Correlating Management Effectiveness and Biodiversity Outcomes

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Worlds Parks Congress
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All the people doing METT assessments and collecting time-series data

Danmarks Grundforskningsfond
Danish National Research Foundation
Protected area performance

Input

- Resources
- Management actions
- Legislation

Protected Area

Outcomes

- STATE
  - Improved responses of conservation target

- PRESSURE
  - Reduced threats to conservation targets

- What evidence exists?
  - Systematic review of existing literature

- Do we have the data to answer this beyond case-studies?
  - Global study using animal population trends and management effectiveness data
Effectiveness of terrestrial protected areas in reducing habitat loss and population declines

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- Systematic review of 2,599 papers
- Only studies causally linking \textit{input} $\rightarrow$ \textit{outcomes}
- Where described we recorded management interventions
- 35 population change papers (42 studies)
Existing evidence

- Majority of studies found a positive correlation
- However, evidence remains equivocal
- Tropical and mammal bias

Protected area performance

**Input**
- Resources
- Management actions
- Legislation

**Protected Area**

**Outcomes**
- STATE
  - Improved responses of conservation target
- PRESSURE
  - Reduced threats to conservation targets

**Context**
- Socio-economics
  - Governance
- Climate change
  - Pollution
- Values
  - Ethics
- Ecological processes
- Evolutionary processes
- Landscape Topology

Geldmann, 2013
Protected area performance

Input

Management Effectiveness Tacking Tool (METT)
1,634 sites with 4,136 assessments

Outcomes

Living Planet Database
2,103 sites with 9,298 populations

Context

Slope and elevation
Human Footprint, MODIS landcover, GRoads, Human population density
Malnutrition, and Infant mortality rate
The METT

A score card evaluation of context, inputs, and process in a protected area

Conducted by GEF, UNDP, WWF as well as multiple other organizations and countries

Collects information on threat, objectives, staffing, budget, designations AND

30 specific questions

<table>
<thead>
<tr>
<th>Name of protected area</th>
<th>Bounba Bek (BB) National Park (proposed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of protected area (country, ecoregion, and if possible map reference)</td>
<td>Cameroon, Western Congo Basin Moist Forest Eco-region 2°58' and 2°24N and 14°40 and 15°18'E</td>
</tr>
<tr>
<td>Date of establishment (distinguish between agreed and gazetted)</td>
<td>Agreed 1996 / Gazettement pending</td>
</tr>
<tr>
<td>Ownership details (i.e. owner, tenure rights etc)</td>
<td>State owned land and managed under the permanent estate regime</td>
</tr>
<tr>
<td>Management Authority</td>
<td>Government Wildlife and Protected Areas Authority</td>
</tr>
<tr>
<td>Size of protected area (ha)</td>
<td>238,260</td>
</tr>
<tr>
<td>Number of staff</td>
<td>Permanent 12 (Gov't) and 6 (WWF staff) / Temporary 8 temporary game guards</td>
</tr>
<tr>
<td>Annual budget (US$)</td>
<td>120,000</td>
</tr>
<tr>
<td>Designations (IUCN category, World Heritage, Ramsar etc)</td>
<td>Category 6 being proposed</td>
</tr>
<tr>
<td>Reasons for designation</td>
<td>Extremely rich in wildlife, timber and other NTFPs. Local communities include indigenous forest people, Bala pygmies</td>
</tr>
<tr>
<td>Brief details of World Bank funded project or projects in PA</td>
<td>Bounba Bek between 1997 and 2001 benefitted from GEF funds amounting to about US$500,000 targeting basic research</td>
</tr>
<tr>
<td>Brief details of WWF funded project or projects in PA</td>
<td>WWF has been involved in the region since 1987 but had a management role since 1997 with management of GEF funds and also invested more than US$600,000 over the past 5year to establish management infrastructure, monitoring programme etc</td>
</tr>
<tr>
<td>Brief details of other relevant projects in PA</td>
<td>Capacity building of local communities in management of community hunting zones and also establishment of consultative forums between stakeholders notably sport and logging companies. Bounba Bek proposed NP forms a continuous forest block with Nkz proposed NP. Nki is part of a trans-boundary conservation initiative comprising PAs in Cameroon (Dja biosphere reserve), Congo-Brazzaville (Odzafrica NP) and Minkebe in Gabon. WWF is also working with various logging companies operating in the region on SEM-C</td>
</tr>
</tbody>
</table>

List the two primary protected area objectives

Objective 1: Ecological integrity of the forest is maintained by enhancing sustainable natural resource exploitation and management

Objective 2: Local communities directly benefit in a participatory management process by regulated access to resources and accrued benefits from commercial exploitation of surrounding multiple use zones

List the top two most important threats to the PA (and indicate reasons why these were chosen)

Threat 1: Unsustainable timber exploitation activities

Threat 2: Poaching

List top two critical management activities

Activity 1: Working with local communities and other stakeholders to establish sustainable exploitation and management practices

Activity 2: Law enforcement and control
<table>
<thead>
<tr>
<th>Question</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Legal status</td>
<td>16 Security of budget</td>
</tr>
<tr>
<td>2 Protected area regulations</td>
<td>17 Management of budget</td>
</tr>
<tr>
<td>3 Law enforcement</td>
<td>18 Equipment</td>
</tr>
<tr>
<td>4 Protected area objectives</td>
<td>19 Maintenance of equipment</td>
</tr>
<tr>
<td>5 Protected area design</td>
<td>20 Education program</td>
</tr>
<tr>
<td>6 Protected area boundary</td>
<td>21 State and comm. Neighbors</td>
</tr>
<tr>
<td>7 Management plan</td>
<td>22 Indigenous people</td>
</tr>
<tr>
<td>8 Regular work plan</td>
<td>23 Local communities</td>
</tr>
<tr>
<td>9 Resource inventory</td>
<td>24 Visitor facilities</td>
</tr>
<tr>
<td>10 Research</td>
<td>25 Commercial tourism</td>
</tr>
<tr>
<td>11 Resource management</td>
<td>26 Fees</td>
</tr>
<tr>
<td>12 Staff numbers</td>
<td>27 Condition assessment</td>
</tr>
<tr>
<td>13 Personal management</td>
<td>28 Access assessment</td>
</tr>
<tr>
<td>14 Staff training</td>
<td>29 Economic benefit assessment</td>
</tr>
<tr>
<td>15 Current budget</td>
<td>30 Monitoring and evaluation</td>
</tr>
</tbody>
</table>
The living Planet database (LPD)

More than 20 years of work collating existing monitoring of vertebrate populations

We considered all time-series which had at least 3 data points over 5+ years from 1990

For each population we calculated a slope as the dependent variable specific to the protected areas
METT sites
LPD sites
Overlap (n= 111 with 465 populations)
Overlap with context
(very) Preliminary results

Model selected based on AIC, testing 512 different models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>-0.001</td>
<td>0.014 *</td>
</tr>
<tr>
<td>Perimeter</td>
<td>-0.232</td>
<td>0.030 *</td>
</tr>
<tr>
<td>Slope of PA</td>
<td>-0.002</td>
<td>0.286</td>
</tr>
</tbody>
</table>

When taking management out, the socio-economic factors comes out as significant.
Summary

- Literature evidence is not very strong — though more positive cases than negative

- Global overlap between METT and LPD is small

- Very preliminary results suggest management is important, but could be a reaction more than a treatment

- There is still a STRONG need to get more data to better test the relationship between inputs and outcomes in a BACI setting

- Management effectiveness tools is a simple approach to getting at this their interpretation is far from straightforward