

KAINGO RESEARCH CENTRE

An initiative of the Kaingo Reserve Foundation

www.kaingo.org



RESEARCH ON KAINGO GAME RESERVE

KAINGO
Game Reserve

Kaingo Game Reserve is an officially declared protected area in the Waterberg, an area rich in landscapes, biodiversity, and archaeology. Kaingo is a core area of the UNESCO declared Waterberg Biosphere Reserve and falls in the Critical Biodiversity Area 1 category (Irreplaceable) as zoned in the Limpopo Conservation Plan. That underscores not only the importance of the protection of the biodiversity inside of its boundaries, but also the management thereof to improve and maintain its health and productivity.

Not only is the species diversity a defining factor of the biodiversity of an area, but so are the ecological processes which regulate and maintain the interactions between the diverse biota present on and around the reserve. The Kaingo Reserve Foundation promotes applied research at Kaingo Game Reserve and the wider Waterberg, that, in turn, can lead to best practice for ecological management.

Through the Foundation, research is environmentally focused with a strong emphasis placed on projects that have the potential of guiding a best-practice approach to the ecological management of the reserve and the wider Waterberg area. Prospective projects undergo an approval process which includes, amongst other things, a research proposal that includes scientific and management outcomes, budgets, projected time frames and key deliverables for each phase of the work to be undertaken.

All prospective projects will need to fall within one or more of the three core themes to be considered namely:

- Conservation Ecology - Biodiversity conservation of species and ecosystems
- Understanding the impacts of Climate Change
- Archaeology - The human impact: past, present and future.



CONSERVATION ECOLOGY

Biodiversity conservation of species and ecosystems

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A clearer understanding of ecosystem functioning in a relatively large, yet fenced, environment such as Kaingo is needed to guide the future management of the resources towards the achievement of the conservation objective, both on Kaingo and the wider Waterberg. A well planned and executed research strategy is thus of the utmost importance.
Below are a some of the key research areas and questions conservation managers at Kaingo are interested in:

- The description and quantification of the biodiversity that is protected on the reserve in terms of species composition and numbers is fundamental research needed and so to the comparison to the norms for the Waterberg.
- What impact did historic and more recent past land uses and management practices have on the ecology and its functioning and how can it be neutralised and/or mitigated, if it needs to be?
- What is needed in terms of time and resources to rehabilitate land that has been modified by historic anthropogenic impacts?
- What really was the state and appearance of the biodiversity components of the reserve and wider Waterberg before modern man entered the equation, and can that state realistically be recovered?
- Kaingo represents a portion of the savanna biome of which the most important driving forces for maintaining its integrity are rainfall, herbivory, and fire. Considering the changes that had taken place during historical and more recent times, how might these driving forces have changed, and how might the desired/most “natural” state of the resources be defined, and how could that desired state be restored/achieved?
- Kaingo has 13 km of Mokolo river vegetation, and the status and health of this protected habitat should be determined, evaluated and its management advised by a scientific database.
- What is the role that large predators such as lions can and should play on a reserve of similar size and characteristics as Kaingo, and how can the species best be employed to achieve the conservation objective, both of the reserve and of the species?
- How can the genetics of populations of species, particularly that of species of conservation concern, best be managed?



CLIMATE CHANGE

Understanding the impact of Climate Change

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During Earth's history, natural processes caused changes in temperature and rainfall patterns and inevitably impacted biodiversity patterns and abundances. Climate change is happening and although the climate has altered in the past, the rate and scale of the current warming in unprecedented. Human activities that release greenhouse gases into the atmosphere is a definite contributor to global warming. Even a 2°C warming might have devastating effects on biodiversity in Southern Africa.

Species that are adapted to specific climate conditions may struggle to survive as their habitats undergo significant alterations. Conservation must adapt to these changing conditions, focusing on climate-resilient strategies and habitat restoration to mitigate the impact of global warming on the region's rich biodiversity.

Establishing a robust knowledge foundation regarding the impacts of climate change on biodiversity is crucial for continued effective biodiversity conservation efforts. These impacts include local or wider species extinctions, species range shifts and changes in distributions, hybridization and inter-species competition.

The prediction of threats to ecosystem services (health and water and food security) and extreme weather events (droughts and floods) needs to be supported by relevant research.

Critical questions and issues that may require specific research include:

- What changes in carrying capacity are predicted due to changes in precipitation and temperatures?
- Which species (especially threatened species) occurring in the Waterberg are most vulnerable to the effects of climate change, and why?
- How can the effects of global warming locally be mitigated by management in Kaingo?
- How is climate change affecting, or predicted to affect, biodiversity (e.g. species and communities) and ecosystem structure and function, and what is the mechanism of change?
- Can key indicators of changes in the environment and particularly biodiversity be identified?



ANTHROPOGENIC FACTORS

The human impact – past, present and future

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The aim is to discover, study and document archaeological sites on Kaingo and more broadly in the Waterberg. Such sites include Stone Age encampments in the open and in rock shelters, rock art, and Iron Age villages, smelting areas and initiation retreats. The timeframe for human settlement on Kaingo already promises to have started earlier than one million years ago and it was occupied sporadically between that time and the present. One preliminary finding is that there may have been long gaps in occupation of the Waterberg and we need to find out why that happened.

The periods of occupation must therefore be dated using a variety of dating techniques available nationally and internationally. Human settlement was determined by available resources – water, plant and animal food, firewood and raw materials for tool-making.

If some of these disappeared, people would have left, too. Thus, archaeological investigations must link closely with palaeo-environmental studies. Archaeological excavation of charcoal, animal bones and sediments enables reconstruction of past environments and changing climate. Resource availability was, and is, key to viable human settlement in the Waterberg. By knowing what caused abandonment versus successful settlement in the past we can make efficient plans to deal with resource uncertainty in the future.

As part of the study of the past human impact on Kaingo, and farther afield in the Waterberg, we already know that hominins like Homo erectus were on the landscape a million years ago and that Homo sapiens arrived later, several hundreds of thousands of years ago. More recently, Bushmen were on Kaingo, painting rocks and rock shelters. In the last 2000 years, pastoralists came through the area with fat-tailed sheep, and black Iron Age farmers settled in considerable numbers after 1000 years ago. The relationships between these populations need investigation, but this can only be done once the material culture signatures of each group are well understood.



BASELINE DATA COLLECTION

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Kaingo aims to understand current species richness, abundance and composition for a range of taxa. Baseline information will enable us to identify increases or decreases in a species, as well as change in community composition. Identifying essential ecological processes in the Waterberg and how these processes are changing over time is a vital measuring tool and an important function of research on Kaingo.

What are the key elements causing shifts in species or community structure (drivers – short, medium and long term, both natural and anthropogenic), and how does this impact Kaingo as a whole?
What are the implications of various management interventions, and how do these impact Kaingo's biological integrity?

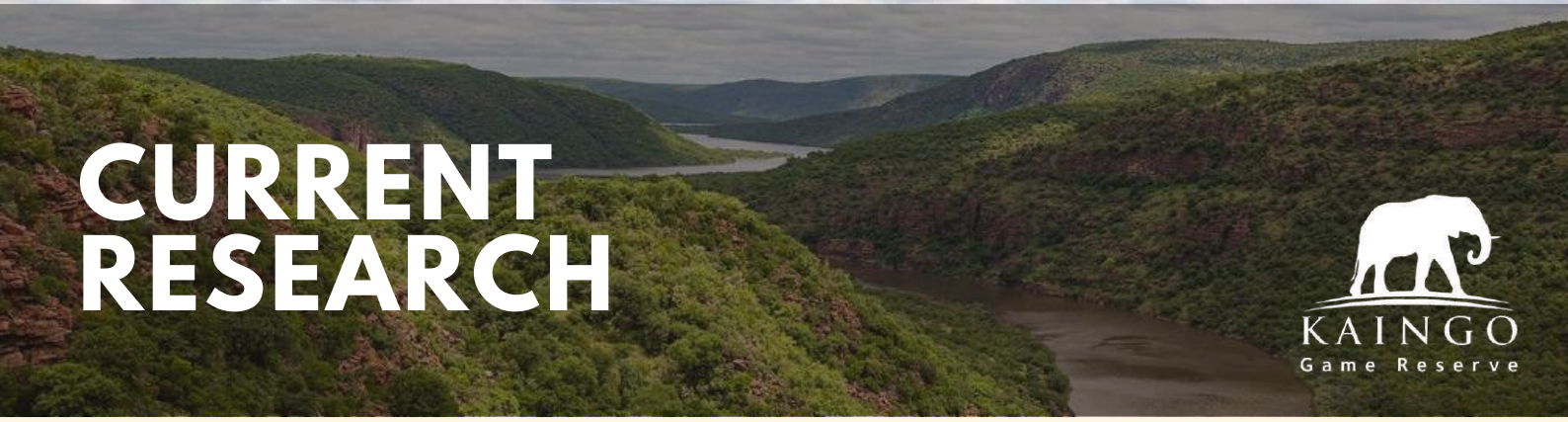
There is a need to conduct surveys and inventories across Kaingo for lesser-known taxa.

KAINGO GAME RESERVE

Kaingo Game Reserve is a wilderness of outstanding scenic beauty, an African Eden, situated in the malaria-free Waterberg, 2.5 hours from Johannesburg. The reserve is a declared protected area with Critical Biodiversity 1 classification and a core area of the Waterberg Biosphere Reserve, officially declared by UNESCO (in 2001). Considered high conservation value, we're now striving to conserve this breath-taking landscape for future generations.

Sweeping across 16 200 hectares (41 000 acres) of bushveld savannah, river, valley and magic mountain landscapes, Kaingo represents a piece of Africa as it used to be with unique wildlife experiences, conservation and research activities and picturesque natural assets in abundance. With the mighty Mokolo river weaving through breath taking landscapes the reserve is home to more than 60 mammal and more than 300 bird species.

Kaingo offers incredible ecological biodiversity for a unique African wildlife and nature experience in a 'Conservation First' reserve, where all tourism income goes towards our conservation efforts.



CURRENT RESEARCH

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Current research topics at Kaingo include:

- Ecosystem nutrient cycling
- Vegetation monitoring
- Baseline biodiversity data collection.

Kaingo is a site of significant cultural heritage; stone tools and rock art are the bedrock of archaeological research at Kaingo.

The FBIP Waterberg Biodiversity Project extensively use Kaingo for their comprehensive and structured multi-year biodiversity survey of the Waterberg to create a database that will support the conservation and management activities of numerous stakeholders in the Waterberg.

INSTITUTIONAL ENGAGEMENT AT KAINGO RESEARCH CENTRE

University of Pretoria
University of KwaZulu-Natal
Wits University
Rhodes University,
University of Johannesburg
University of Limpopo
University of South Africa
South African National Biodiversity Institute
Dendrological Society
South African Institute for Aquatic Biodiversity
Universidad Nacional de Cordoba
Waterberg Research Support Centre,
Birdlife SA
Ditsong National Museum
KwaZulu-Natal Museum
Royal Museum for Central Africa
University of Liverpool
Econovo (Aarhuis University), Envirodel





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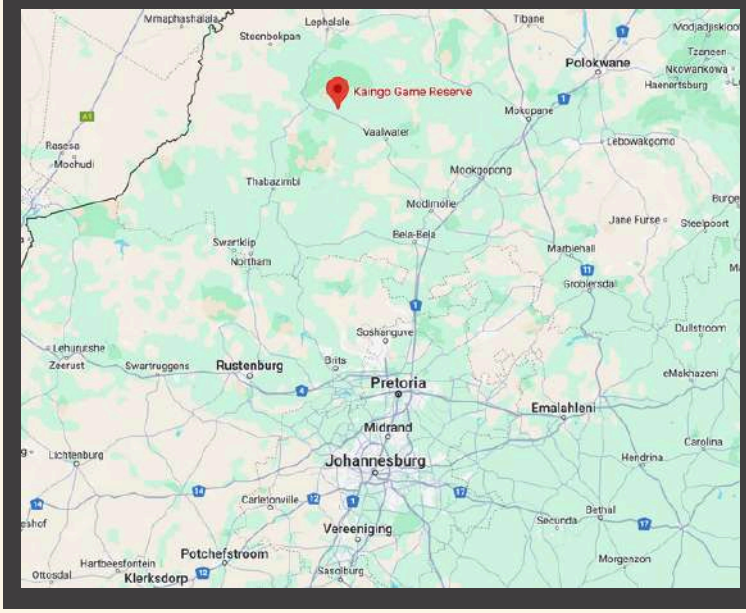
Kaingo Reserve Foundation's objective is to support research that improves ecosystem functioning and conserves biodiversity through the Kaingo Research Centre. We aim to engage targeted research to foster locally relevant solutions for sustainable Waterberg ecosystems. A core objective of the Foundation is to stimulate interest amongst our reserve guests through ongoing interaction with both researchers and Foundation staff while visiting Kaingo.

Set in a beautiful and safe location, the Centre lies on a ridge overlooking a picturesque section of the Mokolo river. The facility can accommodate up to 20 researchers and support staff.

With a central location, the Centre offers convenient access to our main workshop and other logistical support facilities. From the Centre a wide range of habitats across the reserve can be accessed – from deep sandy plains to mountains, woodlands and riverine areas. Researchers are therefore supported in the field while having the security of a well-maintained base for operations. The duration of stay at the Centre is unlimited; some teams have field projects on the ground for more than 3 years, while other researchers stay for short stints but return regularly.

Location

Easily accessible within 2 - 3 hours from Pretoria and Johanessburg



View from the Research Center





RESEARCH CENTRE FACILITIES

KAINGO Game Reserve

The Kaingo Research Centre is located in a fenced compound set on a ridge overlooking the Mokolo river. WiFi internet access is provided at all facilities and accommodations. In line with our approach to sustainability and renewables, the whole centre is off-grid and electricity is via a solar system.

Facilities include:

- Laboratory with ample workspace
- Shared office with ample storage and shelving
- Equipment storage areas
- Serviced accommodation for up to 20 students and researchers split across three areas
  - Main lodge: 5 ensuite double rooms, communal kitchen, lounge and outside area.
  - Hippo house: 4 ensuite double rooms, communal kitchen, lounge and outside area.
  - Stone house: 2 ensuite double rooms, communal kitchen, lounge and outside area.
- Large communal area with lapa, boma fire area, braai facilities and swimming pool
- Two look out rest areas overlooking the Mokolo river
- Laundry facilities



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