GAUTENG BIODIVERSITY GAP ANALYSIS

DEPARTMENT OF AGRICULTURE, CONSERVATION, ENVIRONMENT & LAND AFFAIRS

☞ Introduction
☞ Project aim
☞ Approach to project
☞ Data collection
☞ Threat layers
☞ Data analysis
☞ Time frame

INTRODUCTION

Policy context

☞ South Africa is a signatory to the United Nations Convention on Biological Diversity and is therefore committed to ensuring its objectives are met.

☞ The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity describes South Africa's approach to upholding this Convention.

☞ The BGAP addresses the first of the goals listed in the White Paper, i.e. to conserve the diversity of landscapes, ecosystems, habitats, communities, populations, species and genes in South Africa.

Biodiversity defined

☞ The variety and variability among living organisms and the ecological complexes in which they occur.

☞ The term encompasses different levels of organization including landscapes, communities, species, populations, individual organisms and genes.

☞ Ecological processes are also included.

LANDSCAPES

COMMUNITIES

SPECIES/ POPULATIONS

INDIVIDUALS

GENES
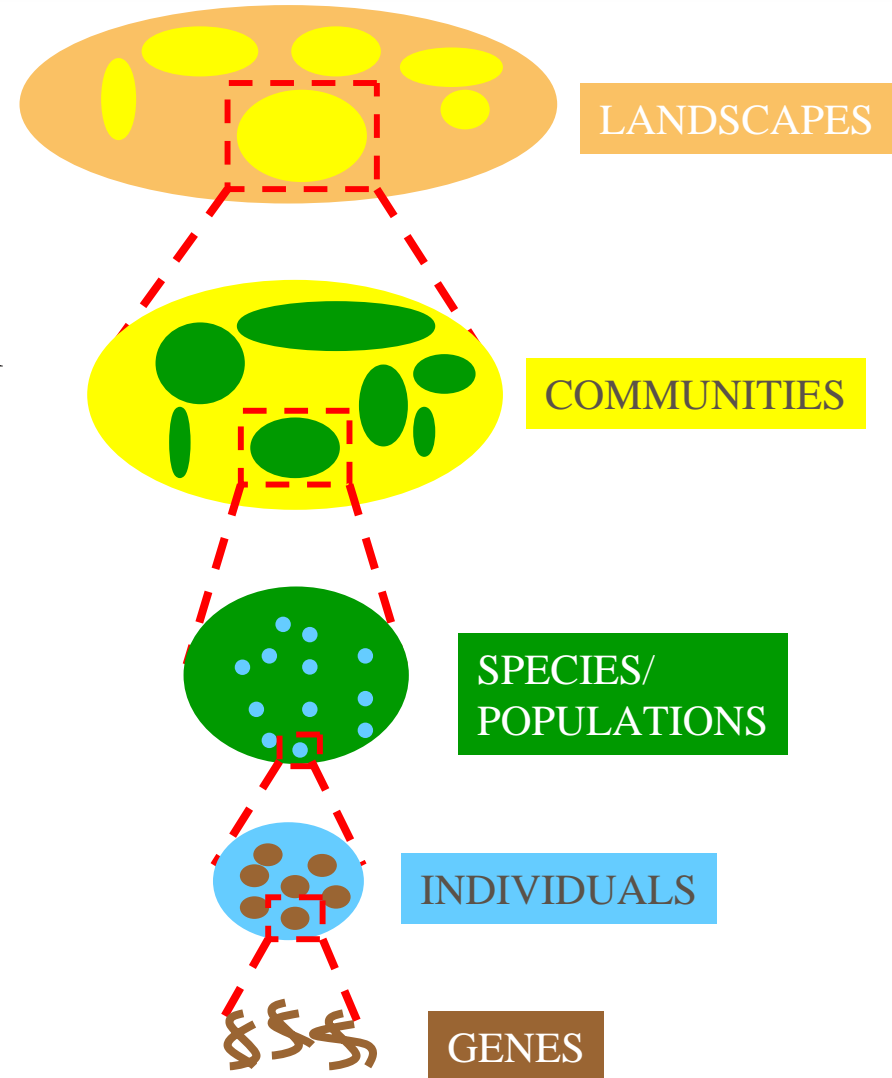
Biodiversity of Gauteng

☞ Although the smallest province in SA, Gauteng is characterized by a high biodiversity.

☞ Gauteng falls within both the savanna and highly threatened grassland biomes that together constitute six vegetation types.

☞ Approximately 83% of the province falls within Highveld Grassland, of which an estimated 0.8% is currently conserved in SA.

☞ An estimated 3303 plant species, 125 mammal species, 483 bird species, 23 amphibian and 101 reptile species occur in the province.

☞ 25 plant species are endemic or "near endemic" to the province, all of them threatened with extinction with at least 56% Critically Endangered or Endangered.

Problems and challenges

☞ There is a serious lack of up-to-date information on the biodiversity of Gauteng; information that does exist is associated with sampling bias, is outdated or has been recorded at too coarse a scale (e.g. quarter degree grids).

☞ The province has the highest human population density and the highest urbanization levels in the country.

☞ The biodiversity of Gauteng is highly threatened by industrialization, mining, agriculture and especially urbanization.

☞ Successful conservation of biodiversity requires the identification and mapping of priority areas where development and habitat transformation and fragmentation should be discouraged and conservation efforts should be focused.

PROJECT AIM

To identify and map the distribution of areas that are of importance to biodiversity in Gauteng through a conservation planning exercise that is based on explicit representation goals and the principles of:

- ☞ complementarity (avoidance of duplication of important attributes),
- ☞ efficiency (most protection for the least cost/area),
- ☞ defensibility and flexibility (many combinations of potential solutions in the face of competing land uses),
- ☞ irreplaceability,
- ☞ retention (consideration of threatening factors),
- ☞ persistence (capturing of ecological processes and exclusion of threats) and
- ☞ accountability (in allowing decisions to be critically reviewed)

and ultimately to provide recommendations for the conservation and management of these areas.

APPROACH TO PROJECT

The history of conservation planning

In the past, conservation areas were not established with biodiversity criteria under consideration – in many southern African countries, protected areas were established for the sole purpose of conserving larger mammal species.

Historical trends in conservation planning
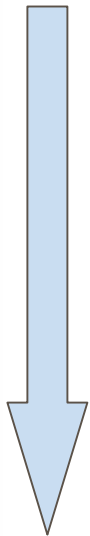
☞ Conservation planning exercises targeting solely the species level of biodiversity.

☞ More studies targeting the level of communities, habitats, ecosystems and landscapes.

☞ More thorough studies targeting both lower and higher levels of biodiversity. Focusing on both species and higher organizational levels should help integrate patterns and processes into conservation planning.

Gauteng BGAP project
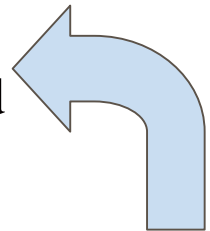
DATA COLLECTION	DATA CAPTURE	DATA ANALYSIS IN C-PLAN

Conservation areas

Habitat diversity and processes

Ridges

Caves

Rivers

Wetlands

Flora

Invertebrates

Birds, reptiles and amphibians
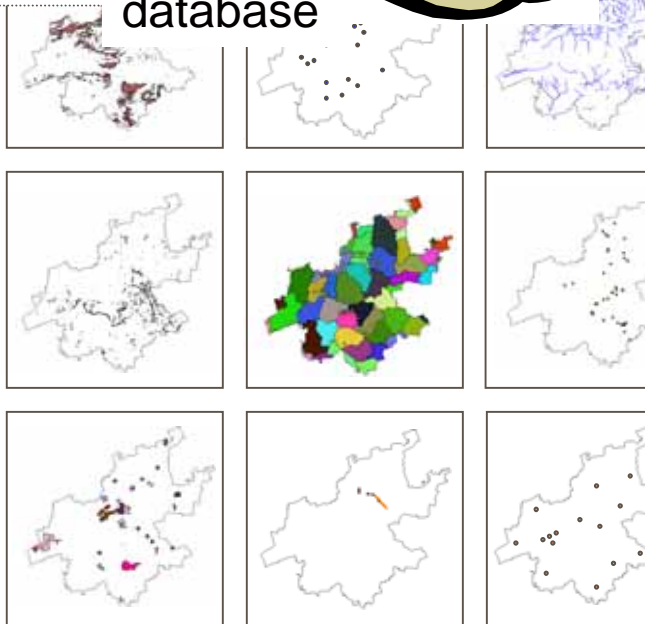
Mammals

Fish

Medicinal plant use

Varroa infestation
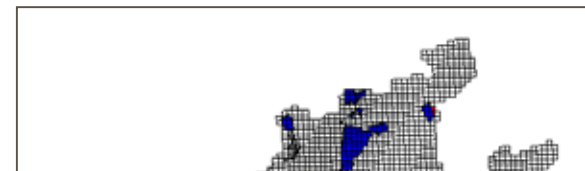
Others
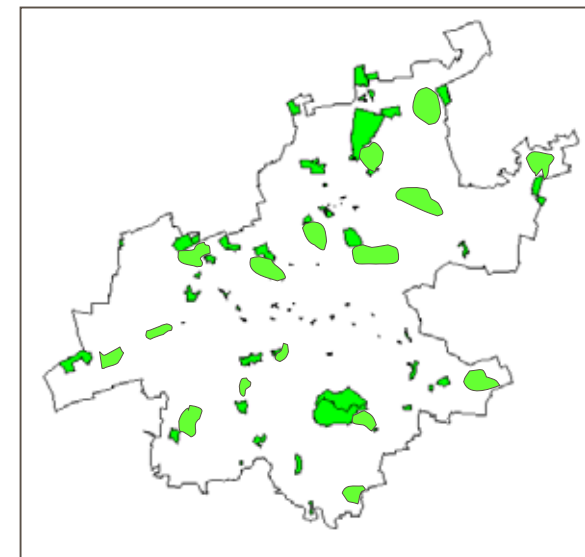
Biodiversity Information Management System

database

site database
site by feature database
feature database

site irreplaceability map

conservation plan

management & policy strategies

Ridges layer

- ☞ Using a GIS digital elevation model, all ridges mapped.
- ☞ A histogram analysis of five major ridge systems in the province indicated that the minimum slope of a ridge is 5º (contour intervals of 20m at 1:50 000 scale).
- ☞ *Class 1 & 2 ridges*: Conserve 100% of all untransformed areas
- ☞ *Class 3 & 4 ridges*: Conserve 100% of all untransformed portions ≥4ha

■ Class 1
■ Class 2
■ Class 3
■ Class 4

Sensitivity classes
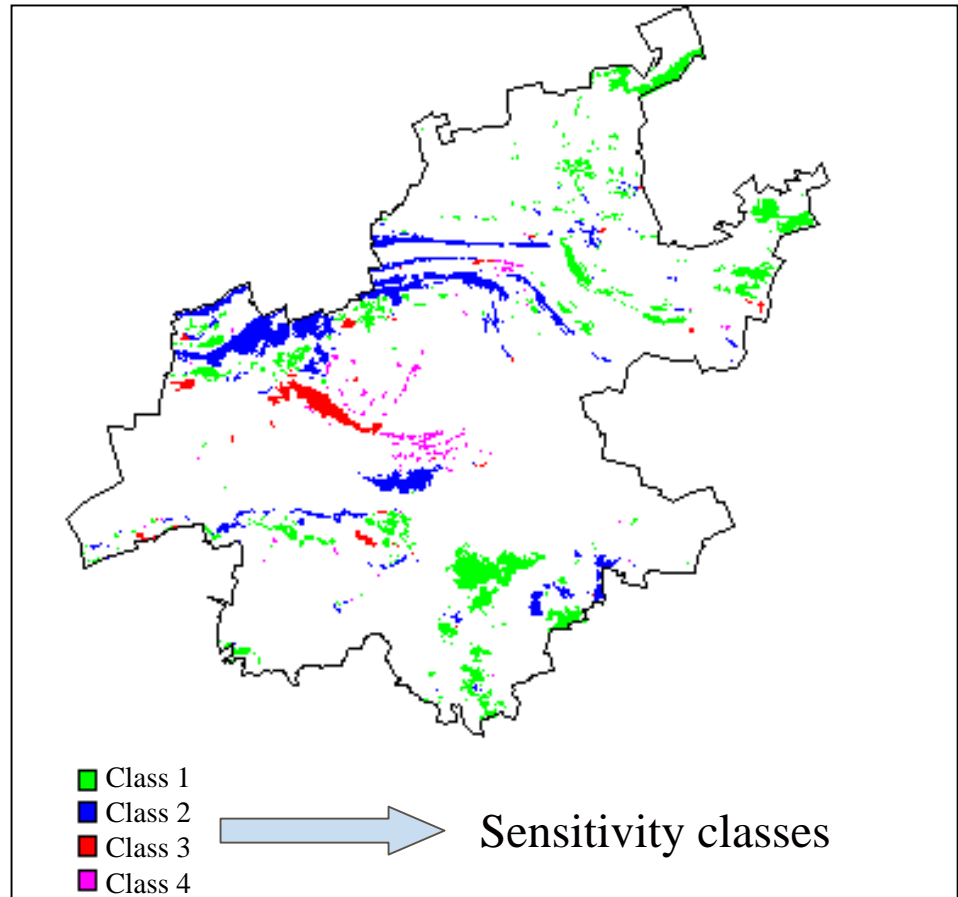
Rivers layer (Piet Müller)

✦ The National River Health Programme contributes to this layer.

✦ Involves the biological monitoring of all the aquatic drainage systems in Gauteng by means of standardized survey techniques.

◈ Riverine Vegetation Index: Surveying of riverine vegetation

◈ South African Scoring system version 4: Surveying of aquatic invertebrates

◈ Fish Assemblage Integrity Index: Surveying of fish populations

✦ Target: Conserve 100% of all rivers.

✦ 100m buffer against edge effects and for rough approximation of 1:100 year floodline.

Wetland layer (Reggy Nkosi)

✦ Current GIS data on wetlands in Gauteng obtained from

   ◈ 1:50 000 maps
   ◈ Aerial photographis
   ◈ Orthophotos
   ◈ 2000 Landcover wetland mapping project

   will be updated and verified.

✦ Target: Conserve 100% of all wetlands.
✦ 100m buffer against edge effects and for rough approximation of
   1:100 year floodline.

Flora layer (Michèle Pfab)

Plant communities

- All untransformed natural/semi-natural vegetation in Gauteng classified into component plant communities using LANDSAT 7 satellite imagery and ground truthing.
- All Red Data plant populations in Gauteng mapped using a GPS and suitable habitat modeled.
- The vegetation type/community and species/population layers combined in a GIS to form flora diversity layer.

RD plant populations
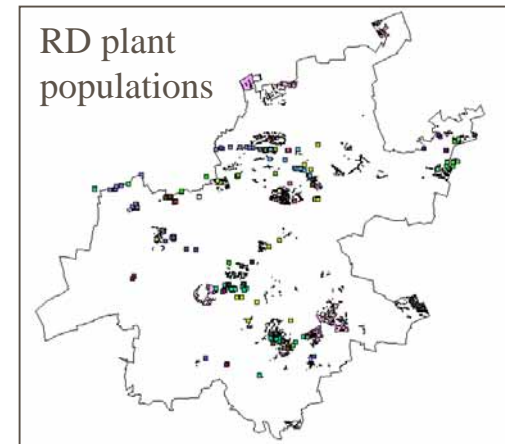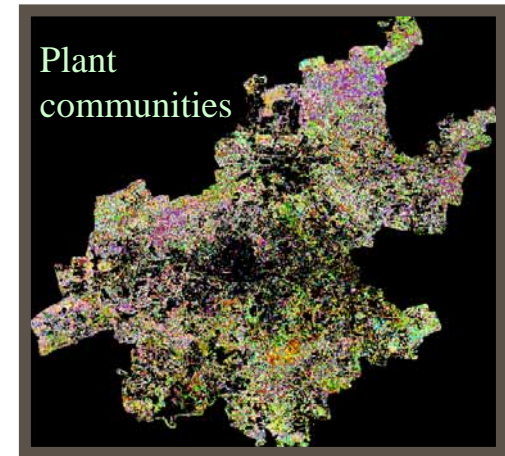
Invertebrate layer (Marianne Forsyth)

✦ Targets threatened and endemic species as well as functional groups (pollinators, seed dispersers, predators, biomass and soil workers).

✦ Sampling using baited pitfalls, vegetation sweeps, malaise trapping, aerial sweeps, baited butterfly traps, night light traps, hand collection and honeybee catch boxes.

✦ Identification of material to genus and species level outsourced to experts.

Heidelberg copper butterfly
HEIDELBERG

Birds, reptiles & amphibians layer (Craig Whittington-Jones)

- All existing information collated.
- Species prioritized using criteria such as endemism, Red Data status and conservation importance in Gauteng.
- All habitat types in each quarter degree grid square sampled at least once from October to April of each year.
- Surveying of reptiles and amphibians involves both active and passive capture techniques.
- A bird atlas underway in co-operation with BirdLife South Africa and local Gauteng bird clubs. Field surveys of birds involve line transects through each habitat type.

Mammal layer (Dean Peinke)

Juliana's golden mole
BRONBERG

✦ All existing information collated.

✦ All naturally occurring free-ranging mammal species prioritized.

✦ All habitat types in each quarter degree grid square sampled at least once from October to April of each year.

✦ Shrews, elephant shrews and small rodents sampled using small mammal traps.

✦ Mole traps set in areas where mole activity is observed.

✦ At least four hours a night allocated to bat sampling using the Anabat II bat detector and mist netting.

✦ Small and large carnivore traps set at suitable sites.

✦ Spotlight surveys for nocturnal species.

✦ All diurnal species encountered during active searches recorded as well as spoor, droppings, feeding signs, burrows, etc.

✦ Habitat suitable for Red Data species afforded specific attention.

Threat layers

 ✦ Agricultural potential
 ✦ Climate change
 ✦ Habitat transformation
 ✦ Invasive fauna and flora
 ✦ Medicinal plant use (Pat Matsau)
 ✦ Mining
 ✦ Pollution
 ✦ Roads (future)
 ✦ Urban development
 ✦ Varroa infestation
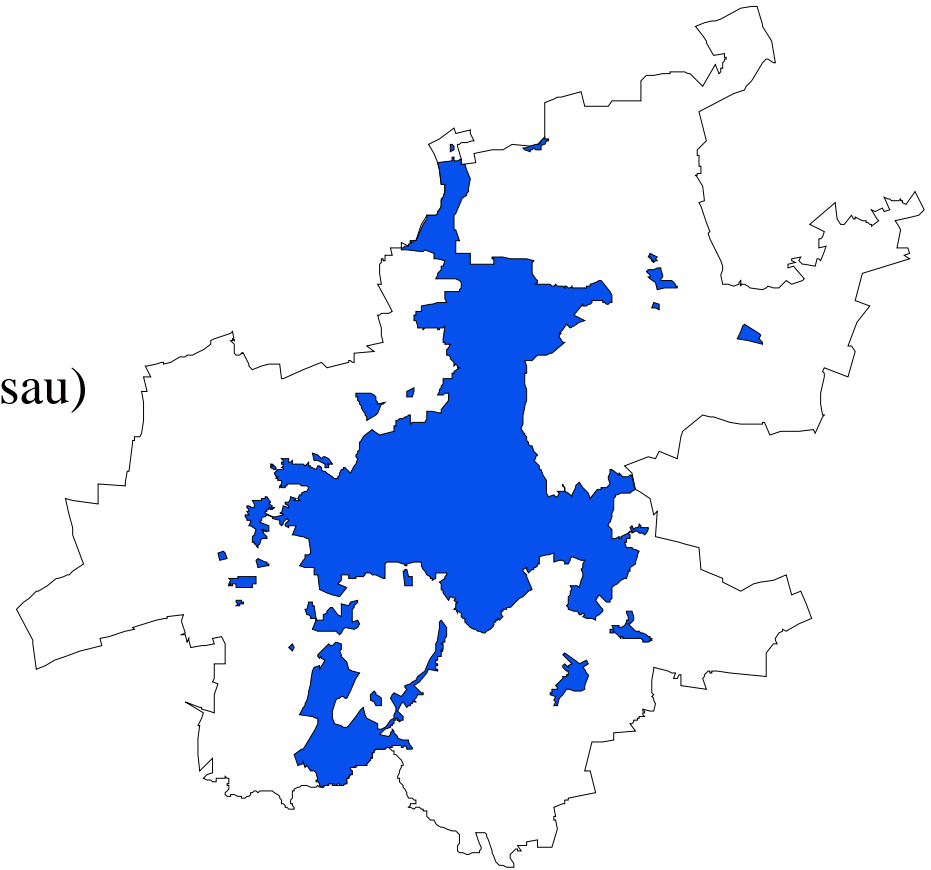
# **<u>Systematic conservation planning protocol</u>**

1. Features to be used as surrogates for overall biodiversity selected.
2. Explicit goals, translated into quantitative operational targets, set.
3. Extent to which conservation goals met in existing reserves determined.
4. Simple, explicit methods used for locating and designing new reserves to complement existing ones in achieving goals.
5. Explicit criteria for implementing conservation action on the ground applied.
6. Explicit objectives and mechanisms for maintaining conditions within reserves adopted, together with monitoring and adaptive management as required.

Irreplaceability

☞ Inherent in any data set, irreplaceability is the major constraint on selecting new areas to achieve representation targets not met by existing conservation areas.

☞ The irreplaceability map produced through the C-plan exercise indicates for each of the areas in a planning region the options for replacing it while still achieving conservation targets.

☞ Irreplaceable areas have no replacements, whereas others have many.

☞ Choosing between alternative replacements can be based on land tenure, threatening factors, trade-offs between opportunity costs and biodiversity gain and the position of existing conservation areas in relation to alternatives.

☞ Areas characterized by high irreplaceability values and high vulnerability ratings should receive priority conservation action.
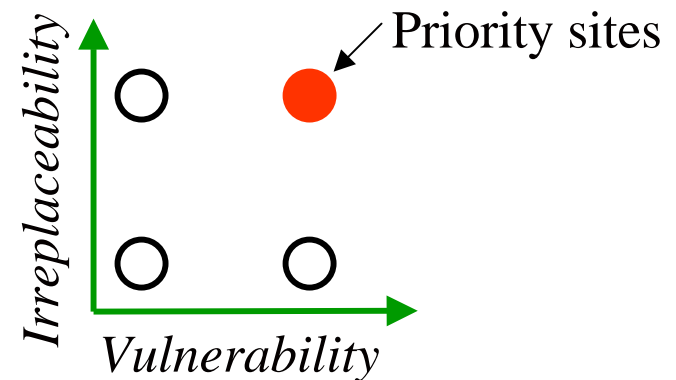
Conservation plan: Version 1

Legend:
- 🟥 Irreplaceable
- 🟦 Important
- 🟩 Conservation areas
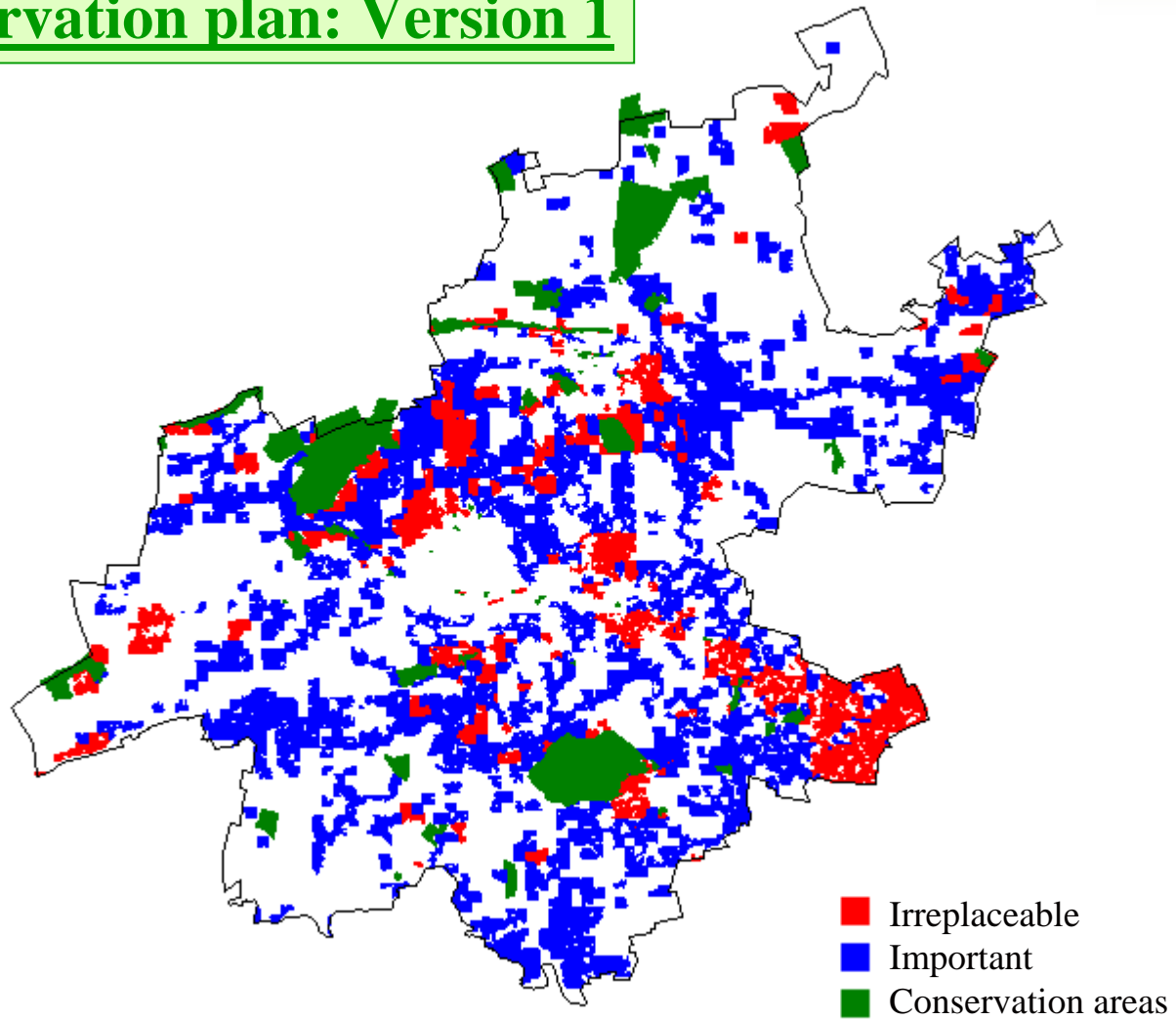
PROJECT OUTPUTS

A Gauteng conservation plan indicating areas important for the conservation of biological diversity where/that:

☞ New provincial nature reserves or other legislated protected areas should be established.

☞ Conservancies or natural heritage sites or other community-based conservation projects should be established.

☞ Strategic Environmental Assessments are required.

☞ Increased policing i.t.o. the Nature Conservation Ordinance, NEMA and ECA is required.

☞ Should be listed as sensitive environments in the schedules of the Gauteng provincial EIA regulations.

PROJECT OUTPUTS …

☞ Evaluations of the conservation status of threatened elements of biodiversity in the province.

☞ Biodiversity inventories for development hotspots in the province.

☞ Biodiversity inventories and management recommendations for conservation areas/reserves in the province.

☞ Incorporation of information into and updating of information contained within GOSP.

☞ Identification of gaps requiring further conservation research by external academic institutions.

PROJECT OUTPUTS …

Contribution towards:

☞ A Gauteng Conservation Information Database for use as a decision support tool by DACEL, other government departments, environmental consultants, the public and NGO's.

☞ The land-use planning process at local government level, e.g. IDP process.

☞ The fulfillment of the goals described in the White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity and future Biodiversity Act.

☞ The fulfillment of international obligations in terms of the Convention on Biological Diversity, the RAMSAR Convention, the Rio Convention and CITES.

☞ The development of provincial policies for the conservation and management of biodiversity.

☞ Identification of management priorities for protected areas and informing the contents of management plans.

TIME FRAME

Project initiated: June 2001
Final report: end January 2007

Yearly schedule:

September - June	☞Fieldwork
	☞Transfer of collected data to Environment on monthly basis
May - September	☞Progress report and detailed planning for following season
	☞Revise conservation targets and vulnerability ratings
	☞Data capture within BIMS and C-plan
October – December	☞C-plan analysis
	☞Revised conservation plan
	☞Draft management and policy strategies