme 1 (Ecology: Ecosystem Functioning & Biophysical Processes)	Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)	Theme 6 (Remote Sensing & Geo-information Systems)
Theme 4	Identifies policy and institutional arrangements which may be instrumental in driving restoration and/or defining related ecological research. Provides impetus to change - governance boundaries.	Identifies opportunities for integrating ecosystem services identification and valuation in policy and decision-making processes. Hence, assuming greater relevance in related decision-making processes.	Provides information on institutional change and livelihood development needed to provide an enabling legal framework for (institutionalising) effect sustainable and equitable restoration effort.		Uses an understanding of governance arrangements to identify opportunities for instruments, incentives, financial arrangements and compensation schemes for restoring natural capital. Indicates bottlenecks in current policy and institutional frameworks for financing long-term restoration.	Provides additional layers to spatial understanding of the complex systems by providing information on socio-political constraints affecting restoration.
Theme 5	Identifies key ecological indicators and benchmarks for restoration against which financing schemes will need to be monitored and measured. Establishes criteria needed to implement such schemes based on ecological integrity related to critical ecosystem functions and processes in restoration.	Prioritizes ecosystem services research by linking values to financing schemes which offer the greatest potential uptake. Harmonises ecosystem services valuation research with actual willingness to buy, sell, reward or compensate services delivered/preserved through restoration.	Financing schemes may influence livelihood analysis, options and scenarios and the networks or arrangement within which stakeholders operate. Recognises the complex and highly dynamic stakeholder relationships that set the context for any system of compensation or rewards. Identifies livelihood trade-offs and stakeholder groups to engage in financing schemes.	Identifies opportunities and constraints in current policies and institutional frameworks for establishing incentives relevant to financing for restoration whilst ensuring equity and benefit-sharing		Provides information for spatial analysis, assessment and scenario-building of how financing schemes may influence – or affected by- biophysical processes, stakeholder preferences and interactions, socio-economic factors and governance arrangements over time and space. Provides linkages between 'buyers and sellers' of ecosystem services.

	Theme 1 (Ecology: Ecosystem Functioning & Biophysical Processes)	Theme 2 (Ecosystem Goods, Services & Valuation)	Theme 3 (Stakeholders, Livelihoods & Social Assessment)	Theme 4 (Policy, Institutions & Governance)	Theme 5 (Financing, Payments & Reward Mechanisms)	Theme 6 (Remote Sensing & Geo-information Systems)
Theme 6	Identifies spatial and-temporal patterns and processes which can be validated with on-ground baseline data to feed into the testing and development of methodologies to derive spatially and temporally explicit information. Characterises the inter-relationships between biophysical processes over time and space.	Enables research on ecosystem services and values to be modelled over time and space and linked to landscape character. Assists in standardising accurate methodology for identifying and valuing ecosystem services to derive spatially and temporally explicit information in relation to stakeholders, conservation and restoration efforts.	Provides information for visualising stakeholder relationships, interactions, networks and social preferences relevant to conservation and restoration issues in an interdisciplinary, multi-functional spatial representation. Maps and evaluates spatial interaction of human activities and natural resource use.	Visualises interrelated and complex processes at diverse spatial and temporal scales in order to support decision-making processes at policy, institutional and governance levels. Enhances communication between stakeholders based on different scenarios and options. Monitors the impact of policies in the ecosystem and provides insights on cost-benefits analysis of different strategies.	Assesses and presents opportunities for stakeholders to engage in innovative financing schemes in relation to spatially expressed restoration options. Represents and models the flux of natural capital.	

Appendix C: PRESENCE Research Questions: Brainstorm Pool

Research Questions
Theme 1 - Ecology: Ecosystem Functioning and Biophysical Processes

Restoration ecology:

- What are the target thicket assemblages in different environmental conditions and land-uses?
- How can restoration effort be optimised to achieve the target thicket assemblages?
    - What more can be learnt about the key species' physiology (e.g. growth and recovery rates) and distribution characteristics (e.g. geographic range, biomass and density distribution) to enhance restoration effort?
    - Which restoration methods enhance germination and seedling/cutting survival (in the field and the nursery)?
    - (How) Should soil be treated (e.g. using wood pulp, fire) to optimise restoration efforts?
    - Can (re-)introduction of animals (e.g. insects) optimize restoration efforts?
    - Why is arid thicket unable to recover from a degraded state on its own accord?
    - Why has human intervention to stimulate restoration not yet proven to be entirely effective despite the promise of spekboom cuttings?

Ecology:

- What are the assemblages in intact thicket in different environmental conditions (e.g. slope, aspect, soil, rainfall, etc.)?
    - Developing a fine-scale predication map of past vegetation cover by means of Remote Sensing
    - What successional processes are at play in the thicket ecosystem?
- What ecological processes/structures are at play in the thicket ecosystem?
    - Which plant/animal species are key in maintaining the ecological processes within thicket?
    - What are the key producers & consumers in the thicket ecosystem and what is their role?
    - What is the role of animal species (e.g. insects) in seed germination and seed distribution?
    - What are the influences of mycorrhizae in intact thicket?
    - What is the optimal clumb size and species composition to restore micro-climate?
- Baseline data: biodiversity inventory of all restored sites (before and after restoration) i.e. plants, birds, mammals, reptiles, insects, nematodes, etc.
- What was the vegetation at a site before it became degraded? [history/paleoecology]What vegetation could it support now?
- Was the initial vegetation stable or was it in a flux state (i.e. does it undergo major changes naturally)?

Soil Science:

- What is the optimal soil structure for the thicket ecosystem (also in relation to soil biota, soil aeration, nutrient exchange, etc.)?
- What are the key (trace) elements within the thicket ecosystem?
- Baseline data: detailed soil maps of all restored sites are required.

Botany:

- What are key species physiology (e.g. growth and recovery rates) and distribution characteristics (e.g. geographic range, biomass and density distribution)?
    - What are the vegetative and generative reproduction strategies of thicket species?
    - What differences are present in key species' ability to fix carbon across various scales?
    - Which environmental conditions influence the growth rate of different thicket species?
    - What are the optimal environmental conditions for key species (e.g. rain fall, frost, soil characteristics, etc.)
    - Which key species decrease soil erosion and increase water infiltration, retention and quality?

Hydrology:

- What is the effect of thicket restoration on hydrology (e.g. base flows of rivers, sedimentation of dams and rivers, soil infiltration)?
- Does replanting degraded slopes reduce water runoff rates, improve water retention on the landscape and ultimately water quality?

Climate change:

- How are weather patterns and subsequently thicket influenced by climate change?
- What are the potential threats of climate change to the restoration efforts?

Theme 1a: Horticultural Research Questions

- What information is already available about the propagation of sub tropical thicket species? (Literature review)
- Which species are difficult to propagate or have not been worked on before and therefore need special attention? (Literature review)
- What are the optimal propagation methods for Subtropical Thicket species? (Developing propagation protocols)
- How do we restore areas to the desired state?
- What actually needs to be done? [horticulture, and ecology (understanding ecological processes etc.)]
- What are the optimal and most cost effective propagation methods for individual species?
- What is the optimal and most cost effective propagation medium and growing medium for Thicket species?
- What are the effects of various fertiliser types, at different stages in the growing cycle, on Thicket species?
- What are the effects of various fungicides and insecticides, at different stages in the growing cycle, on Thicket species?
- Seed propagation vs. cutting propagation: Which is the optimal propagation method in terms of long term survival and growth in the field?
- Would coated seed improve propagation/production of Thicket species in the nursery?
- Phenology – When do key Thicket species come into flower and produce seed? When is the seed ready for collection?
- How are seeds in Thicket dispersed and what processes do they undergo before germinating in a natural system? (e.g. seed dispersal by birds may result in the seed coat being broken down by stomach acid. This may need to be simulated in the nursery in order to break seed dormancy).
- Would the use of hormone treatments improve the rooting success of cuttings planted in the field? (Thicket)?
- Would the use of products such as Stockosorb or other water retention methods, improve the survival rate of field plantings (Thicket)?
- What agronomy related research is necessary in helping to improve vegetation cultivation, planting methods, resilience and recovery?
- Why are a large percentage of spekboom cuttings dying in some plots in the Baviaanskloof?
    - Is it lack of soil moisture, and is this related to poor water infiltration?
    - Is it fungal attack, or some other disease?
    - Do the cuttings require a mycorrhizal symbiosis that is not establishing in certain soil types?
    - Does mortality vary with soil type i.e. is mortality associated with a specific soil texture or nutrient content?
- Which cultivation techniques and spatial restoration planning result in the highest number of cutting survival?
    - At what (st)age should cuttings be replanted from nursery to open soil?
    - How does planting depth affect spekboom cutting survival?
    - (How) Should plant cuttings be treated after planting?
    - Is there a spatial dimension to the performance of the spekboom in the area?

Riparian:

- What are the optimal propagation methods for Riparian species? (Developing propagation protocols)
- What information is already available about the propagation of Riparian species? (Literary review)
- Which species are difficult to propagate or have not been worked on before and therefore need special attention? (Literary review)
- What are the optimal and most cost effective propagation methods for individual species?
- What is the optimal and most cost effective propagation medium and growing medium for Riparian species?

- What are the effects of various fertilizer types, at different stages in the growing cycle, on riparian species?
- What are the effects of various fungicides and insecticides, at different stages in the growing cycle, on riparian species?
- Would coated seed improve propagation/production of riparian species in the nursery?
- Seed propagation vs. cutting propagation: Which is the optimal propagation method in terms of long term survival and growth in the field?
- Phenology – When do key riparian species come into flower and produce seed? When is the seed ready for collection?
- Would the use of enhanced/coated seed improve the success of seeding in the field? (Riparian)
- Would the use of products such as Stockosorb or other water retention methods, improve the survival rate of field plantings. (Riparian)

Theme 2 - Ecosystem Goods, Services & Valuation

Ecosystem functions:

- What key ecosystem functions are present in thicket? How do they interact?
- What are the main ecosystem functions threatened through thicket degradation?
- How should the key ecosystem functions be identified and quantified?
- How can information about ecosystem functioning be used to develop scenarios for multi-functional use?

Ecosystem goods and services:

- What are the ecological, economical and cultural/spiritual goods and services provided by thicket for different stakeholders?
- What are the main ecosystem goods and services lost through thicket degradation/transformation?
- Undertaking a benefit-cost analysis of the ecosystem service(s) in a specific site (comparing autonomous developments to various scenarios). Comparing business-as-usual to various multiple-use scenarios.
- Over what scales do the benefits of ecosystem services flow (local to international)?
- Studying interactions among ecosystem services and land-use options.

Valuation & perception (continues on next page):

- What direct and indirect use values and option values (such as water filtration, flood control, maintenance of soil fertility, natural pest control, etc.) and non-use values (e.g. existence, intrinsic, cultural and biodiversity values) can be identified? (use/non-use values are also termed market/non-market values).
    - Can these ecosystem services be quantified?
    - Can these ecosystem services be monetarised?
- What quantification/value method is most appropriate (e.g., travel cost method, hedonic pricing method, contingent valuation method, production function approach, damage cost avoided, replacement costs, factor income, market price, etc.)?
- Are the values site-specific? Should they be determined locally? Can they be estimated form literature?
- How do stakeholders perceive and value the different goods and services provided by thicket and degraded landscapes?
- What socio-cultural values underpin people's preferences in thicket restoration?
- What is the socio-economic value of restored and degraded thicket (across various spatial scales)?

Theme 3 - Stakeholders, Livelihoods & Social Assessment

What are the economical, socio-cultural and ecological costs and benefits for the different stakeholders involved in restoration?

Who are and/or will be the major actors/stakeholders in restoration of the ecosystem?

- What is the mutual relationship between the stakeholders?
- What are the social, economic and cultural factors driving stakeholders' decisions regarding to restoration?
- What are the needs and views of stakeholders (regarding to large-scale restoration)?
- Do stakeholders have (traditional) knowledge helpful to restoration?
- Would it be useful to group stakeholders according to how they interpret the thicket biome

in order to come to suitable and successful restoration strategies, planning, *management and policy?*

- ❖ Which are the relevant groups to pay for the ecosystem service?
- ❖ What type of rural livelihood processes are taking place?
  - How do local livelihood strategies relate to biodiversity conservation and restoration and how does this understanding contribute to poverty alleviation?
  - What are stakeholders' minimum required income in order to sustain livelihoods?
  - What is the contribution of thicket to rural livelihoods and poverty alleviation in terms of wild plant and animal resources as well as potential options for income and *livelihood diversification?*
- ❖ Poverty alleviation can be interpreted as relating to an increase in income and employment as well as an increase in human capital and dignity. How can restoration of thicket contribute to economically attractive use of biodiversity when focusing on local concerns?
- ❖ Can restoration efforts based on biodiversity, water, combating desertification and carbon markets meet the needs of farmers and communal land owners? Farmers, especially communal farmers will be under pressure to restock as soon as possible whilst carbon investors will want no herbivory for as long as possible?
- ❖ How can restoration (in terms of ecosystem functions and integrity) can be reconciled with socio-economic demands, policy processes, livelihood strategies, stakeholder needs and various land uses (e.g. private lands for agriculture and pastoralism, communal areas, governmental and private game reserves)?
- ❖ What vegetation do we want to restore it to? [socio-economic/human use value and conservation (rarity of vegetation type and species of which it is composed)]
- ❖ In including diverse interest groups on multi-stakeholder platforms, what trade-offs exist between engagement and consultation burnout?
- ❖ What are the main economic activities in the study area that can be related to ecosystem goods and services?
- ❖ Who are the main stakeholders involved and how do they depend on these activities?
- ❖ What are the current economic (& monetary) benefits of the selected economic activities?
- ❖ What would be the potential economic benefits of sustainable use/restoration of the ecosystem goods and services?

Communities:

- ❖ How is the ecosystem of the restoration area socially and culturally valued by the local communities?
  - How is the land used by these local communities?
  - How are those land-uses valued by the locals (e.g. for the sake of survival traditions)?
  - To what extent are the land-uses important for sustaining the local culture?
- ❖ How are the local communities influenced by the current plans for restoration and PES (carbon credits)?
  - What is the best road towards sustaining the livelihoods of local communities when in terms of carbon sequestration?
  - If local plans for carbon sequestration already exist, how are they structured in terms of land use, policies and dividend division?
  - If there are current plans for carbon sequestration, how will the necessary land-use changes influence the local communities?
- ❖ How willing are local communities to change their daily activities in return for PES (carbon credits)?
  - If plans for carbon sequestration do not exist yet within local communities, what are the different ways it could be implemented?
- ❖ In the field of sustainable management; are evident alternatives for carbon sequestration existing?
- ❖ If yes, what will be their implications for sustainability of local livelihoods?

Theme 4 - Policy, Institutions & Governance

- ❖ What is the effect of existing policy, governance and institutional arrangements on current and planned restoration and conservation efforts?
  - What are the key policy questions linked to the social practices and institutional arrangements that allow different stakeholders to access or conserve natural resources?
  - How are relevant policies formed and who are the winners and losers?

- What is the relationship between institutional arrangements and PES?

❖ Which rules and regulations can be used to enhance thicket restoration?
❖ Which policy mechanisms can ensure that benefits of payments for ecosystem services actually reach those responsible for supplying the services?
- What are the key bottlenecks in such policy mechanism and how can these be overcome?

❖ How to translate research into policy?
❖ How should Ecosystem Goods, Services & Values contribute to policy and management processes?
❖ Which institutions are involved and can be involved in thicket restoration?
- (How) Should policy change within government and institutes (ECPB and SANParks) to ensure successful restoration projects?
- How to integrate the needs of STRP/PRESENCE with the needs of the different governmental departments and other institutes?
- From a policy and institutional perspective, what scope is there for investigating various change processes and planning models in terms of empowering individuals and institutions (enabling) and securing conservation and restoration action (implementation)?

❖ What type of methodologies can be applied to ensure democratic and transparent decision making on restoration efforts and planning?
❖ Can relevant agencies or benefactors be lobbied to finance such restoration?
❖ What is relation between land tenure and restoration strategies?
- What are the different land tenure possibilities for restoration?
- What are the stakeholders' interests according the land tenure possibilities?
- Who are the different stakeholders involved in land tenure? What is their status? What are their roles?
- What are the links/conflicts between the different stakeholders involved in land tenure?
- What are their views on the conservation project, concerning land tenure?
- What are the threats of land tenure to restoration efforts?

❖ What are the different trade-offs concerning land tenure?
❖ How can we get desired restoration done? [politics, funding, stakeholder buy in, and management]

Theme 5 - Financing, Payments & Reward Mechanisms

❖ (How) Can knowledge on ecological, economical and cultural values and livelihood benefits provide scope for financing/reward instruments to support biodiversity conservation and restoration efforts?
❖ How can/what basis is there for financing/reward instruments be combined with a mix of participatory, institutional and non-financial instruments to assist restoration of natural capital?
❖ Is qualifying for carbon, biodiversity, water and desertification credits financially and technically feasible (e.g. in terms of establishing baselines/meeting transaction costs)?
❖ What other incomes from the restoration can be generated besides carbon credits?
❖ How can demand for PES (across various scales) be stimulated and implemented?
❖ What knowledge is needed to better explore and implement financing possibilities within the scope of PES and/or biodiversity and carbon offsets across regional, national and international scales?
❖ How can benefits from restoration be supported through innovative financing mechanisms for ecosystem management?
❖ How can an institutional environment be facilitated at local (e.g. cultivation and commercialisation of medicinal plants), national (e.g. PES and water credits) and international (e.g. Clean Development Mechanism and spekboom carbon sequestration) scales to enable (access to) PES?
❖ What are the possible PES mechanisms (like pricing (direct payments), tax incentives (to enable private investments), creating funds (combining public and private finance)?
❖ What combinations of PES are possible to promote restoration and alleviate poverty?
❖ Do payments for ecosystem services lend themselves to include small landowners and communities?
❖ How can the requirements for CDM approval be fulfilled? What needs to be proven? What role does economics play?
❖ What are the economic returns from public investment in restoration under current institutional arrangements (compared with possible improvements like development of markets for some ecosystem services)?
❖ What framework can be established for PES (like watershed services) taking into account the 'receiver' and the 'payer' (example elephant tax in RSA)?

Carbon Market:

- How much income can be generated from the carbon market to provide sustainable livelihoods?
- An expert review of the PDD document is required.
- Continual assessment of the state of the voluntary market is required.
- Documents need to be written to get CCB certification in order to sell credits on the voluntary market.
- How can it be mathematically demonstrated to carbon auditors that the plant aerial and root carbon can be accurately assessed?
- Can we accommodate communal farming and/or mega-herbivores and successfully generate carbon credits?
- Given that the potential for carbon sequestration within landscape restoration is likely to resonate with the growing interest in carbon trading and the CDM, how can equitable access, benefit-sharing and use of resources be assured?
- How - or in what ways - can this knowledge on key species feed into potential carbon trading schemes

Theme 6: Remote Sensing & Geo-information Systems

- Developing a predication map of past vegetation cover.
- The spectral versus spatial resolution trade-off: identifying the appropriate data for monitoring carbon stocks in thicket-wide experimental plots versus large-scale restoration plots.
- Using carbon stock data from the 30 year old restoration site (Krompoort) for calibrating remote sensing data.
- Monitoring spekboom cutting survival in the Baviaanskloof restoration sites using remote sensing data.
- Using carbon stock data from Mike Powell's 180 vegetation plots in the Baviaanskloof for calibrating remote sensing data.
- Disparity or challenge between fine spatial level data for biophysical and spatial resolution for socio-economic data.
- How can RS & GIS potential be explored for tracking changes in ecosystem services and developing rigorous methodology for carbon accounting in semi-arid ecosystems (e.g. tracking soil carbon leakage, soil moisture correlations, canopy cover comparisons and herbivore impact monitoring (game and livestock)).
- How can remote sensing methodology in a semi-arid environment be approved under the Clean Development Mechanism (CDM)?
- How can remote sensing be proven to be useful and acceptable for CDM accreditation?
- To what extent can such tools be valuable in participatory resource monitoring and policy decision-making?
- Can spatial analysis methodology ensure local capacity building and promote time and cost effectiveness and 'inclusiveness' in focusing the restoration effort?

Geo-Information Systems:

- Mapping of ecosystems functions, goods, services and values.
- Mapping of stakeholder networks, land tenure and perspectives.
- Mapping of relevant ecological, socio-economic, socio-cultural knowledge as relevant to management, policy & planning.

Appendix D: A Snapshot of Relevant Lessons Learned

EXAMPLE 1 - From Cowling *et al.* (*in press*):

Cowling *et al.* (2002) analysed twelve projects from various production sectors in South Africa and designed a simple model for understanding the mainstreaming process. In essence, the structure comprises four elements:

1. *Prerequisites* – elements without which mainstreaming cannot happen;
2. *Stimuli* (or windows of opportunity) – elements external and internal to the sector that catalyse awareness of the need for mainstreaming;
3. *Mechanisms* – the actual activities that seek to effect mainstreaming; and
4. *Outcomes* – the measurable indicators of mainstreaming effectiveness.

The most frequently cited prerequisites in these projects were democratic and accountable governance, awareness and knowledge, and organisational and institutional capacity. Mainstreaming is primarily achieved through behaviour change.

EXAMPLE 2 - From Adekola (2007, *unpublished*)[5]:

Whilst it can be ordinarily assumed that reasons for perceived failure of (restoration) implementation will be simply the opposite of the listed reasons for success enumerated in Table 7 (below), additional shortcomings were also identified in selected studies assessed. The most important shortcoming mentioned in these restoration studies was typically found in an African context and involved **uncertainty over tenure issues (ownership)**. For example, who owns – or has access to - the lands containing the 'restored' forest.

Such issues were not adequately addressed at the commencement of these projects and thus tended to cause bottlenecks in the latter stages. In particular, **no arrangements were made for benefit sharing** (how rewards are to be distributed and shared). Thus it is important that the issues relating to the security of tenure and land ownership be addressed from the outset of any restoration project.

Another critical issue often cited is the **failure to ensure long-term capacity building of local people and organisations**. This should be paramount as often projects have "died" with the end of the current project life span - not necessarily only because of a lack of financing, but because the locals do not have the capacity or capability to manage the project as previously or know where to seek new funding opportunities. Together, this has the potential of eroding most of the gains of the project. For example, in the Gwari Banso project, the inability of the project to provide the farmers with the capacity to manage the established plantations as well as ensuring sustainability of the programme was said to have the eroded most of the gains of the project.

Table 7 below lists factors for success in restoration projects as identified in the case study review undertaken by Adekola and Zylstra (2007, *unpublished*).

[5] Olalekan Adekola is a recently graduated MSc student within the Environmental Systems Analysis Group, Wageningen University. His internship report assessed lessons learned from restoration cases listed in the Nature Valuation & Financing Case Study Database [http://eyes4earth.org/casebase] and other published literature.

Table 7: Reasons for success in restoration

Factors contributing to 'success'	Case Study Examples
Initial broad consultation with partners and their decision to cooperate	**Gwari Banso Project**: The initial stakeholder consultations with local landowners, regional District Assembly and the Ministry of Food and Agriculture and the Forest Service to elicit views and suggestions were deemed critical in ensuring the project initial success.
Public involvement throughout all stages of the project	**Mowitch Estuary Project:** public was involved from site selection to project design; ensured public acceptance.
Stimulating/Creating public education and awareness	**Shinyanga Region Project**: education and awareness stimulated local interest and prevented misunderstandings. **Illinois Prairie Project:** initiators sponsored/organised popular free tours, activities and monthly programs which were very popular to raise awareness about the project.
Use of local knowledge and traditions to support restoration	**Lake Chad Basin:** use of farmers' practices and experiences was reported to be a strong reason for achievements. **Shinyanga Region Project**: availability and utilization of a past history of *Ngitili* (traditional management) which had not been forgotten by the people aided in creating a sense of project ownership and belonging in the local community.
Strong will of local people to participate in the face of possible opposition from other sectors of society	**COPRANAT Restoration**: initiated and implemented by local women, despite discouragement from the men. With determination, the project succeeded; men also joined in.
Addresses livelihoods and needs of the local people and land owners	All 'successful' cases addressed the benefits derived by people to support their livelihoods; and ensured that the 'flow of benefits' was not severely diminished.
Restoration strategies used (technical)	**French Polynesian Reef Restoration:** installed protective barriers to prevent shoreline erosion during restoration.
Appropriate utilization and 'uptake' of scientific expertise and information	Although not all restoration projects are preceded by scientific research, the most successful cases are where prior research (primary and secondary) was found to be essential. **Lake Chad Basin:** Past research on farmers' preferences on tree species and on tree planting distance were utilized in project implementation and assisted good decision-making.
Scientific vision, dogged determination and good communication skills on the part of the project initiators	**Working for Water:** Owed much of its initial success to the likes of Guy Preston and other scientists, who managed to convince politicians of the importance of the issue. This combined with the political vision of Kader Asmal (former Minister of Water Affairs and Forestry), who saw the opportunity to link environmental, social and economic concerns in one programme, was a critical factor.

Appendix E: Contact List - Workshop Participants

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