Using the Mpumalanga Biodiversity Conservation Plan in Protected Area expansion and land-use decision making in Mpumalanga Province, South Africa

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Overview of Presentation

- Need for a conservation assessment
- Systematic Conservation Planning
- Integrated assessment (aquatic & terrestrial)
- Output to biodiversity categories
- Formalisation of land-use guidelines
- Products & Usage
- Summary
Why the need for a conservation plan?

Land-use change (2005-2010)
Prior to MBCP .......

- Reviewing of applications were re-active and handled on a case-by-case basis.
- Comments were often subjective and not objective.
- Strong need to pro-actively plan so that decisions are part of a larger strategic plan with conservation of biodiversity as its foundation.
MBCP Objectives

To develop a conservation plan that will:

1. Spatially identify a representative and viable sample of biodiversity

2. Ensure environmentally sustainable development

3. Support the strategic objectives of MTPA (i.e. Mpumalanga Protected Expansion Strategy)
Systematic Conservation Planning

1. Compile and collate data on the biodiversity of the planning region
2. Set quantitative targets for biodiversity features
3. Review targets against existing conservation areas
4. Analyse and identify additional areas requiring conservation (spatial biodiversity priority areas)
5. Implement conservation actions on the ground (e.g. sustainable development, PA Expansion)
6. Maintain the required values of biodiversity areas & update plan

SCP Principles

In short, if we want to conserve biodiversity effectively, we need to conserve:

- a *representative* sample of all biodiversity (pattern)
- ensure ecological and evolutionary processes that allow this biodiversity to *persist* over time (process)
- set *targets* for the conservation of biodiversity features
Integrated Assessment

Aquatic Biodiversity Assessment
(identify important subcatchments)

Assessment of competing land-uses
to minimize conflict

Incorporate into final Terrestrial
Biodiversity Assessment
Conservation Planning Software

MARXAN identify smallest possible area to meet all the targets. Limit on total size of conservation system (efficiency & minimizing costs)

CLUZ user-friendly GIS interface with ArcView 3.3

Min Set function

Low cost + Good connectivity + Good target achievement

• Complimentarity – incorporating species not represented elsewhere
• Efficiency – protecting the most species per unit area
Terrestrial Assessment

- 65,000 Hexagons (118 ha each) as planning units
- 340 biodiversity features
  - 68 Vegetation units
  - Amphibians (3 taxa)
  - Birds (17 taxa)
  - Invertebrates (17 taxa)
  - Mammals (13 taxa)
  - Plants (190 taxa)
  - Reptiles (10 species)
- Ecological processes
- Revised protected area
- Transformation (lost habitat)
Targets for Vegetation Types

(graph courtesy SANBI)

- SA agree on 75%
- species area curve

100% of area

100% of species

75%

target eg 35%
Biodiversity is Target Driven

Explicit quantitative targets reflecting what you want to conserve to achieve a living landscape

<table>
<thead>
<tr>
<th>Examples of Targets Used</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation Lyndenburg Montane Grassland</td>
<td>24%</td>
</tr>
<tr>
<td>Mammal Ourebia ouribi</td>
<td>7500 ha</td>
</tr>
<tr>
<td>Butterfly Metisella meninx</td>
<td>1 locality</td>
</tr>
<tr>
<td>Bird Blue Swallow (nesting)</td>
<td>2 km buffer around nest sites</td>
</tr>
<tr>
<td>Frog Bufo gariepensis nubicolus</td>
<td>400 ha</td>
</tr>
<tr>
<td>Reptile Cordylus giganteus</td>
<td>1000 ha</td>
</tr>
<tr>
<td>Plant Cycads (critically endangered)</td>
<td>All known localities</td>
</tr>
<tr>
<td>Plant Warburgia (muthi)</td>
<td>15 localities (21 total)</td>
</tr>
</tbody>
</table>

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Prioritised Spatial Threats
Landuse Pressures
Portfolio highlights most efficient selection of areas required to meet biodiversity targets.

Transformation → Biodiversity data → Protected areas → Targets → MARXAN

Aquatic Assessment: Favour

LU Pressures: Avoid

Randomly runs 100 times to select most efficient area to meet targets – Frequency of Selection (Irreplaceability)
Need to convert ‘irre replace ability’ map into meaningful output

• Categorize output according to land-use options (or flexibility)

• *Irreplaceable* = 100% irreplaceable sites (frequency of selection)

• *Highly Significant* = 50 - 99% irreplaceable sites

• *Important & Necessary* = Ideal reserve network to meet targets

• *Least concern* = Not required to meet target

• *No natural habitat remaining* = Transformed
SANBI: Findings on the relative impact of land-uses on biodiversity

Findings on the relative impact of land uses on grasslands (O'Connor, 2005)

- Conservation: 1
- Game: 1.4
- Livestock: 1.9
- Tourism: 2.4
- Dry crops: 3.4
- Rural: 3.6
- Irrigated crops: 3.6
- Dairy: 4.0
- Timber: 4.1
- Mining: 4.5
- Urban: 4.7
## Proposed Land-use Guidelines

### TABLE: Types of Land-use suited to each Biodiversity Conservation Category

<table>
<thead>
<tr>
<th>No</th>
<th>Type of Land Use</th>
<th>PAs</th>
<th>Irreplaceable</th>
<th>Hi Sig</th>
<th>Imp &amp; Nec</th>
<th>Ecol Corr</th>
<th>Least Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conservation Management</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Extensive Game Farming</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Extensive Livestock Production</td>
<td>R</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Rural Recreational Development</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>Rural (Communal) Settlement</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>6</td>
<td>Dryland Crop Cultivation</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>Intensive Animal Farming (incl. dairy)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>Y</td>
</tr>
<tr>
<td>8</td>
<td>Irrigated Crop Cultivation</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>Y</td>
</tr>
<tr>
<td>9</td>
<td>Timber Production</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td>10</td>
<td>Urban &amp; Business Development</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td>11</td>
<td>Major Development Projects</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>12</td>
<td>Linear Engineering Structures</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>13</td>
<td>Water Projects &amp; Transfers</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>14</td>
<td>Underground Mining</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>Y</td>
</tr>
<tr>
<td>15</td>
<td>Surface Mining, Dumping &amp; Dredging</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

**LEGEND** – Guidelines apply only to untransformed land with natural vegetation cover

- **Y** - YES, permitted and actively encouraged activity
- **N** - NO, not permitted, actively discouraged activity
- **R** - RESTRICTED to compulsory, site-specific conditions & controls when unavoidable, not usually permitted
Products

- A0 wall map
- MBCP Handbook
- Free GIS Viewer (ArcExplorer 2)
- ArcGIS Online (soon!)
ArcExplorer 2 CD-Rom version
Aquatic Assessment – underpinning Terrestrial Assessment

- Planning units are subcatchments: modelled from 90M DEM
- 1503 units
- Average size: 5820 ha

List of Aquatic Biodiversity Features
- Rivers
- Wetlands
- Species (4 threatened fish)
- Peat wetlands
- Hydrological important areas/high water yield
- Processes (pan and wetland clusters)
- Supporting layers (e.g. PESC & transformation)
- 157 Features used in final assessment
Political support

- Presented to MEC DALA at onset of project (June 2005)
- Presented outcome to MEC DALA (December 2005)
- Presented to Mpumalanga Cabinet (January 2006)
- Presented to MEC DEDP (February 2006)
- Presented to all municipalities (July & August 2006)
- DALA presented to Economic Cluster (February 2008)
- Presented to municipalities & teachers at Enviro Expo (June 2008)
- Presented to Social Cluster (July 2008)
- **Endorsed by Mpumalanga CABINET** (August 2008)
MBCP Uses

- Guide the **identification of Threatened Ecosystems** (Biodiversity Act)
- Spatial priorities for Mpumalanga **Protected Area Expansion** Strategy
- Form basis of **Bioregional Plan** for Gert Sibande District (Biodiversity Act)
- Geographic priority areas in terms of **Environmental Impact Assessment regulations** (Listing Notice 3)
- Currently consulted to **assess all development applications** in Mpumalanga (internal)
- Informs priority areas for **clearing of invasive alien plants** (Working for Water)
- Informs **municipal Integrated Development Plans** and Spatial Development Frameworks (work in progress)
Summary & way forward

- Marxan and SCP process follows a rigorous methodology
- National & provincial departments encouraging SCP
- Strong reliance on SCP to identify priority areas thus allowing for fast-track developments outside priority areas
- BUT reliant on good data
- MTPA and supporting organisations investing in new data and improved methodology to revise MBCP
- Climate change priorities critical to new MBCP
THANK YOU