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Kruger National Park, South Africa: a global conservation icon

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Managing a large national park:

More than just animals

Kruger National Park
Mission Statement:

'.. to **maintain biodiversity**

in all its **natural facets and fluxes**,

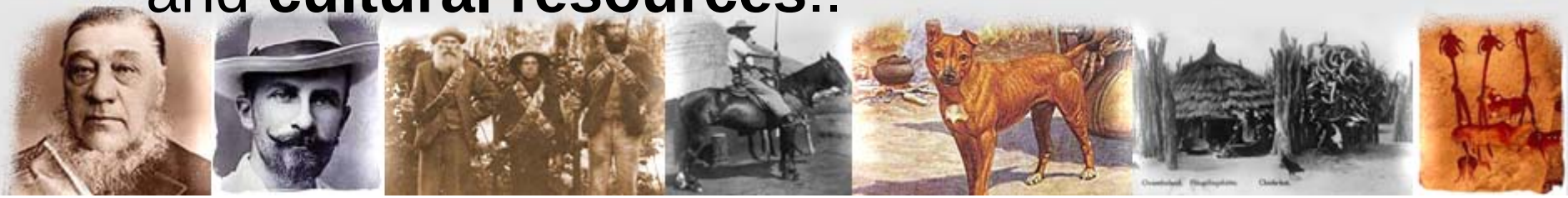
to provide **human benefits,**

build a **strong constituency**

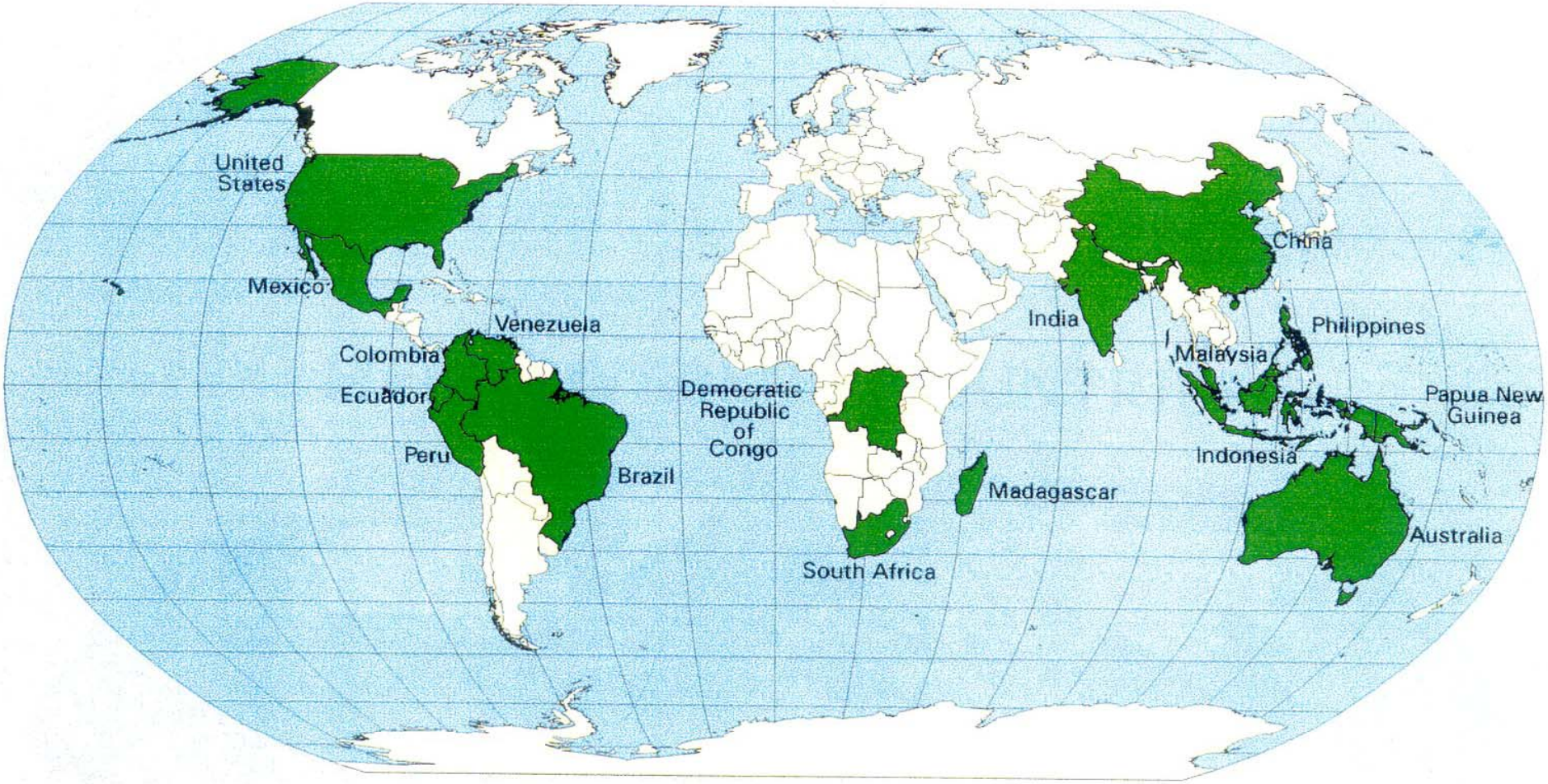
and to preserve as far as possible the

wilderness qualities

and **cultural resources**..'



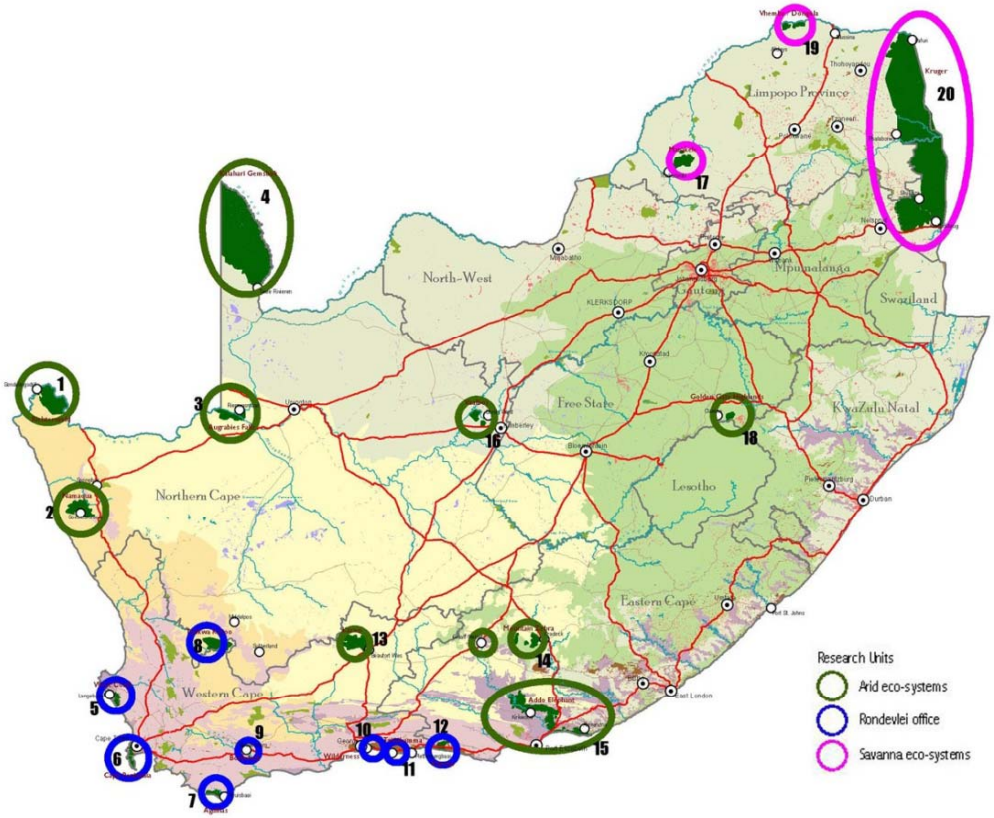
MEGADIVERSITY COUNTRIES

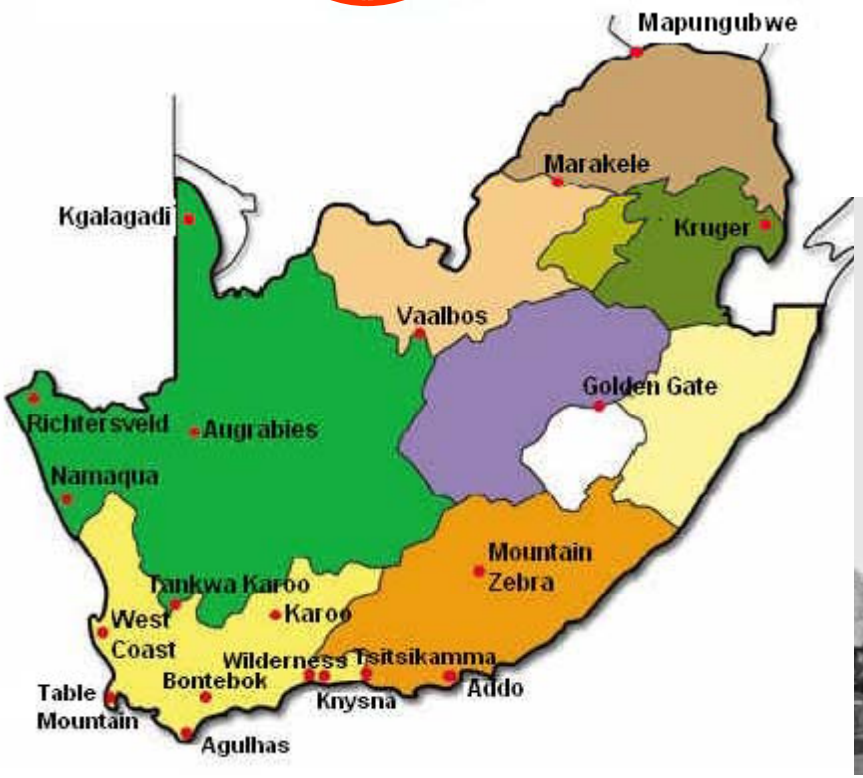


MEGADIVERSITY COUNTRIES: Just seventeen nations collectively claim within their borders more than two-thirds of the Earth's biological resources. These countries are also home to a major portion of the planet's cultural diversity. In terms of plant and animal species at risk, as much as 80 percent of the world's most endangered biodiversity is found within the megadiversity countries.

CONSERVATION INTERNATIONAL

A BIO-DIVERSE COUNTRY





~ 1 221 037 km2
~ 55 million people
9 provinces

Wales 20,767 km²

Israel 20,77 km²

Slovenia 20,273 km²

20,200 km²
(2 million ha)

380 km N-S

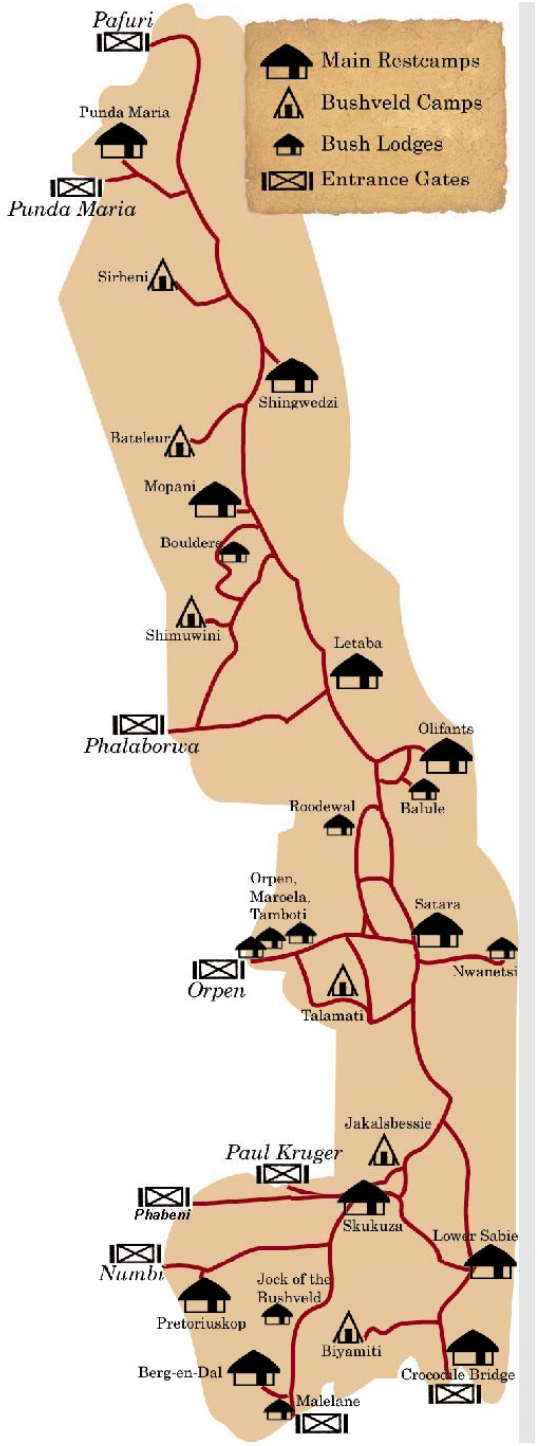
9 hrs drive N-S

60 km E-W

3,300 employees

1,3 million visitors a year

17 main tourist camps



Species Diversity

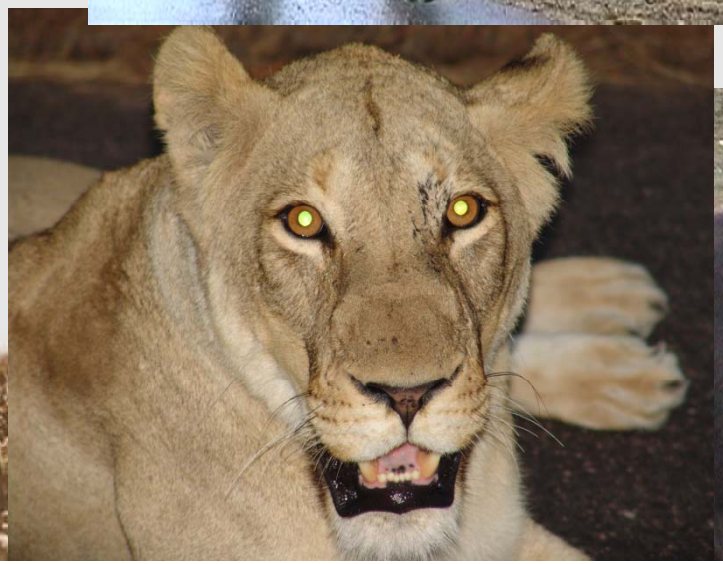
- Plants - 2 000 spp.
  - Woody Plants - 404 spp.
  - Grasses - 224 spp.
- Birds - 505 spp.
- Mammals - 147 spp.
- Reptiles - 117 spp.
- Fish - 50 spp.
- Amphibians - 34 spp.
- Invertebrates - Many thousands spp.

Ceratotherium simum

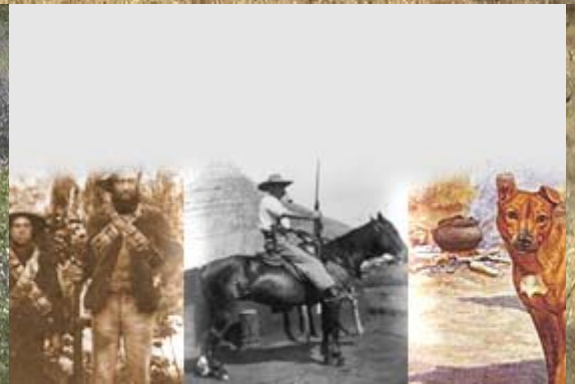
Panthera leo

Panthera pardus

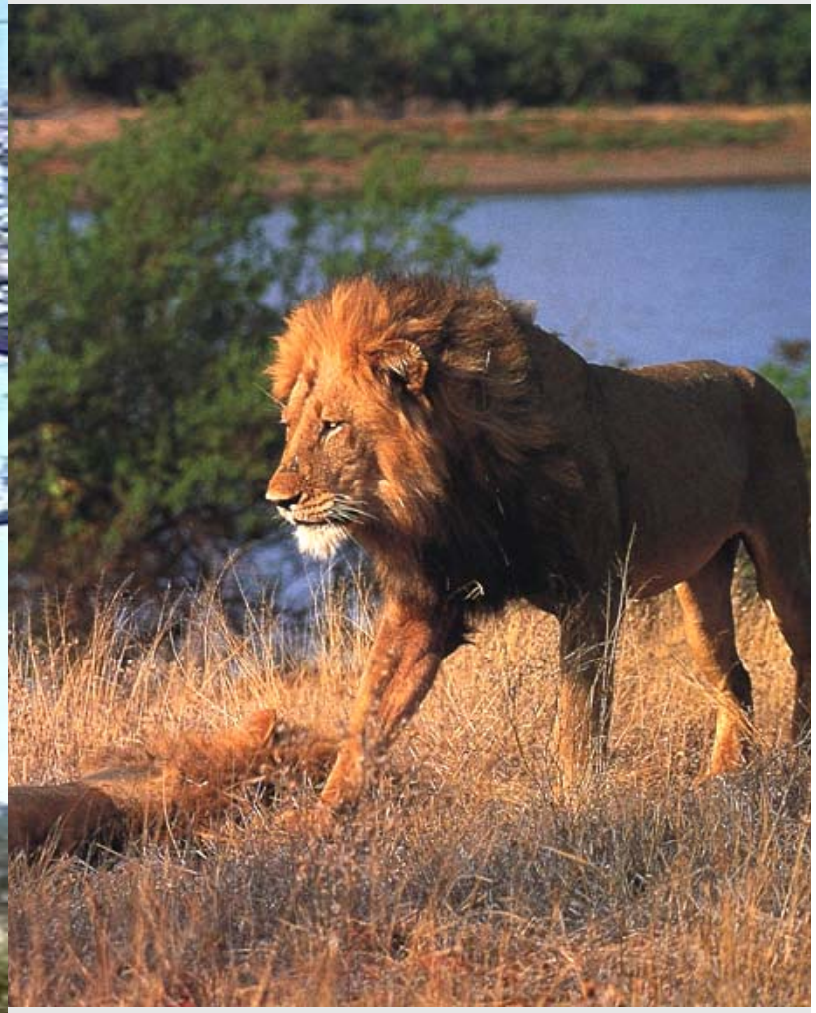
Loxodonta africana

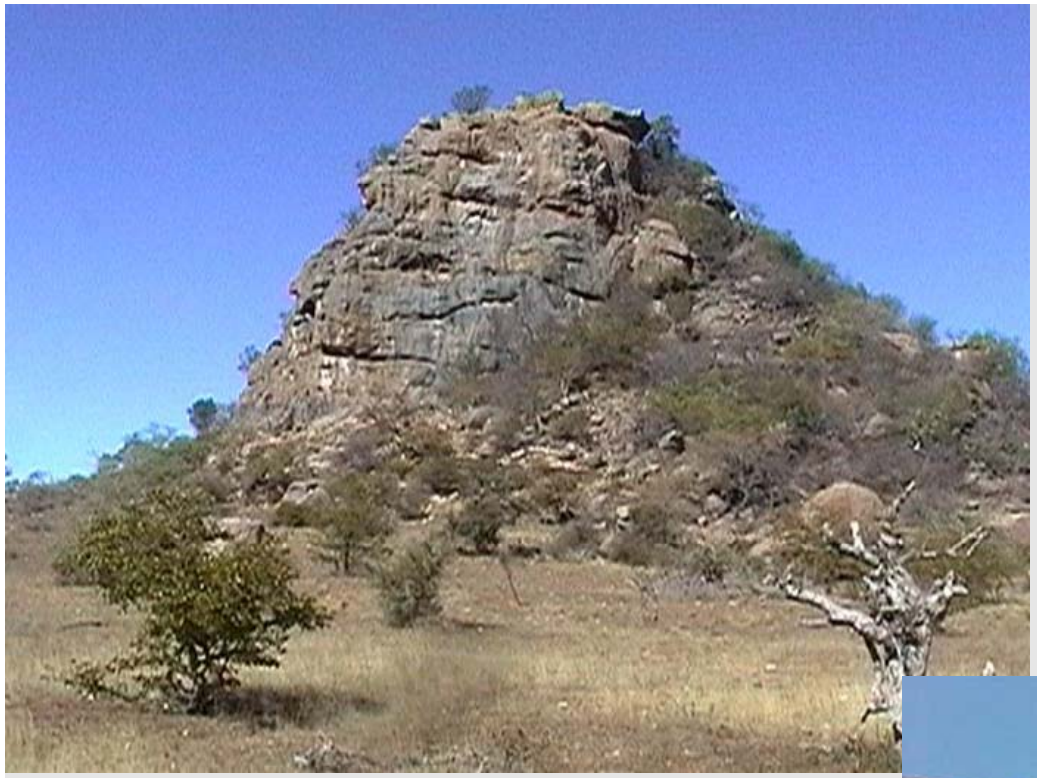


Syncerus caffer



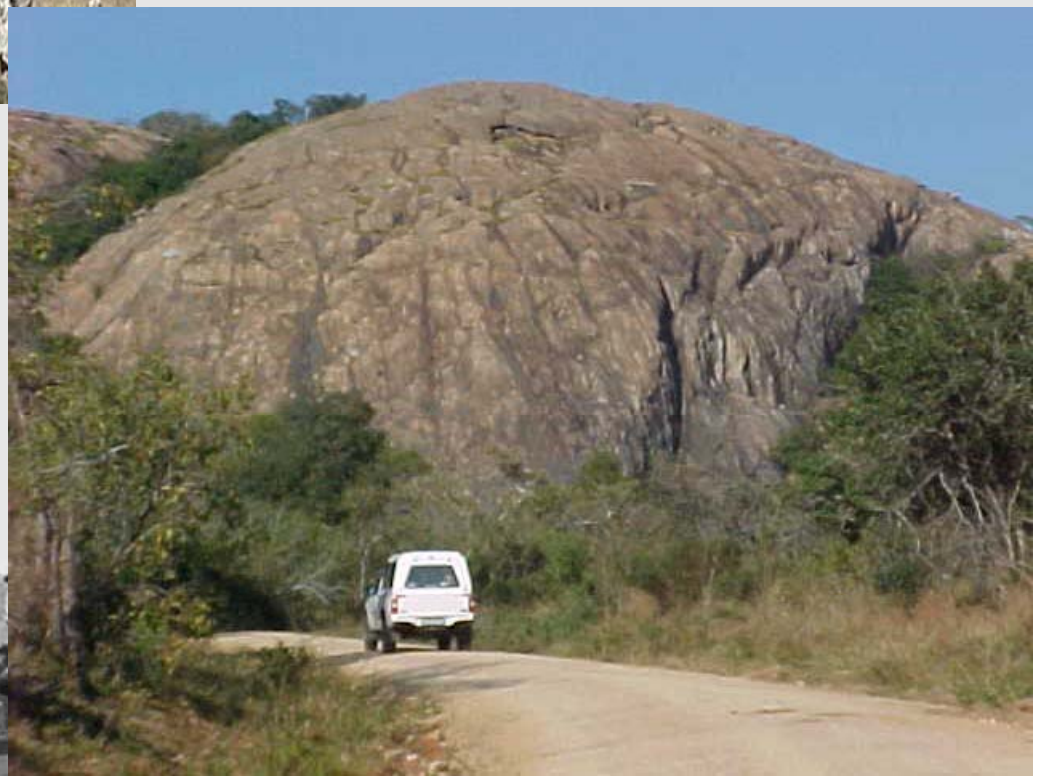
Adansonia digitata (baobab)





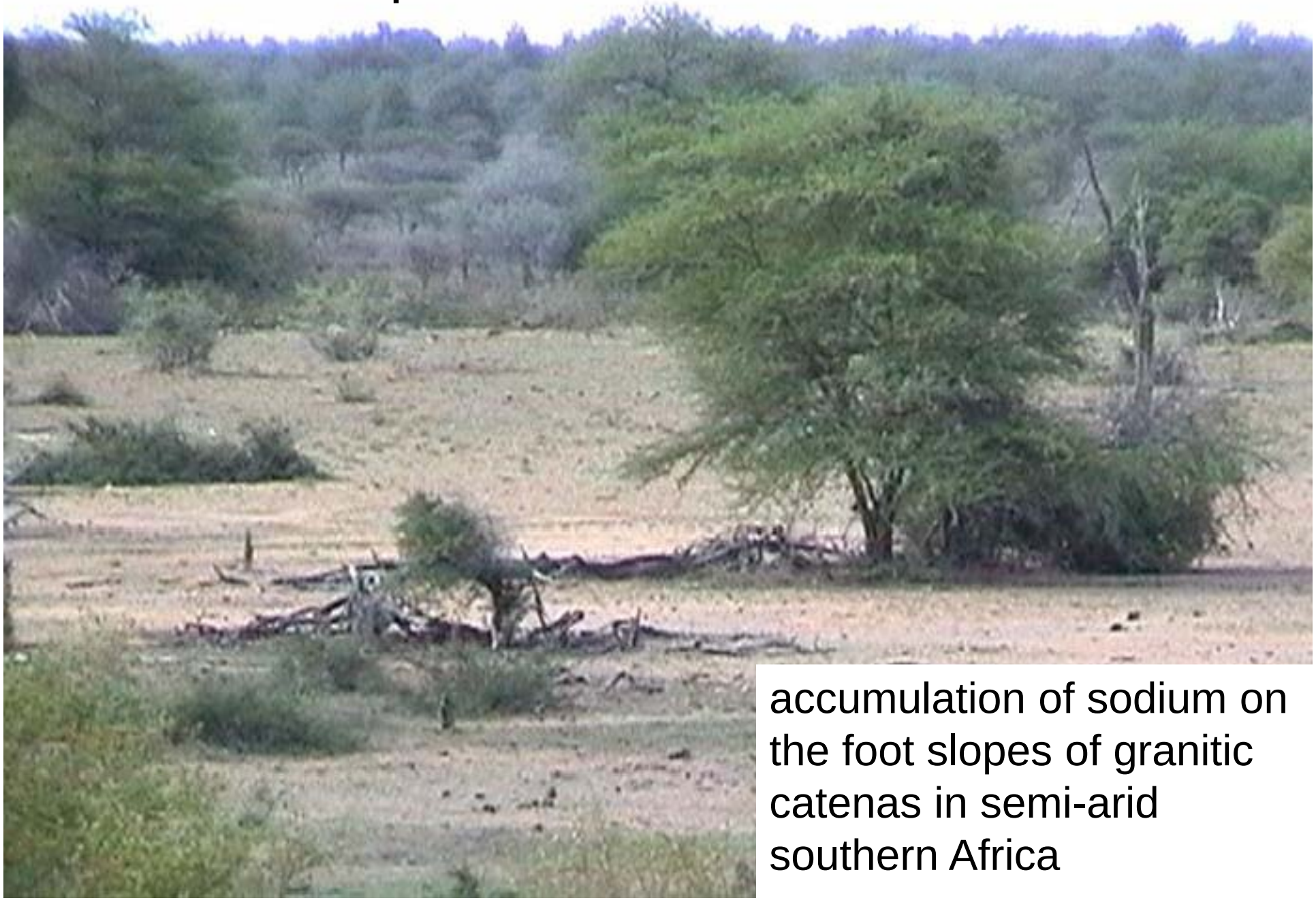
Landscapes

Granite hills

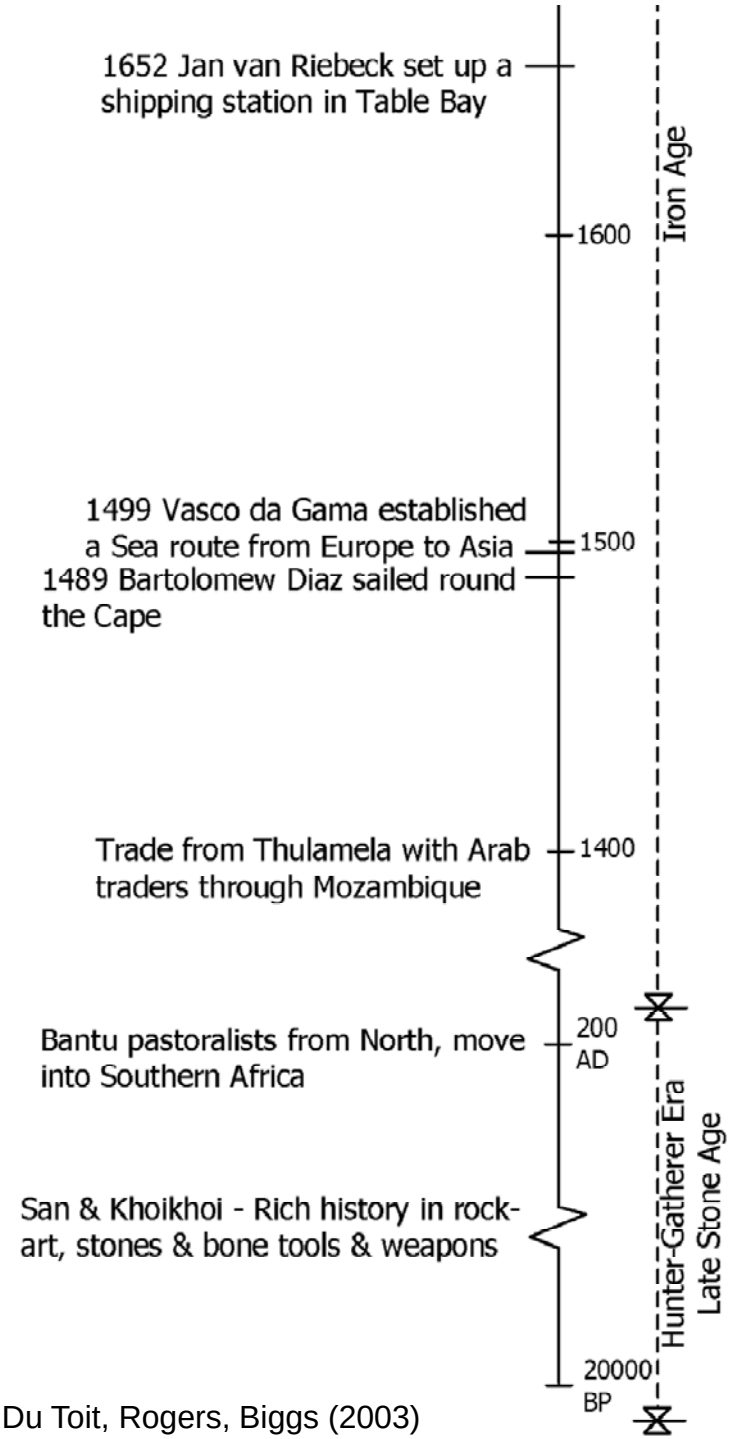


Sclerocarya birrea bush

Sodic sites / patches



accumulation of sodium on the foot slopes of granitic catenas in semi-arid southern Africa



Du Toit, Rogers, Biggs (2003)

Hunter-Gatherer period

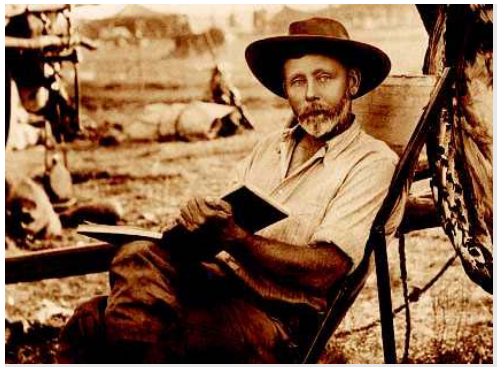
- Also called stone-age period because of stone tools used
- Stone-age people and the San had little impact on natural processes and populations
- Nomadic - followed migrating game herds
- They left a rich heritage in terms of their stone tools and rock-art paintings

Early Kruger

More than 300 archaeological sites of pre-modern man have been found

The Iron-age Period (200 AD - 1836)

- Settlement of black farmers in Lowveld from north
- Constructed villages, collected wood for fire and building material, cleared bush for grazing areas, prepared lands for agriculture, and stayed in an area until resources were depleted
- Formidable hunters, used fire and game pits to capture bigger animals
- Traded in ivory, gold & slaves with Arabs by the 12'th century AC (eg. 26,000 kg ivory in 1768 through Inhambane)
- "Difaqane" in early 1800's (King Shaka and Zulu wars)



The Colonial period: Pioneers & Hunters (1836-1902)

- Voortrekkers trekked out of Cape & settled in Transvaal
- Uncontrolled hunting for meat, skins and ivory decimated game populations.
- The first game laws were implemented in 1858 by the then Transvaal Republic.
- The Sabie Game Reserve was proclaimed in 1898.

1899 Start of Anglo-Boer War

1898 Sabie Game Reserve proclaimed

1896 Rinderpest Epidemic

1886 Gold rush to Johannesburg

1870 Diamond rush to Kimberley

1836 Trichardt trek Delagoa Bay

1835 Slavery abolished in Cape

1835 Start of Great Trek

1828 Shaka (Zulu ruler) killed

1820 British settlers arrived E Cape

Difaqane - State of continuous war amongst Black tribes

1725 F. De Cuiper - First recorded European in the Lowvled

1900

1800

1700

Colonial Period

1950 Research Section Established-KNP — 1950

1946 Stevenson-Hamilton retires

1939 Start of World War II — 1940

1933 First boreholes for game sunk

1930

1926 National Parks Act — 1925

1920

1914 Outbreak of World War I

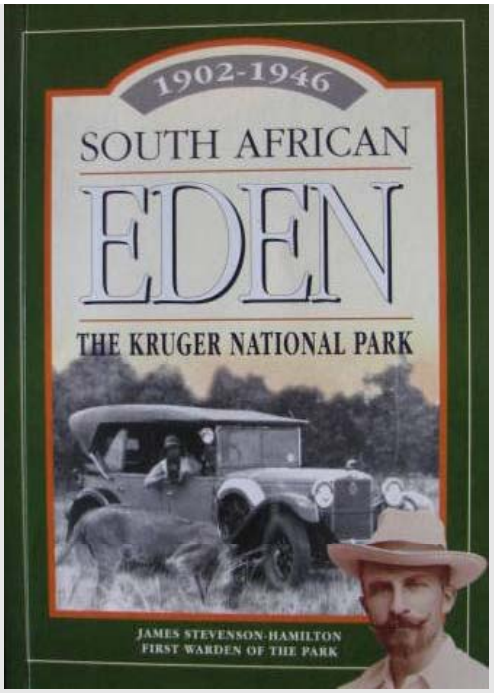
1910

1902 Stevenson-Hamilton appointed as Park warden

1902 End of Anglo-Boer War — 1900

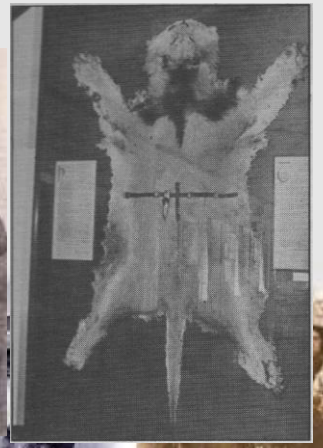
Creating a National Park

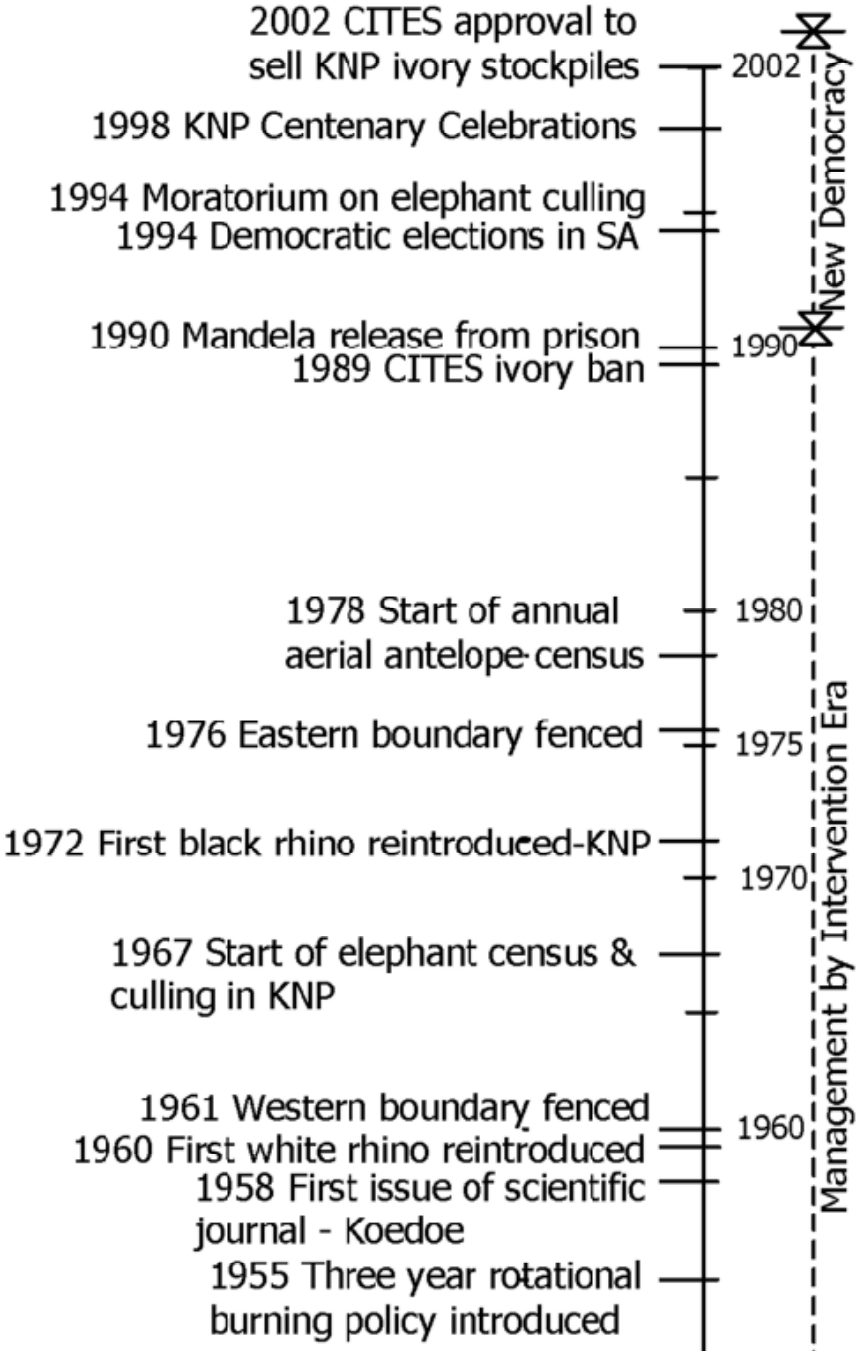
Game preservation Era



Game Preservation Era (1902-1925)

- Stevenson-Hamilton appointed as Warden in 1902.
- Emphasis was on rebuilding depleted game populations.
- Management actions included predator control and veld burning.
- Movement of black families out of reserve.
- S-H lobbied to create a National Park




2002 CITES approval to sell KNP ivory stockpiles
1998 KNP Centenary Celebrations
1994 Moratorium on elephant culling
1994 Democratic elections in SA
1990 Mandela release from prison
1989 CITES ivory ban
1978 Start of annual aerial antelope census
1976 Eastern boundary fenced
1972 First black rhino reintroduced-KNP
1967 Start of elephant census & culling in KNP
1961 Western boundary fenced
1960 First white rhino reintroduced
1958 First issue of scientific journal - Koedoe
1955 Three year rotational burning policy introduced
2002
1990
1980
1975
1970
1960
New Democracy
Management by Intervention Era

Creating a National Park (1926-1946)

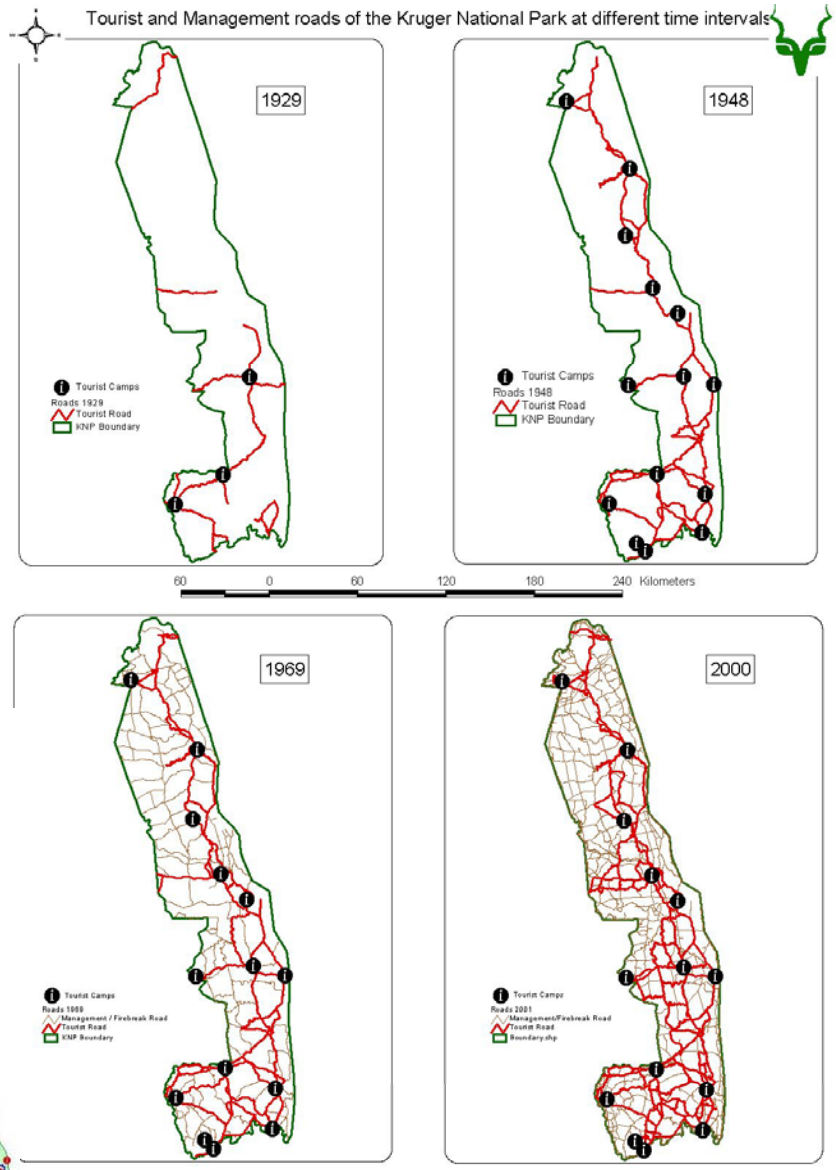
- National Parks Act promulgated in 1926.
- Public gained access – 1st 3 vehicles into Kruger in 1927
- Infrastructure created to accommodate tourism.
- Water provisioning for game started to distribute game more evenly.
- S-H retired in 1946 at age 79 after 44 years in KNP

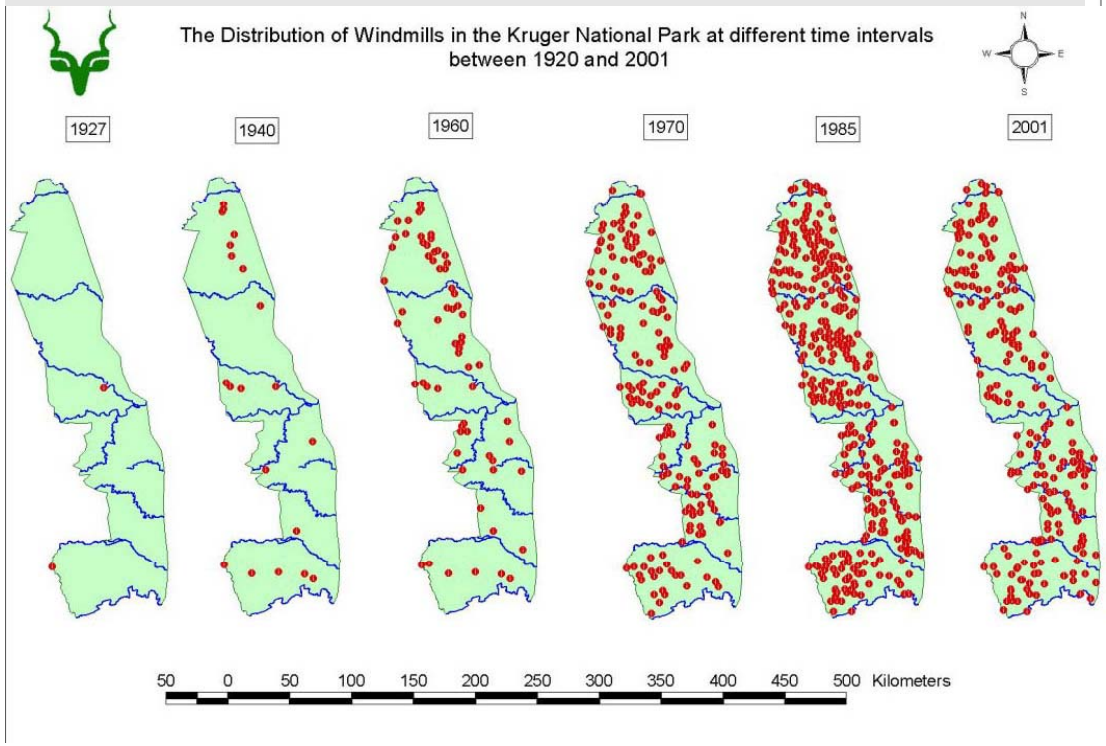
1927 first tourists

The Era of Management by Intervention (1946-1990)

- KNP Research section created in 1950.
- Baseline research and fire experiments started.
- Kruger Park was fenced for disease control purposes.
- Era of "Management by Intervention".
- Management actions were rotational burning, elephant culling and water provisioning.
- Segregation of black people from the environment due to politics.

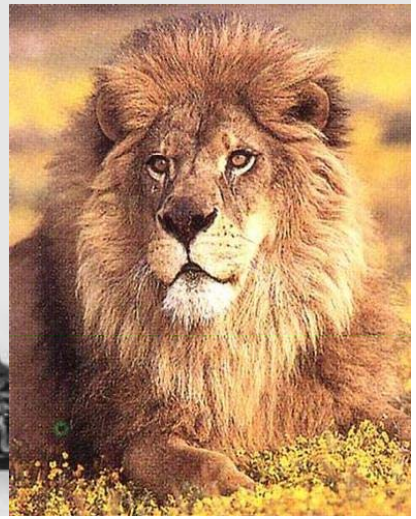
‘Management by Intervention’ Era (1946-1990)

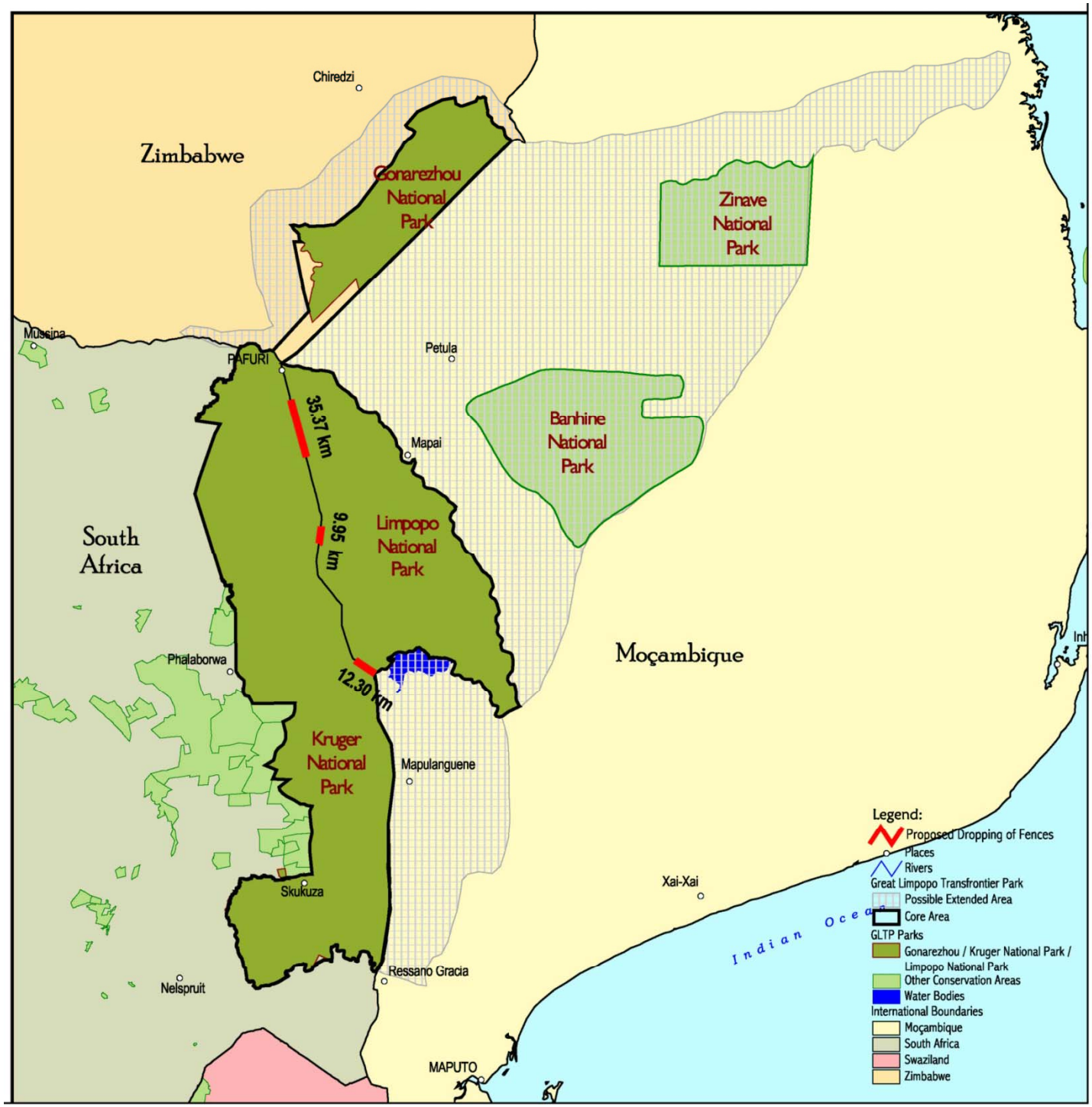




The new Democracy
(1990 – 2002)

- **First democratic elections in South Africa held in 1994**
  - Draft new management objectives
  - Draft new research programme
  - Changes in elephant, water and fire policies
  - Social Ecology section created in 1995
  - Greater Limpopo TFCA





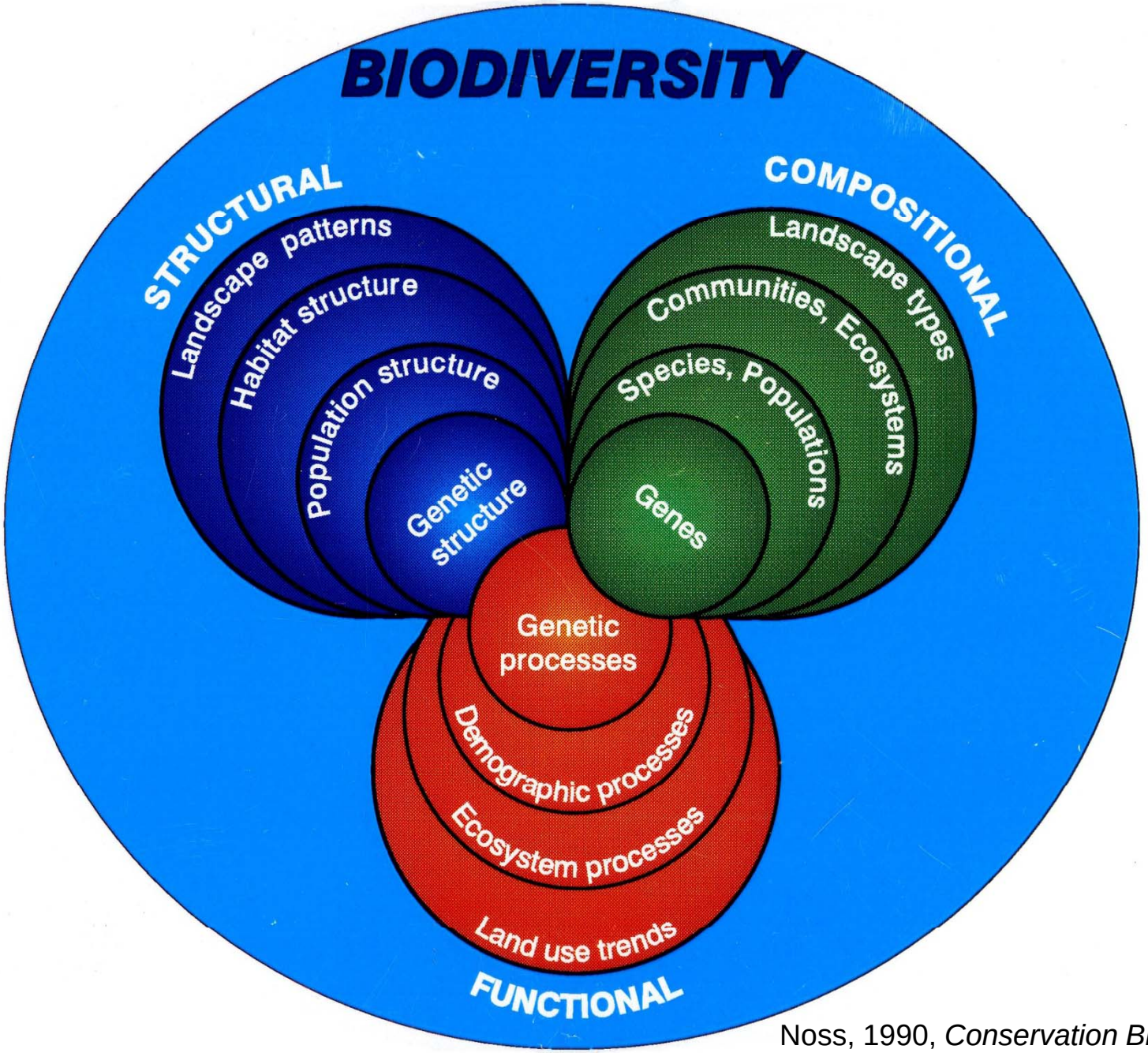
Peace Parks: Trans-frontier national parks

NEW MANAGEMENT EXPLICIT FOCUS:

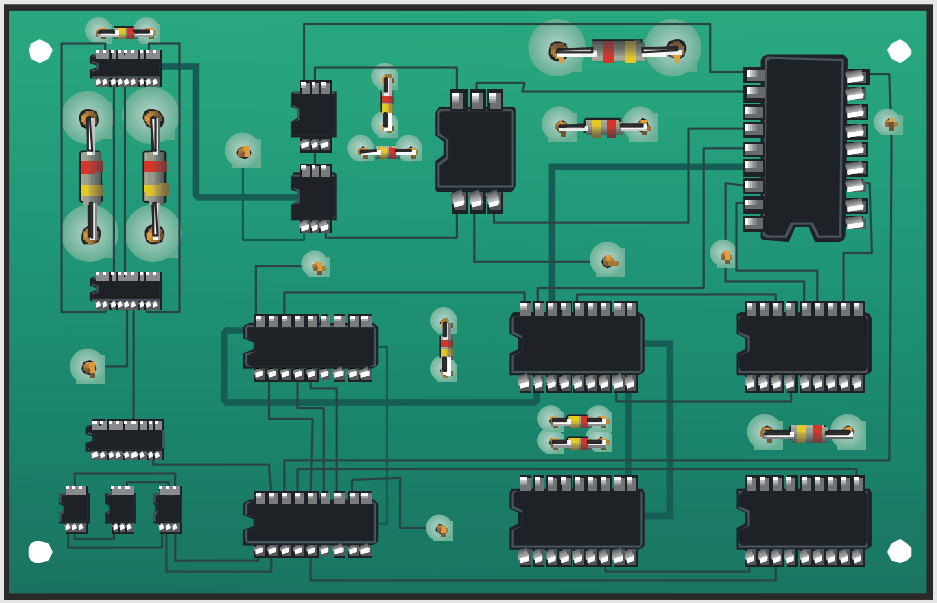
- Biodiversity,
- Heterogeneity,
- Dynamic systems
- Multiple space and time scale

- Ecosystems are complex –
  - the challenge of complexity & working in complex sociological ecosystems

- Kruger's desired state –
  - What is it?
  - how it is derived

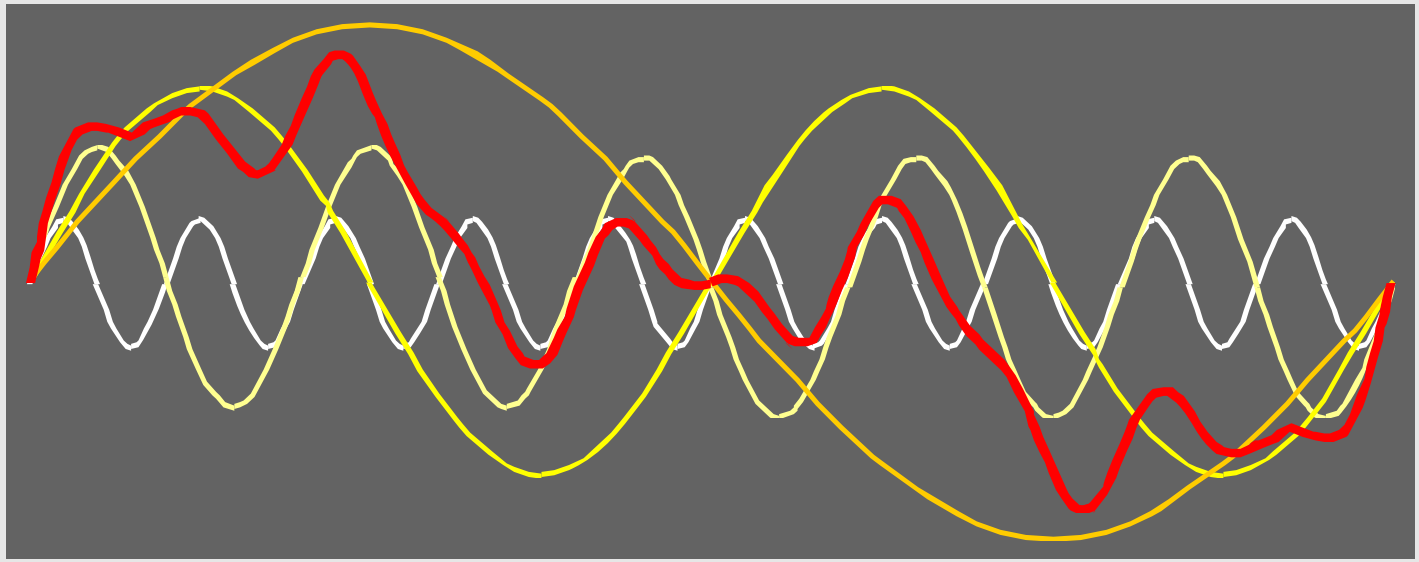


Noss, 1990, *Conservation Biology*



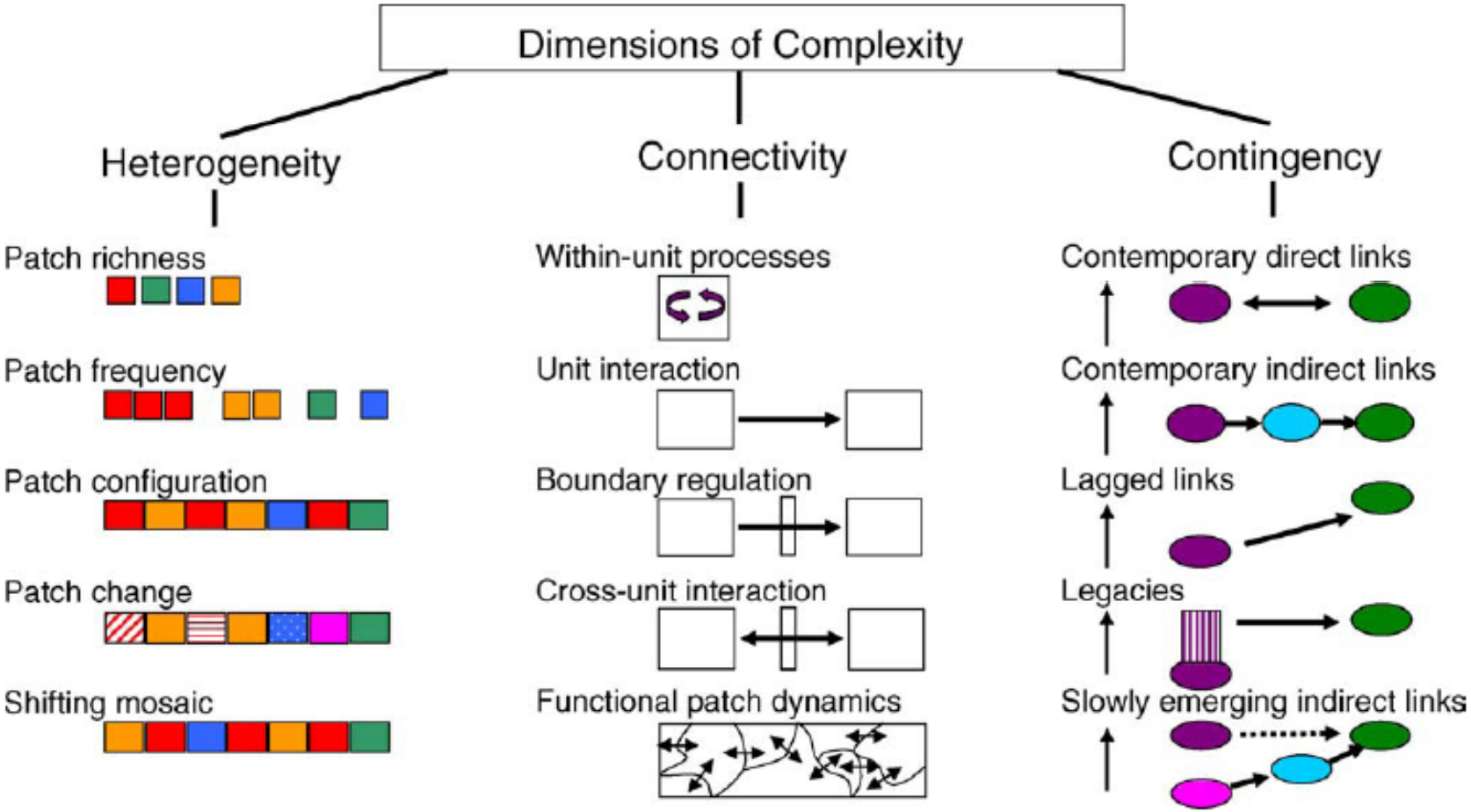
Complicated system:
Predict the outcome?
How you get there?
How it works?

➢ KNOWABLE



Complex system:
Predict the outcome?
What it looks like?
How you get there?

➢ UNCERTAINTY



(Cadenasso, Pickett, Groves 2006)

Biodiversity Values for SANParks

- We adopt a **complex systems view** of the world while striving to ensure the **natural functioning** and **long term persistence** of the **ecosystems** under our care.

- We aim at persistent achievement of **biodiversity representivity** and **complementarity** to promote **resilience** and ensure **ecosystem integrity**.

- We can **intervene in ecosystems responsibly and sustainably**, but we focus management on **complementing natural processes** under a "**minimum interference**" philosophy.

- We accept with humility the **mandate of custodianship** of biodiversity **for future generations** while recognising that both natural and social systems change over time.

How do we do this?

KNP Mission

Biodiversity Objectives

To maintain biodiversity in all its natural facets and fluxes.

- Ecosystem Objective
  - Atmospheric
  - Aquatic
  - Terrestrial
  - Alien Species
  - Rare Biota
- Legal and Statutory

Balancing Objectives

(= sustainable utilisation if defined broadly and holistically, e.g. Child)

To develop a thorough understanding of the integrated socio-ecological system (SES), especially in the regional context, for maintenance of a resilient SES and to balance human activities and development inside and around the KNP with the need to conserve ecosystem integrity and wilderness qualities by agreeing on a desired[1] set of future conditions, and by developing an adequate suite of principles and tools.

[1]These are (a) necessarily environmentally fluctuating and (b) realistic but aspirational

- Strategic Adaptive Management
- Balanced Development and Biodiversity Planning
- Appreciation and Inculcation of VSTEEP Framework
- Environmentally Responsible Practices
- Alignment of Business Operations and Plans

People Objectives

To provide human benefits and build a strong constituency, preserving as far as possible the wilderness qualities and cultural resources associated with the KNP.

- Tourism
- Wilderness
- Direct Human Benefits
- Constituency Building
- Cultural Heritage

Enabling Objectives

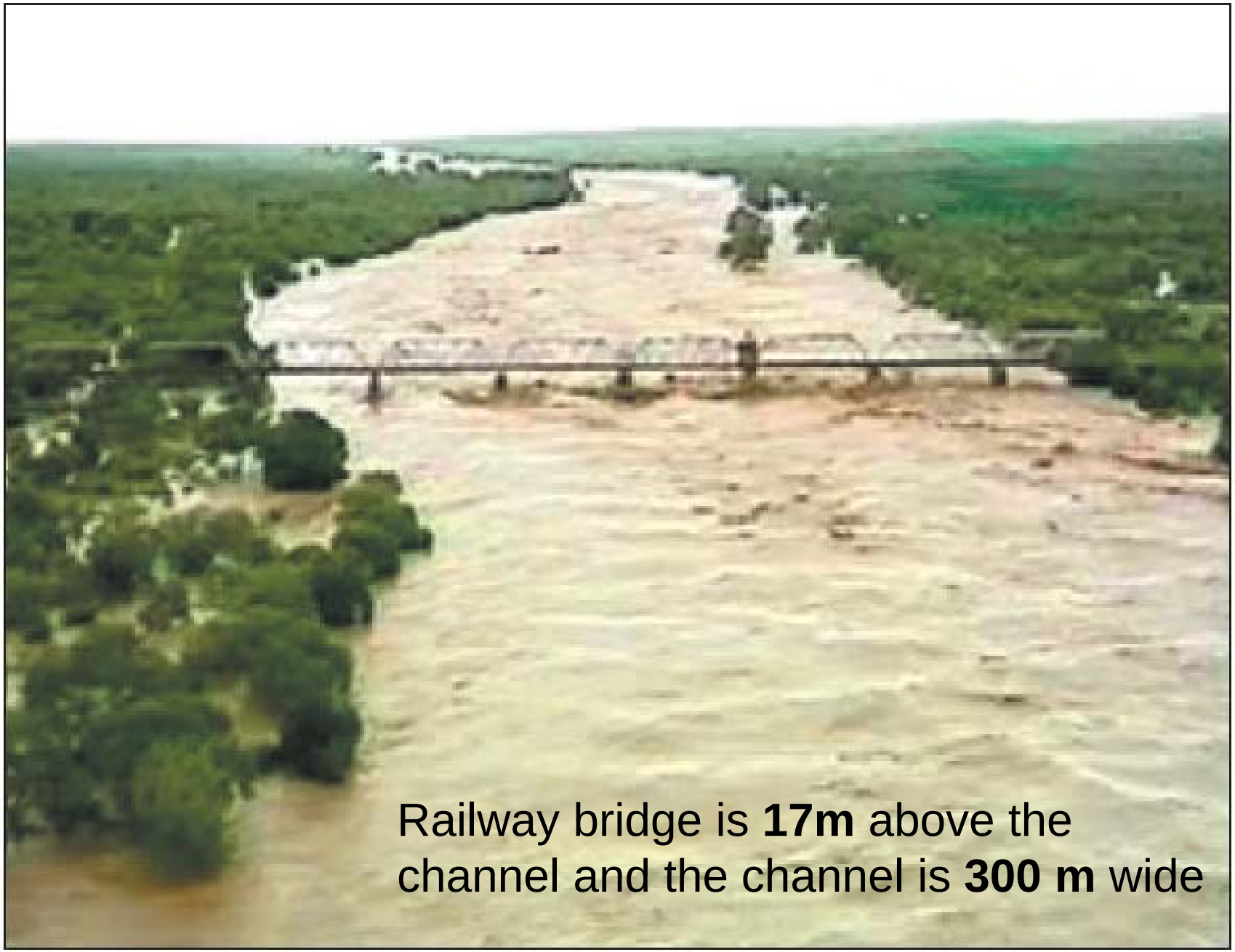
To provide cross-cutting support services which enable KNP to achieve the line function biodiversity and people objectives, and balance these effectively.

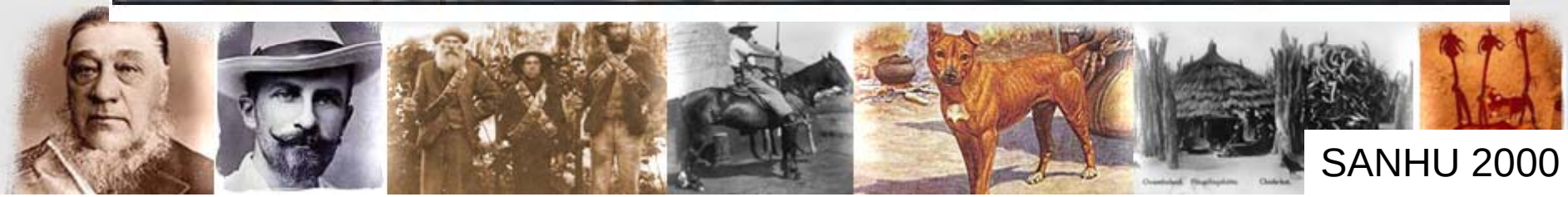
NB : must be cross-linked to and is subject to growth depending on further demands from the other three objectives.

- Communication
- Infrastructure
- Human Resources
- Financial Resources
- Administration
- Knowledge Resource Management
- Core Subject-specific Support

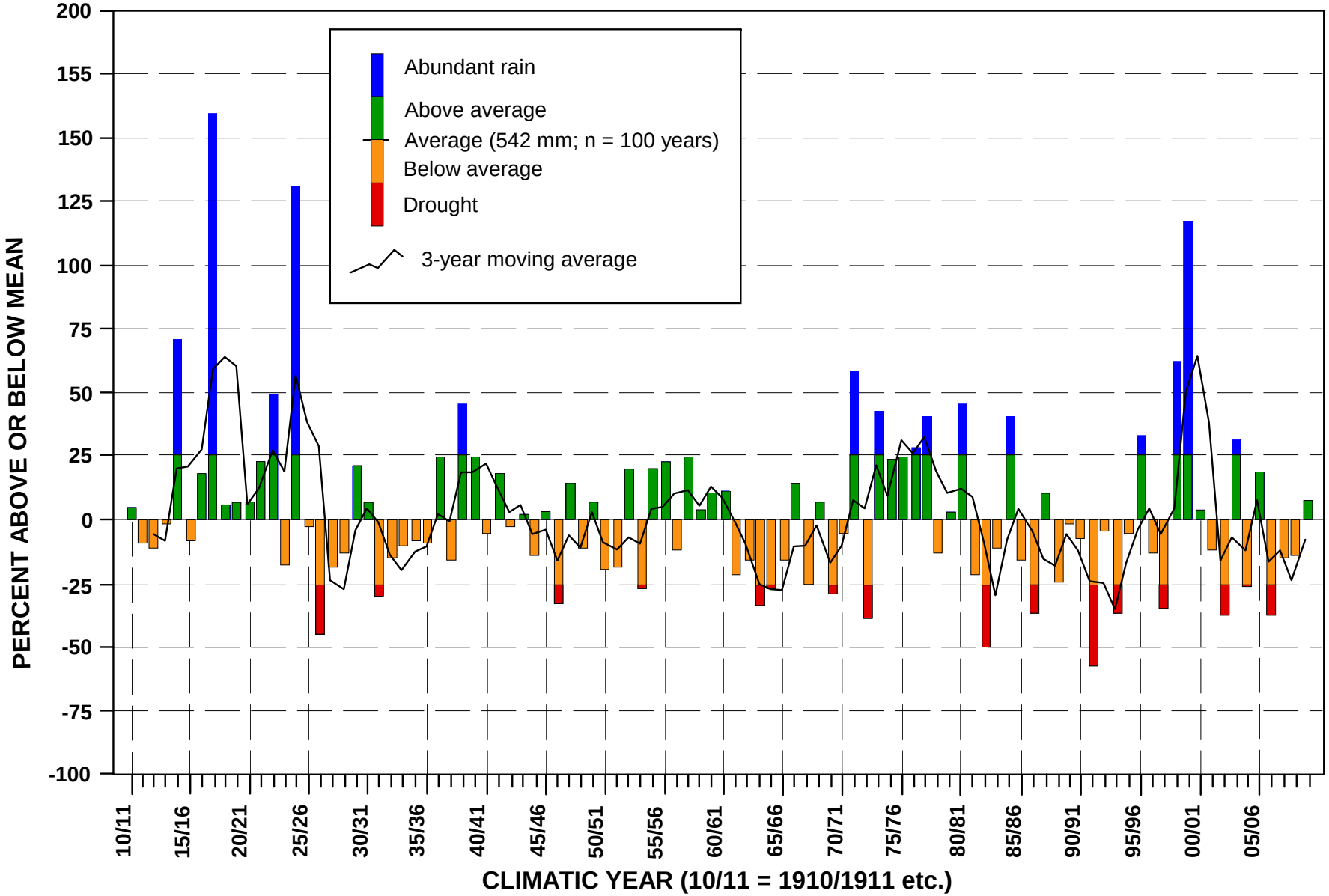
Dynamic ecosystem: 2000 Flood Sabie River 1:100

SANHU 2000


Railway bridge is **17m** above the
channel and the channel is **300 m** wide



SANHU 2000

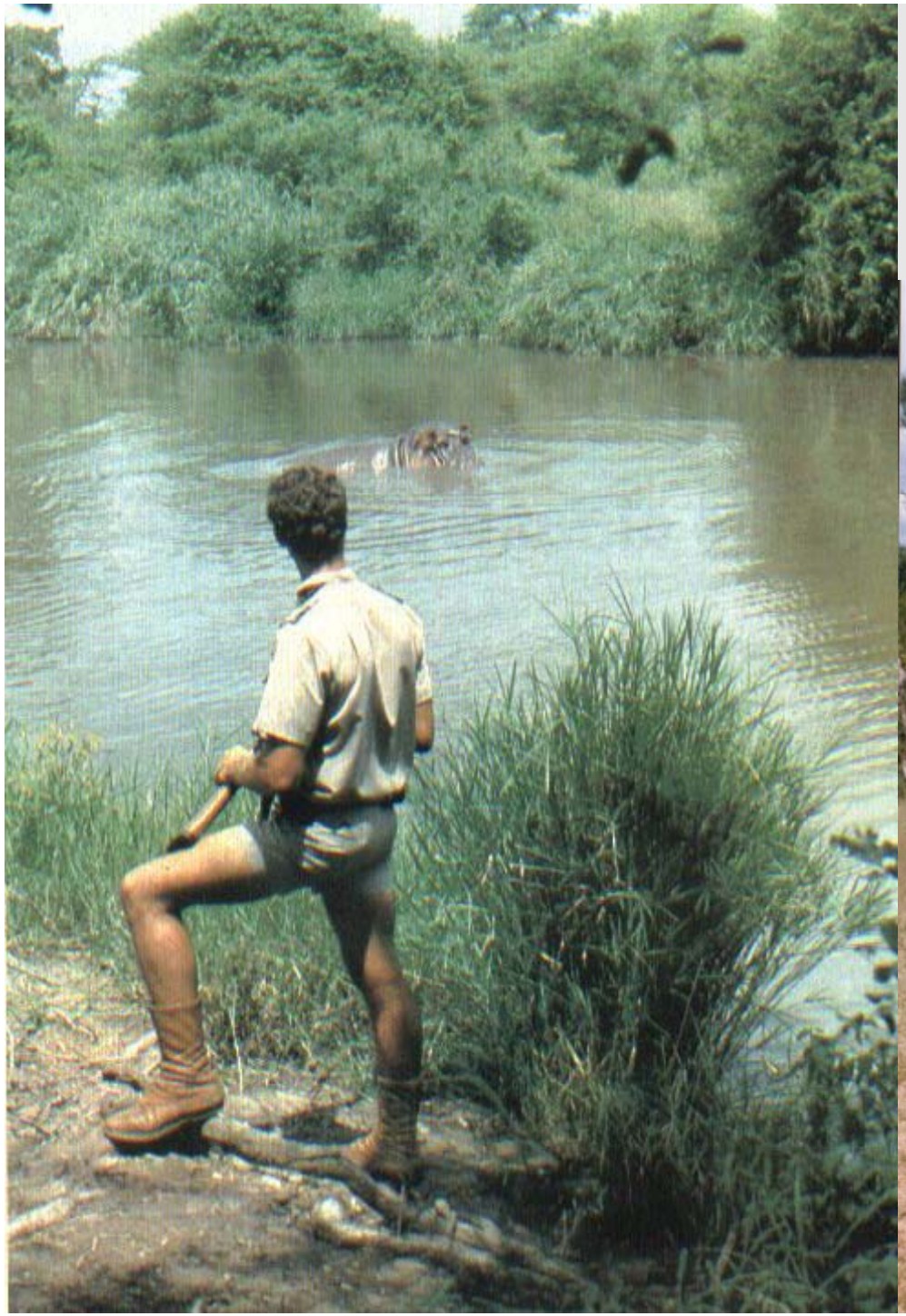


ANNUAL RAINFALL DEVIATION FROM THE LONG-TERM MEAN ANNUAL TOTAL (100 YEARS)

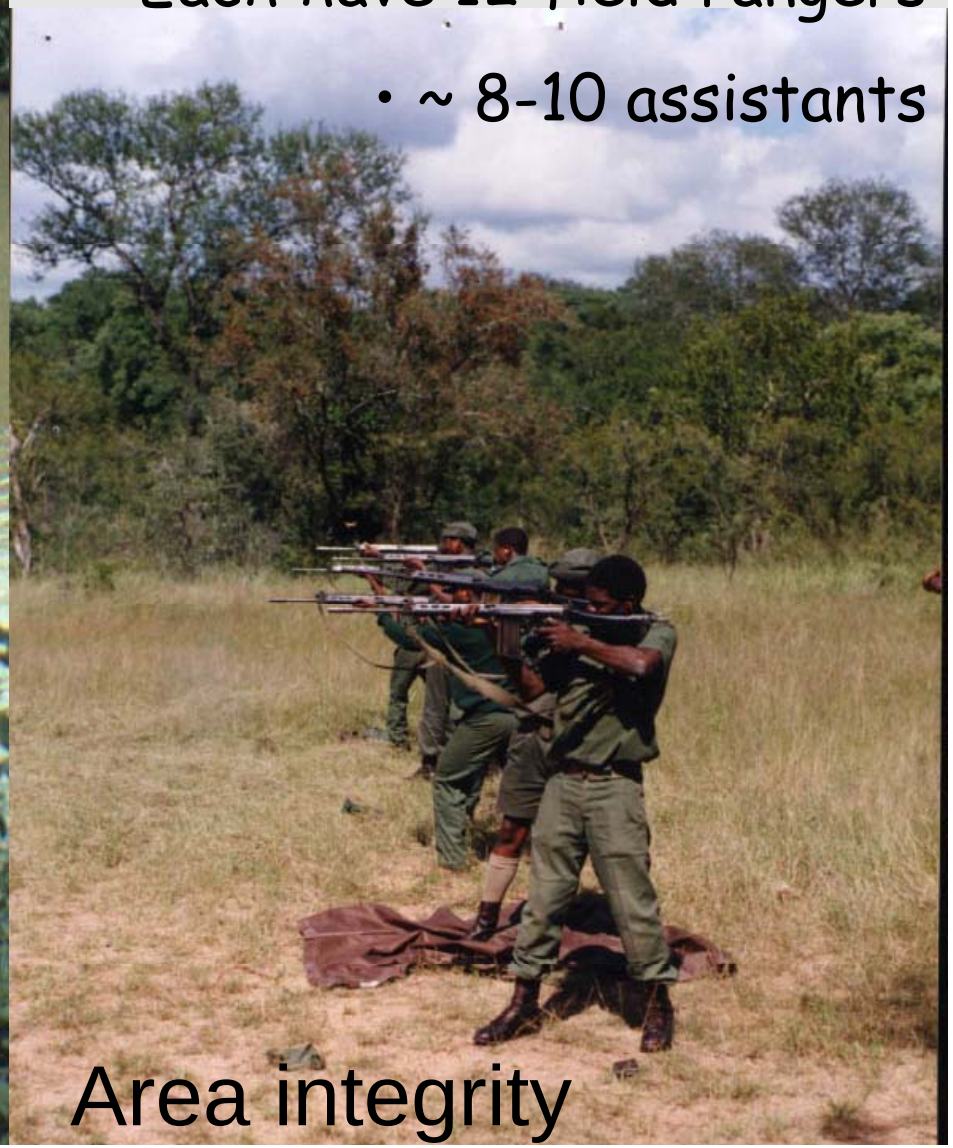
(N ZAMBATIS 2010)

Activities and divisions of KNP

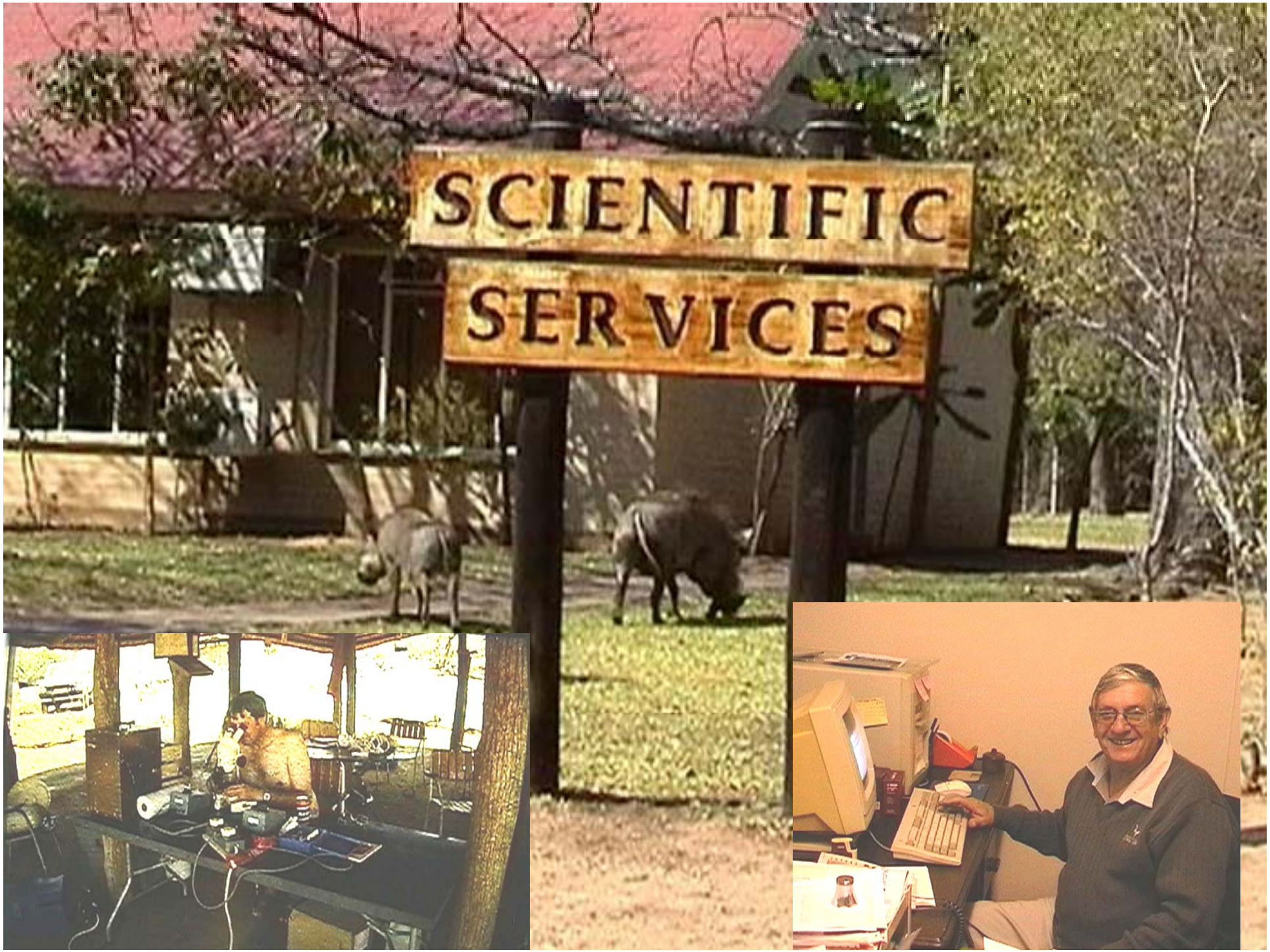
Requirements for managing a large protected area



- 22 ranger posts
- Each manage ~100 000 ha
- Each have 12 field rangers
- ~ 8-10 assistants

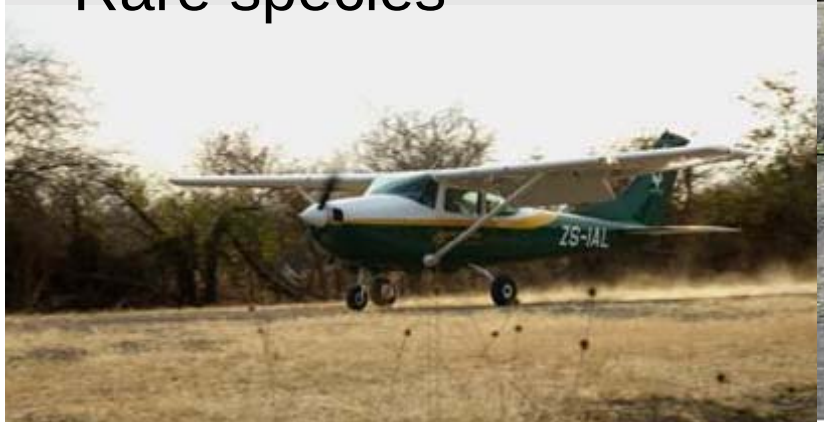


Area integrity


SCIENTIFIC
SERVICES

Aerial census:
Elephant,
Rhino,
Buffalo,
Other spp.

Population number
Herd size &
Structure
Disease
Drought
High rainfall years
Rare species

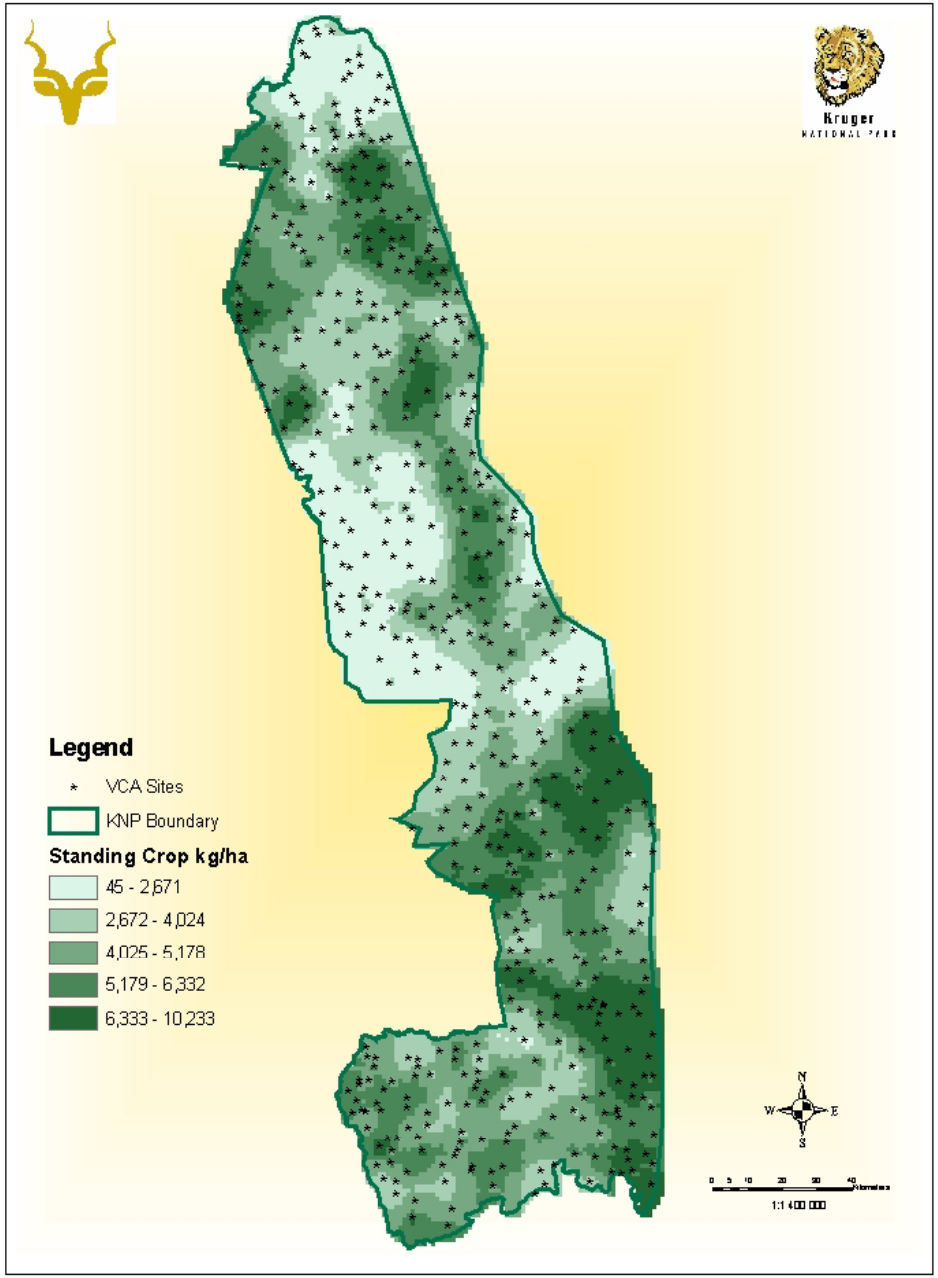


Vegetation monitoring

~ 500 sites

- Range condition
- biomass
- grass species composition
- Grass / forb ratio

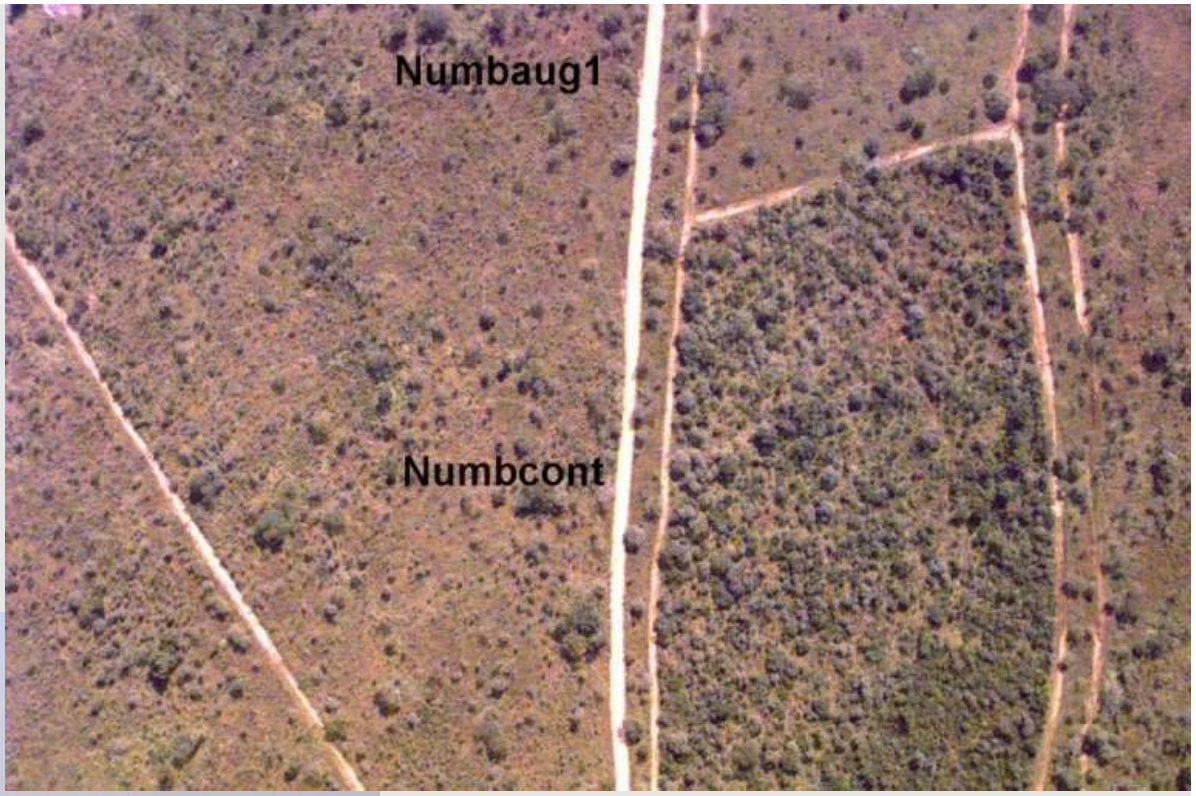
Veld Condition Assessment Sites and Interpolated Biomass for the Kruger National Park



THE ROLE OF FIRE IN SAVANNAS

THE ROLE INTENSITY, FREQUENCY, SEASONALITY

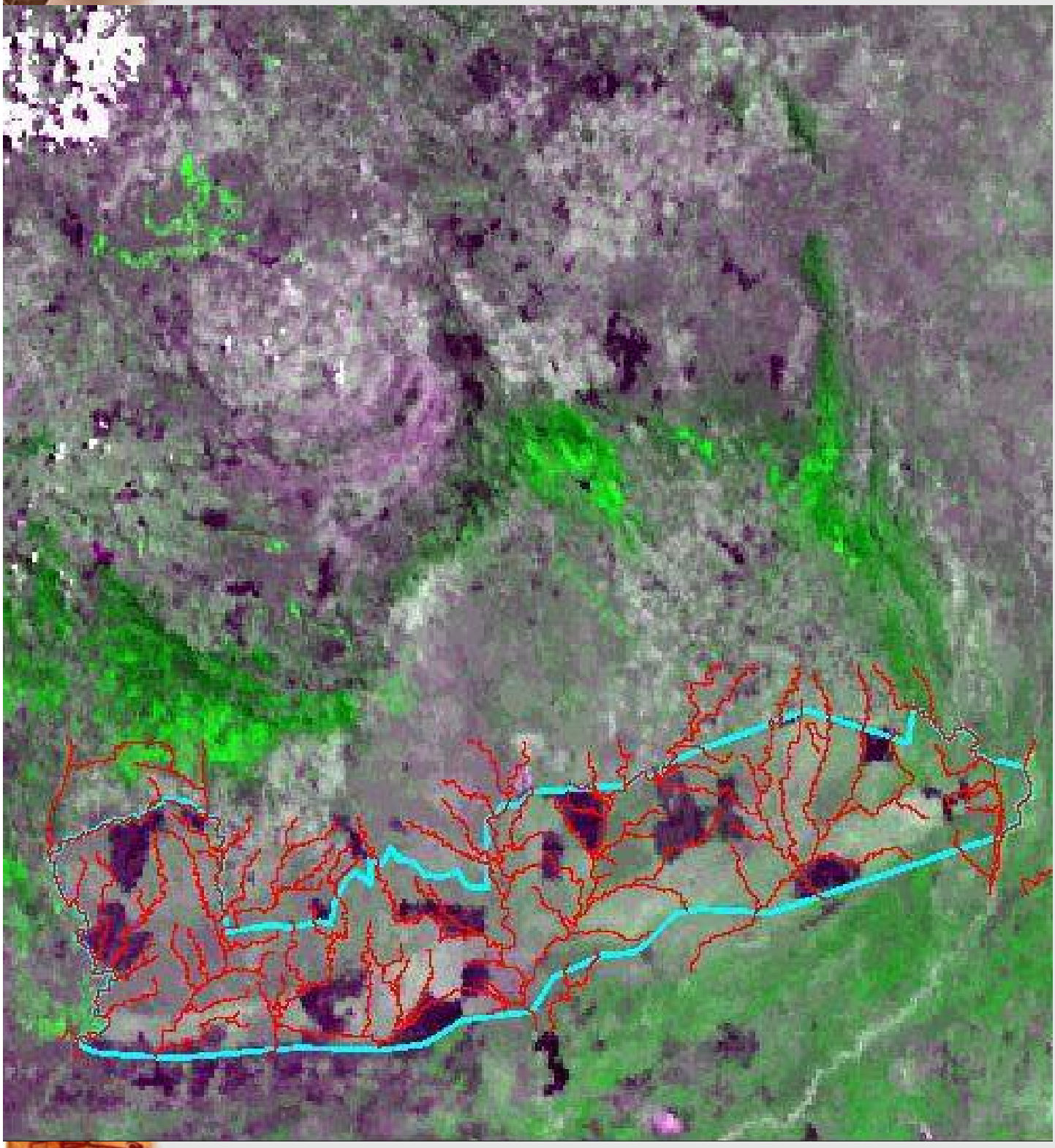
THE ROLE OF FIRE IN SAVANNAS



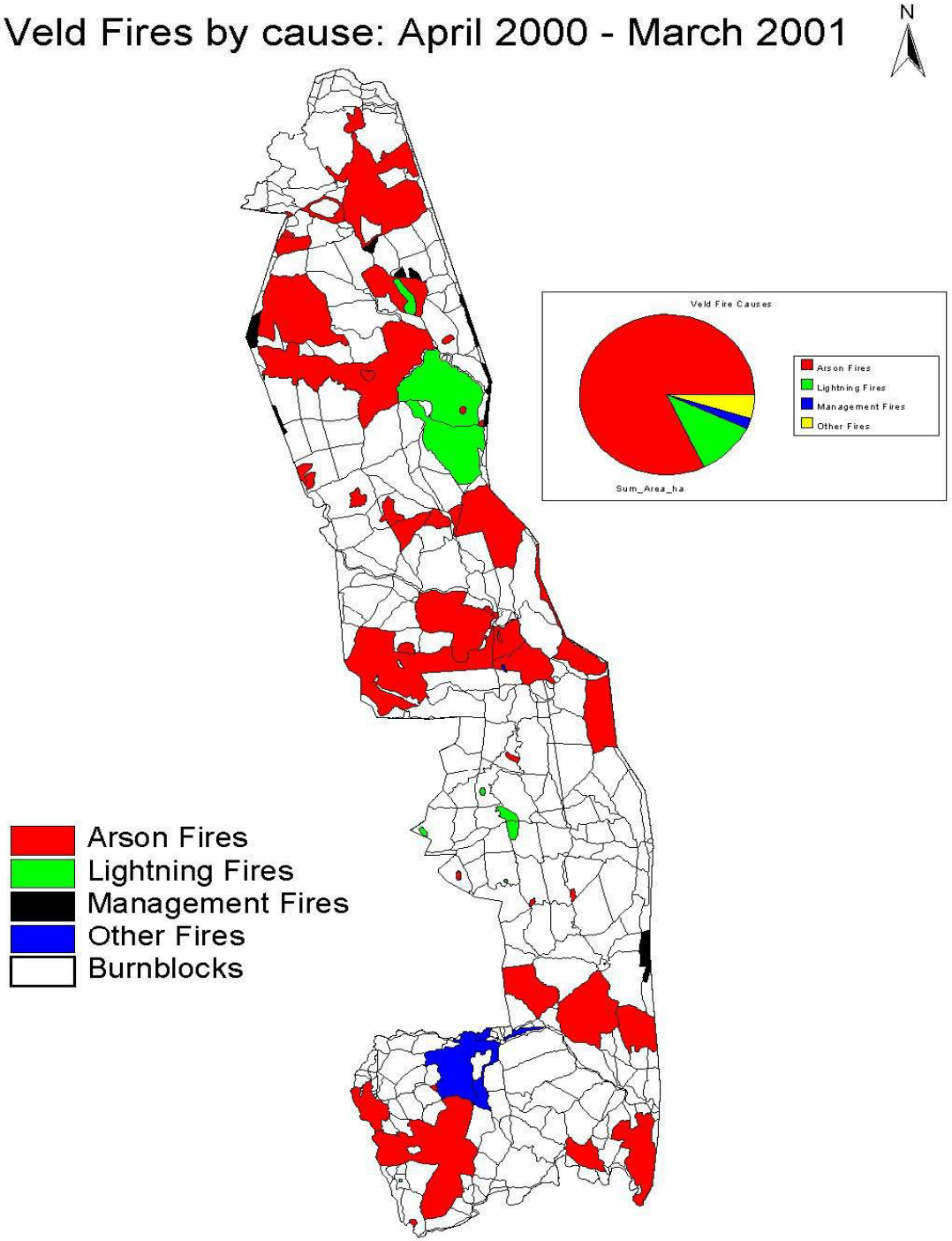
50 yr old experimental fire plots

PATCH MOSAIC BURNING POLICY

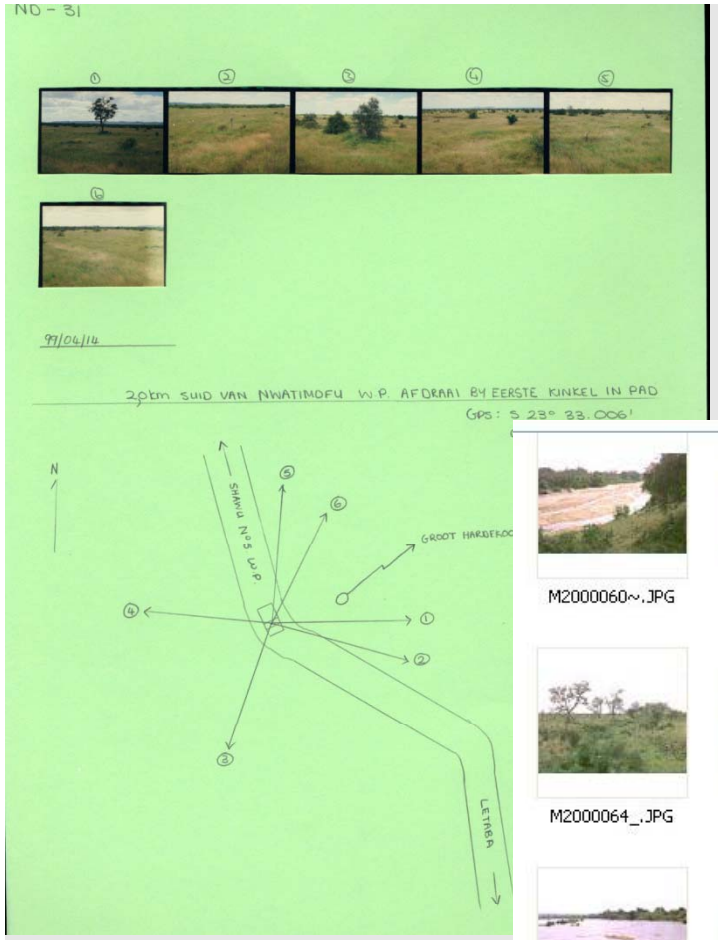
Navashni Govender

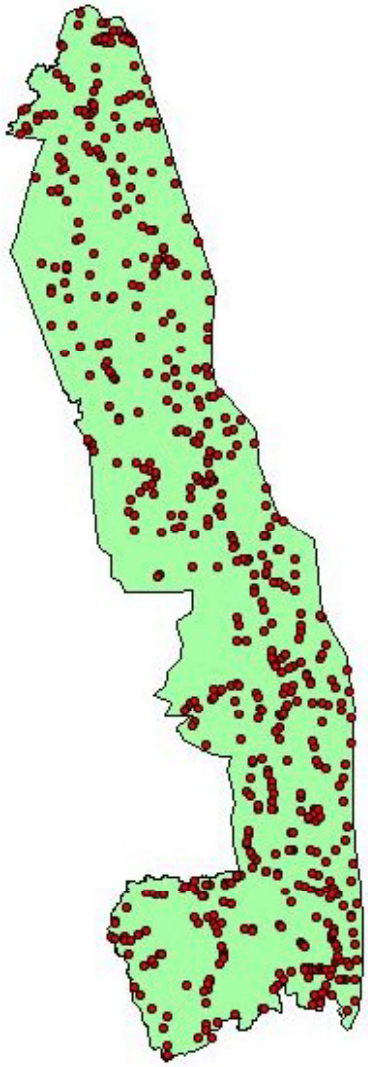


Veld Fires by cause: April 2000 - March 2001

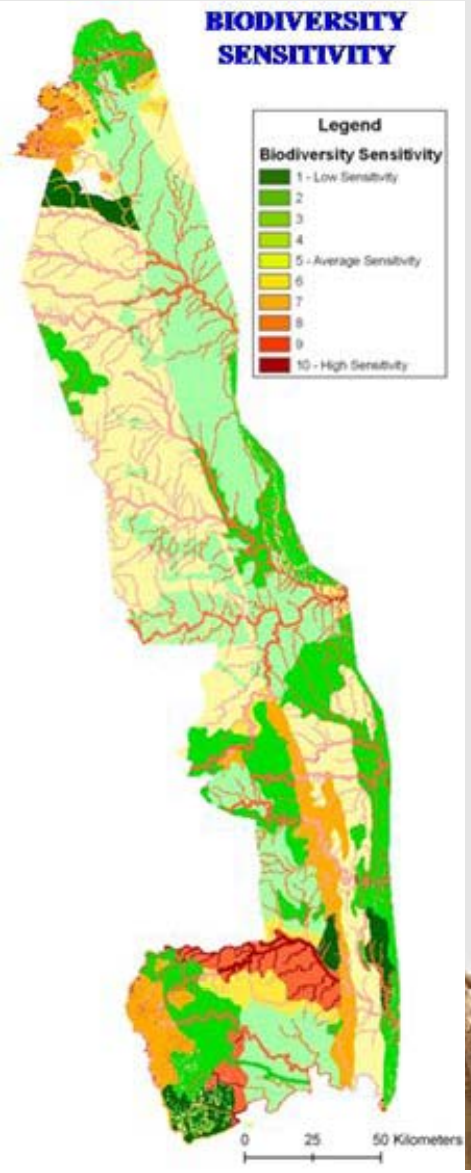


Fixed point photography



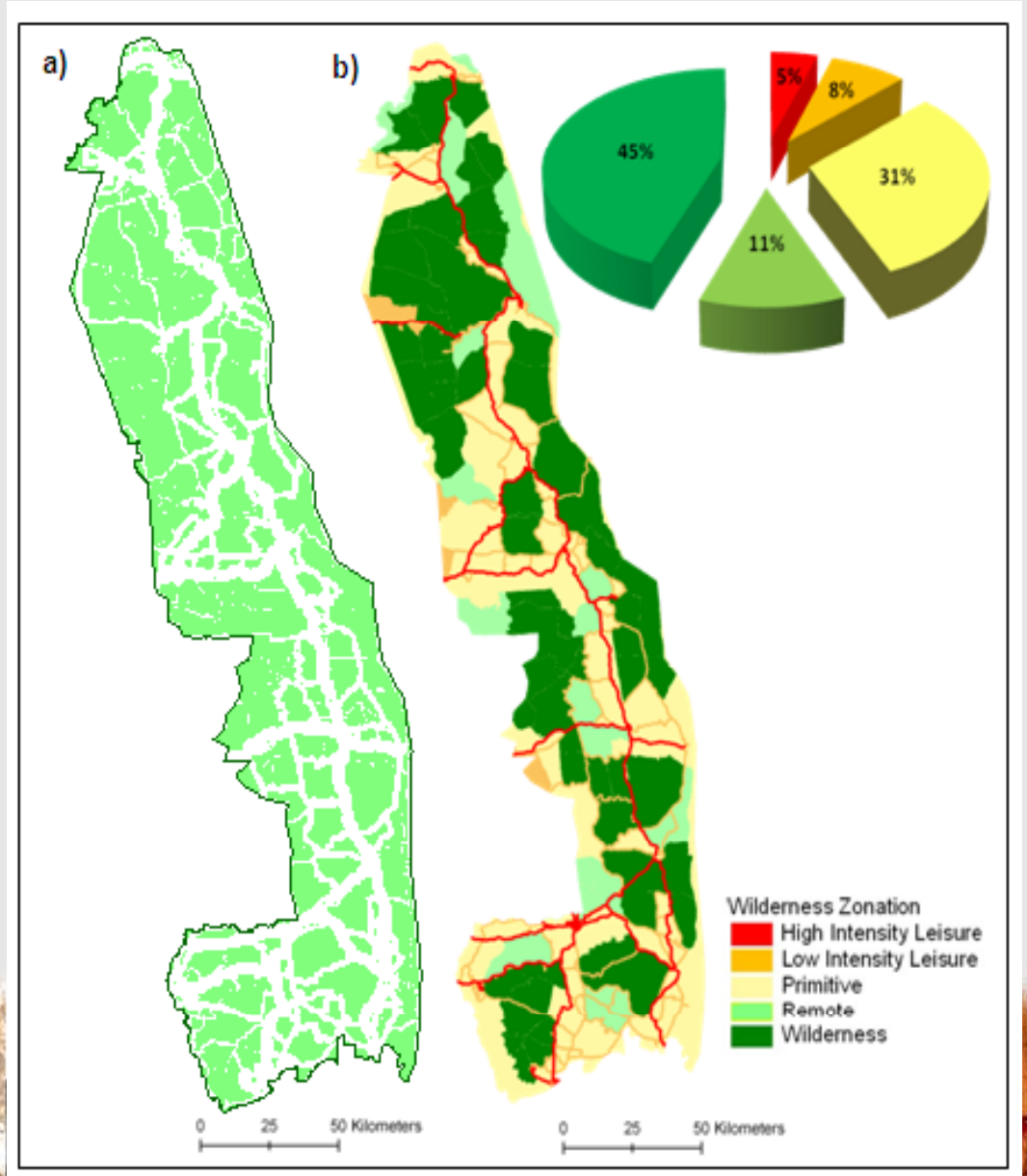


Biodiversity sensitivity analysis



Wilderness

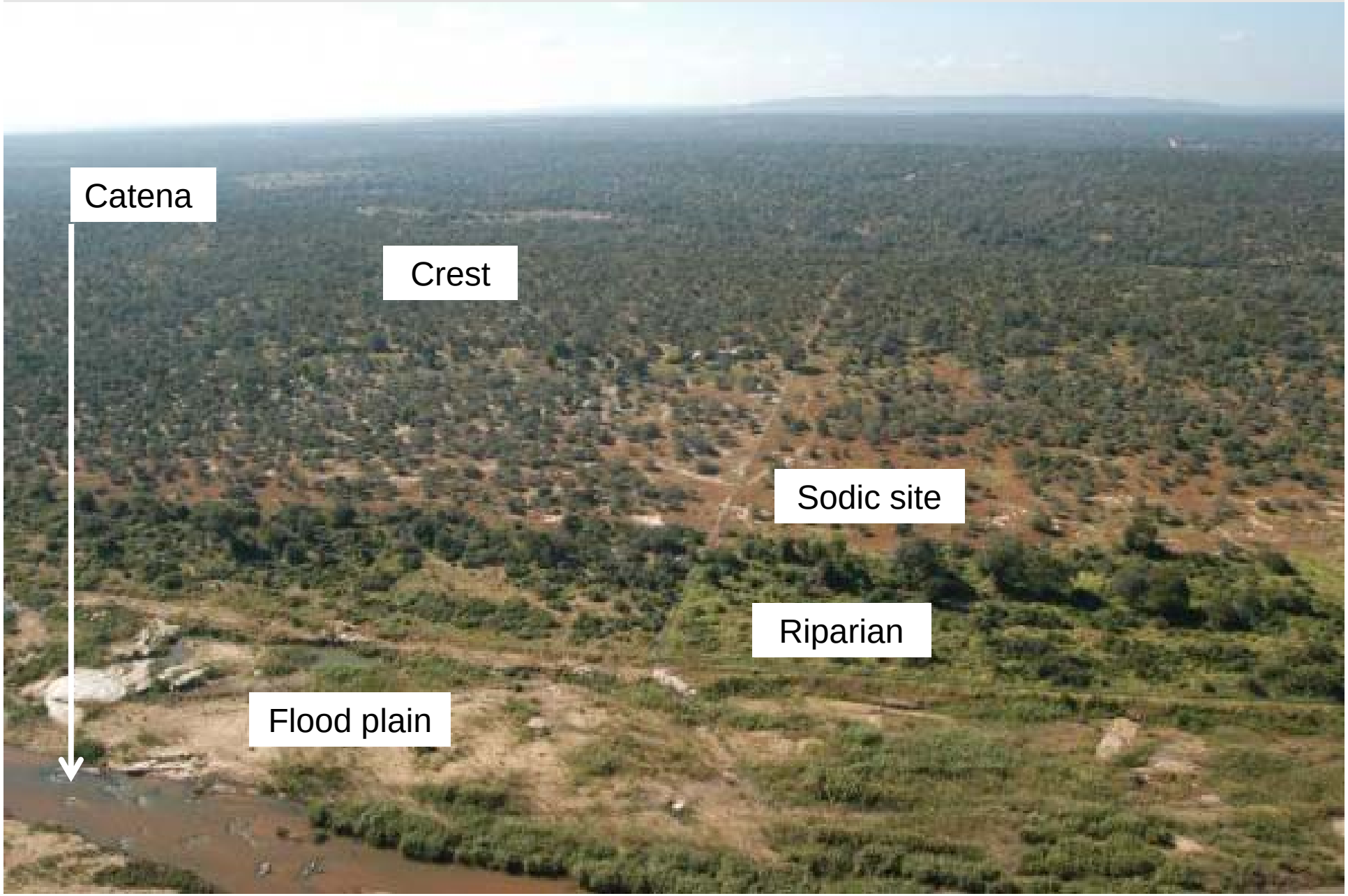
(Mac Fadyen 2009)



Artificial Water Provisioning

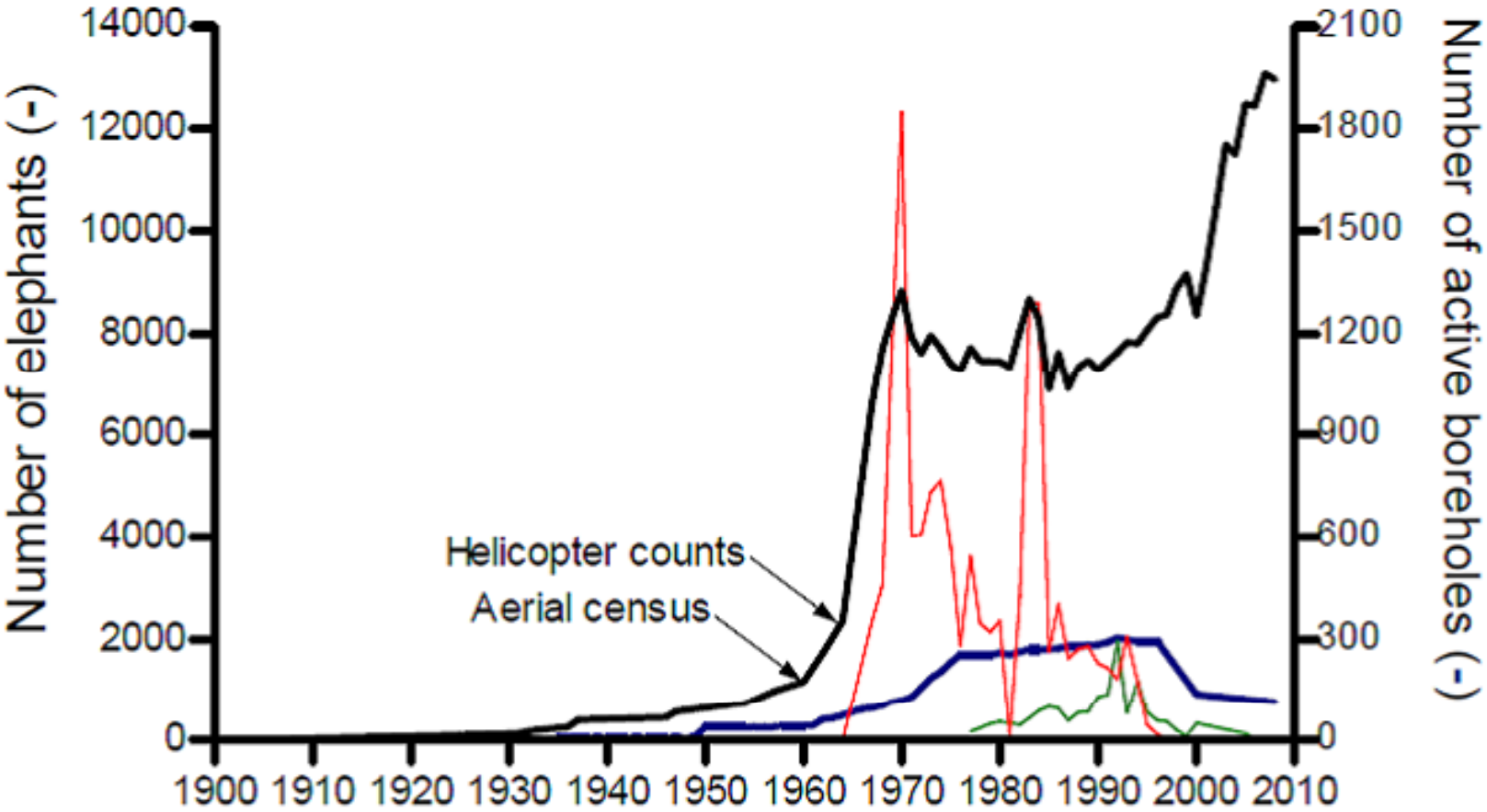
20 – 25 year exclosures

effect of different combinations of fire, elephants and other herbivores on the vegetation

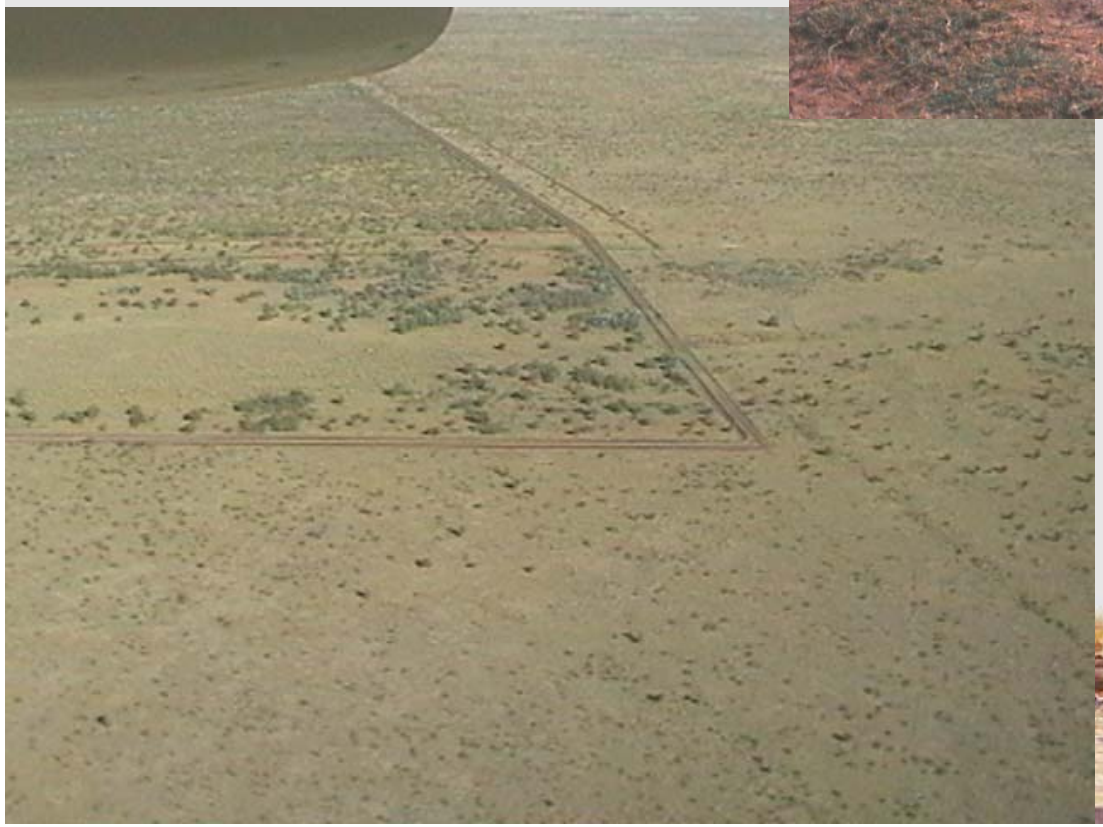

Catena
Crest
Sodic site
Riparian
Flood plain

Elephants

Box 5. Historic trends in elephant numbers in Kruger[49]



Exclosure: Elephant & fire



250 crocodile deaths

- Why?
- Complex system, no clear answers

Herbarium & specimen collection

Tourism

A financial imperative..!

Lower Sabie tourist camp

Olifants tourist camp

Luxury Accommodation

R3500- R7000 p/p/n
EUR350-700 p/p/n

ECO TRAILS & TENT SAFARIS

ECO TRAILS & TENT SAFARIS

WILDERNESS TRAILS

Technical services

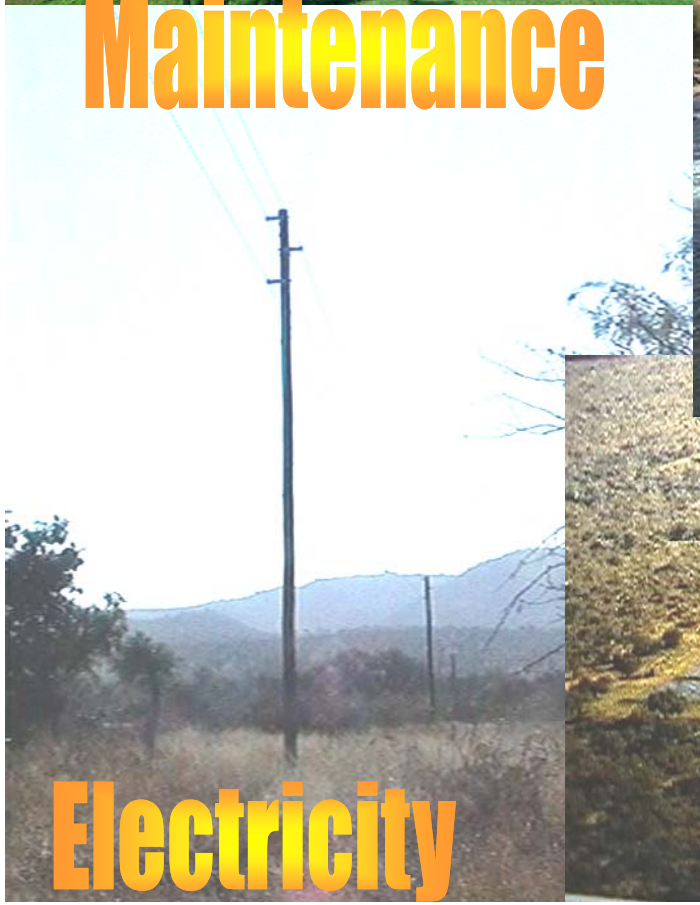
Maintenance

Vehicles

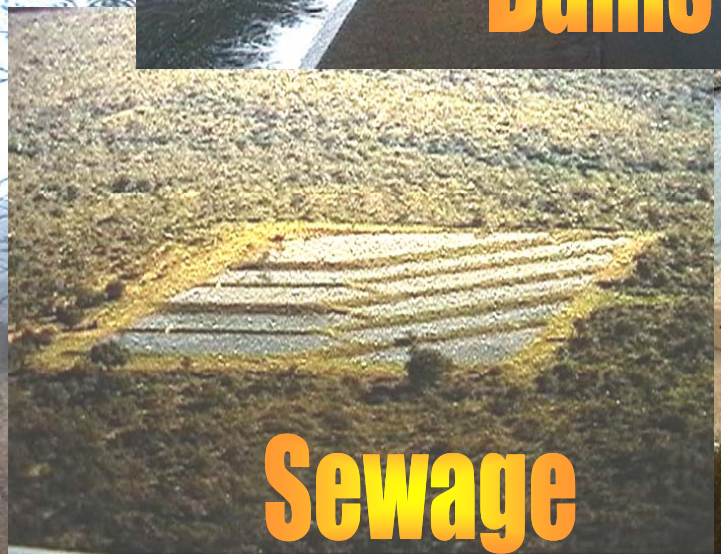
Pumps

Dams

Fences



Electricity

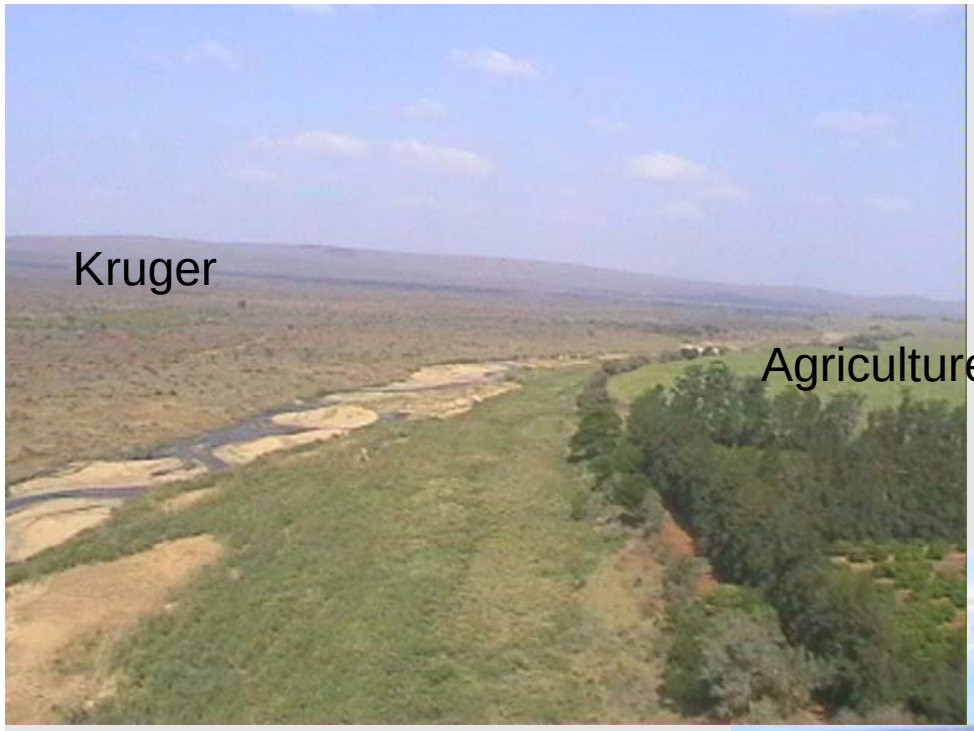


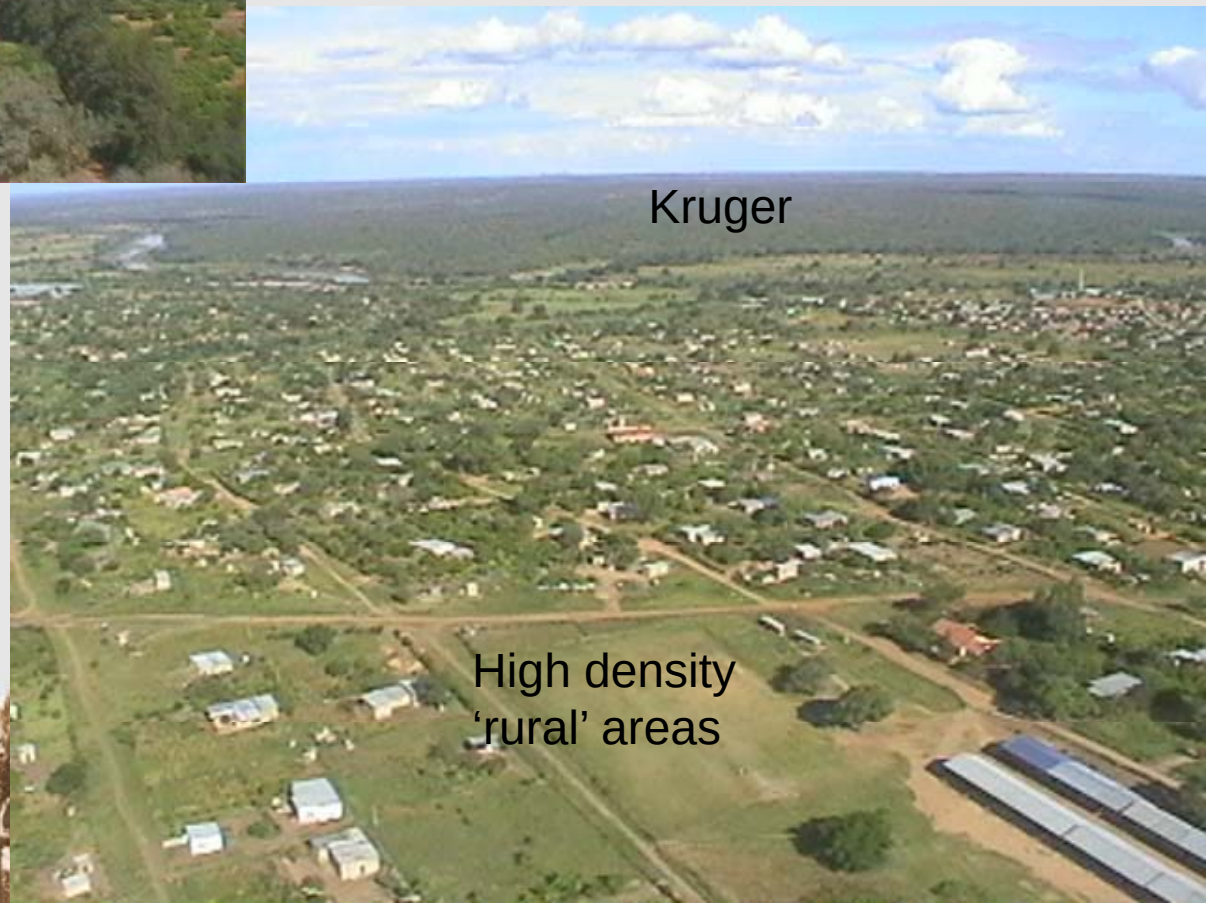
Sewage

Fishways

Some problems…

DIRECT NEIGHBOURS

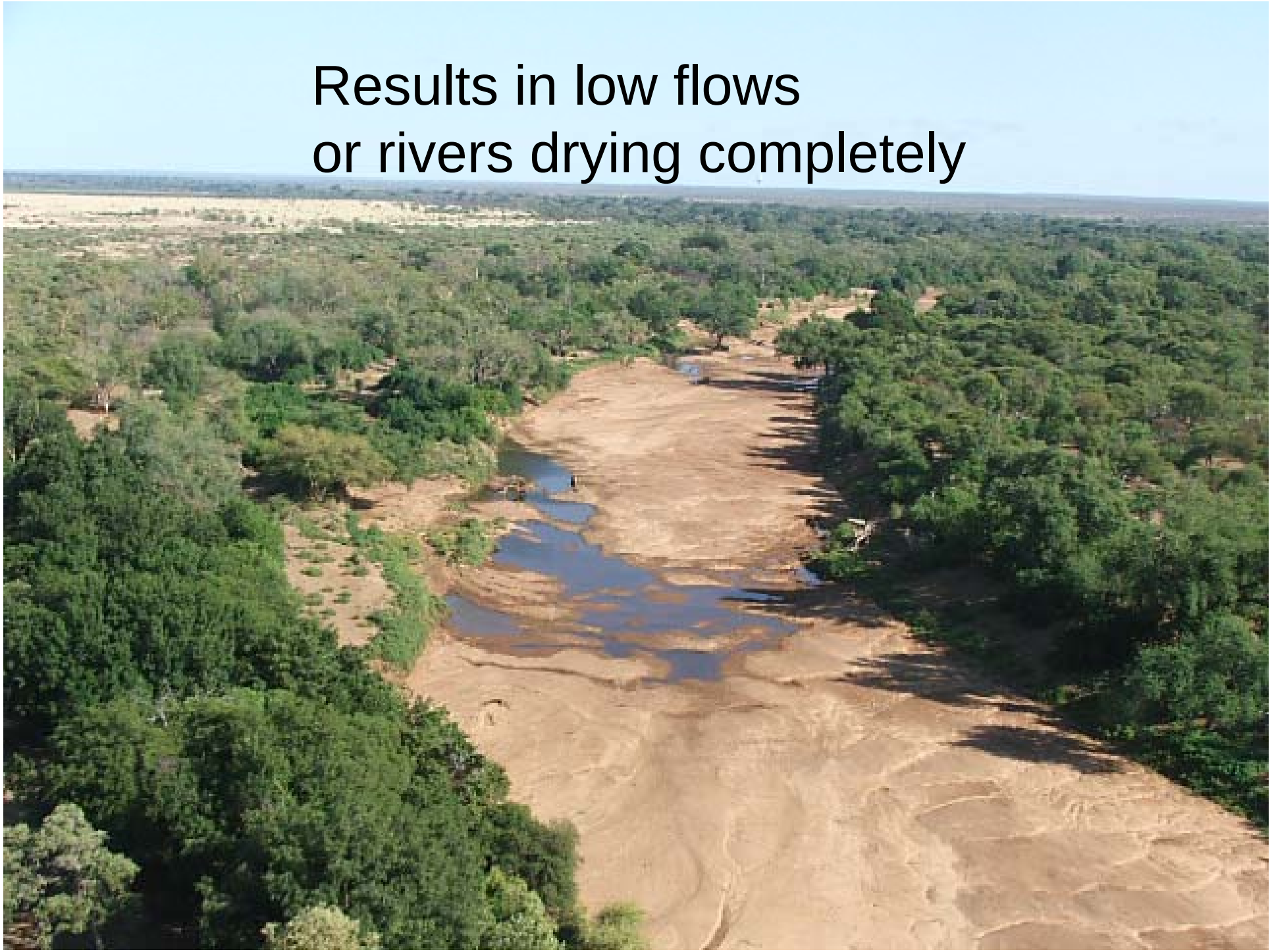




Dams in the park

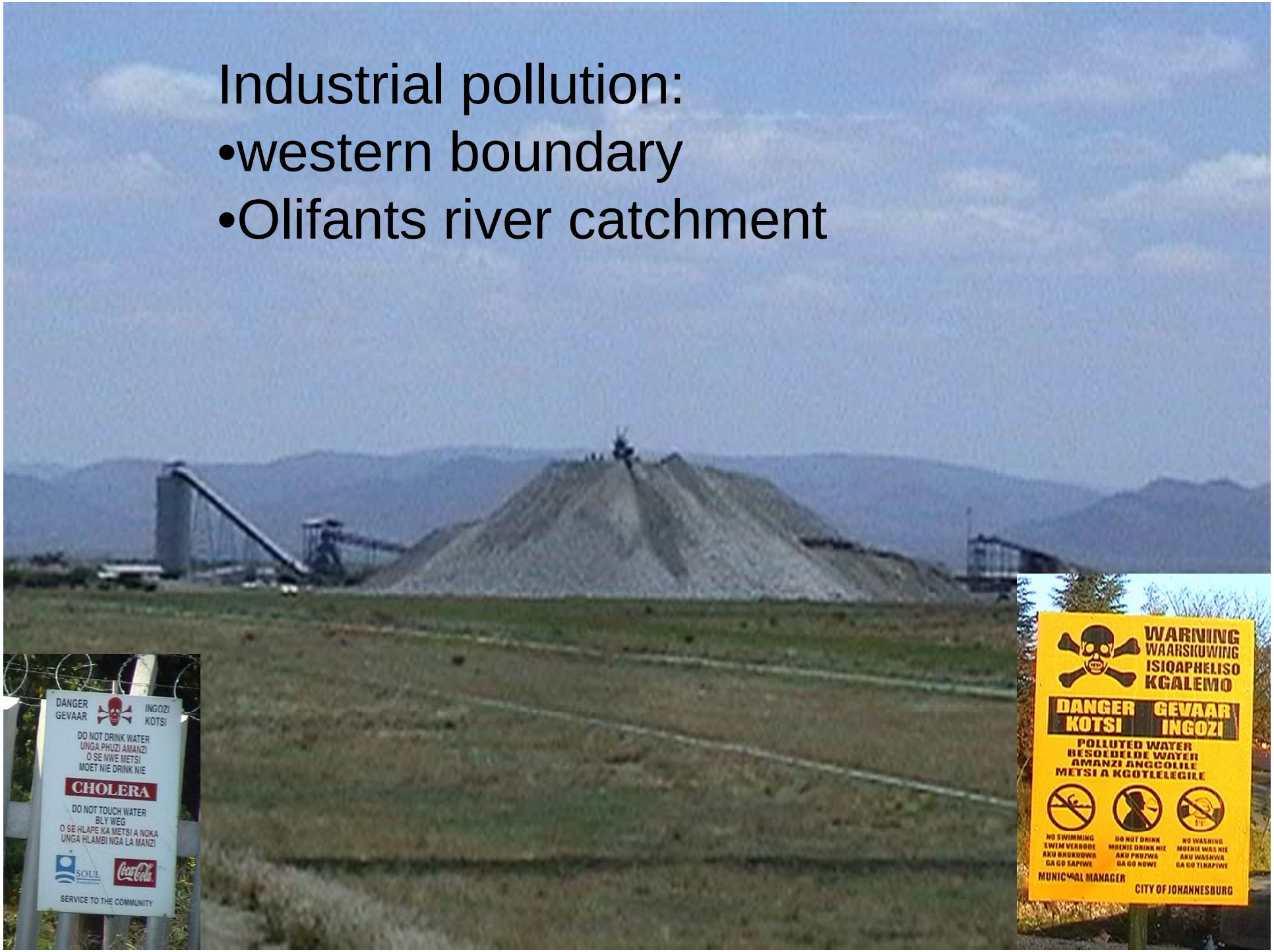
Reversing old management decisions

Large impoundments up
river from Kruger.....


Results in low flows
or rivers drying completely

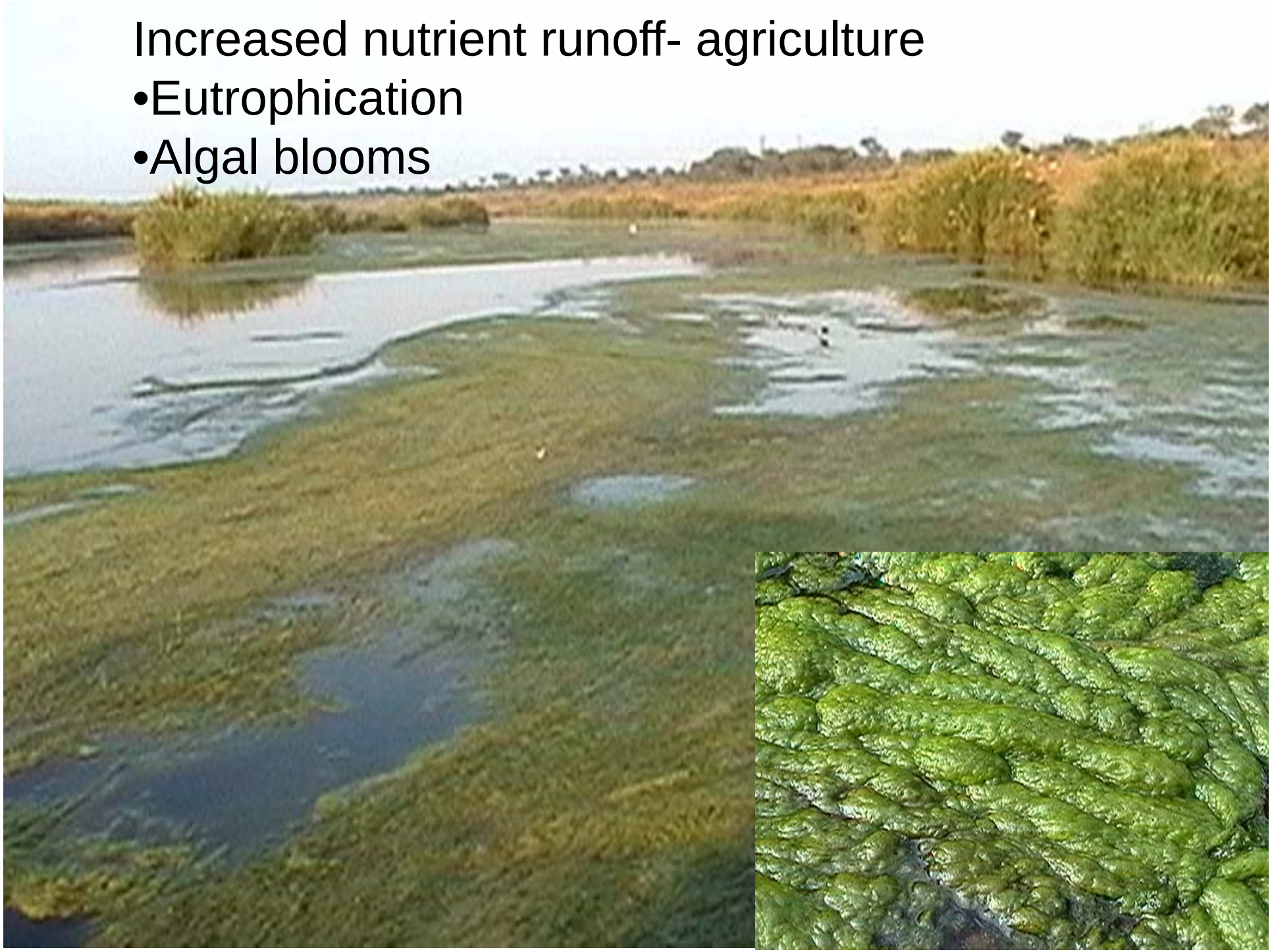
Industrial pollution:

- western boundary
- Olifants river catchment



Increased nutrient runoff- agriculture

- Eutrophication
- Algal blooms



Summary – managing a large protected area

- Historical context
- Acknowledging complexity as ecosystem property
- Balance tourism and conservation
- Protected area integrity (rangers)
- Understanding the system (scientists)
- Integration through common understanding

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