NRF-SAEON

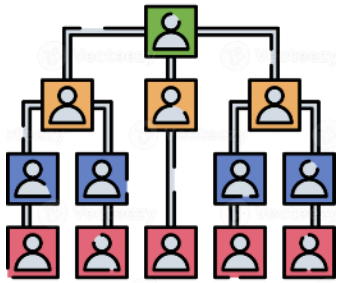
South African Environmental Observation Network

Prof Dave Thompson
NRF-SAEON Biodiversity Scientist

NWU Honorary Professor
WITS University Visiting Researcher

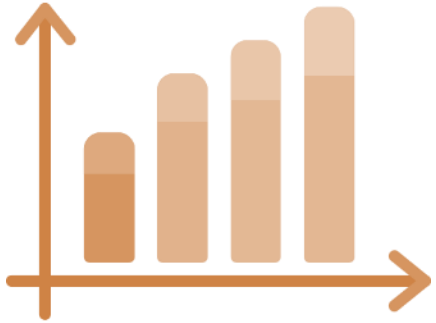
South African Environmental Observation Network

Overview



Position + Footprint

Activities + Opportunities



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National System of Innovation

Department of Science, Technology & Innovation (DSTI)
2022-2032 Decal plan

National Research Foundation (NRF)

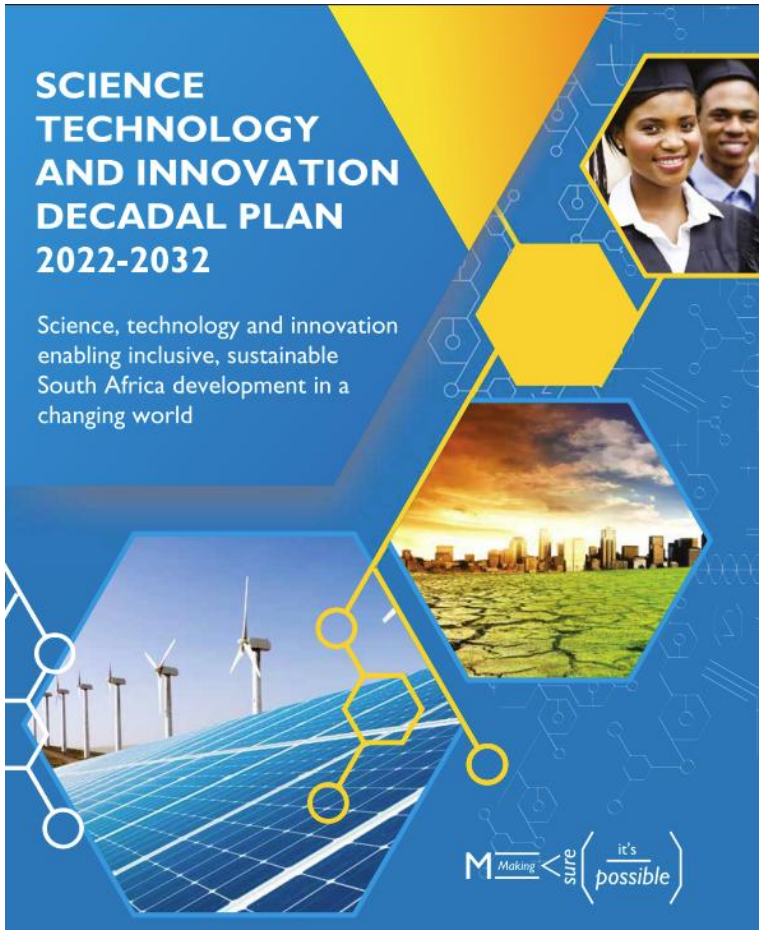
National Facilities (NFs)

'*indispensable infrastructure platforms and research institutions managed as facilities centred on substantial instrumentation, equipment, or skills base*'

- South African Astronomical Observatory (SAAO)
- South African Institute for Aquatic Biodiversity (SAIAB)
- iThemba Laboratory for Accelerator-Based Sciences (iThemba LABS)
- South African Radio Astronomy Observatory (SARAO)

- **South African Environmental Observation Network (SAEON)**

*SAASTA (South African Agency for Science & Technology Advancement) and RA (Research and Innovation Support & Advancement) are NRF business divisions



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Guiding Frameworks

DSTI Societal Grand Challenges (2019 White Paper on STI)

1. Climate Change: Developing solutions for mitigation and adaptation

2. **Future-proofing Education**: Aligning curriculum with 4th Industrial Revolution (4IR) need.

3. Re-industrialising the Economy: Modernising manufacturing and mining through innovation

4. Future of Society: Exploring how technology impacts social equality and justice

DSTI Key Strategic Priorities for high impact (2026/27). 5 KSP, 10 sub-themes

1. Emerging Technological Investment: Unlocking **funding for cutting-edge fields**

2. Health & Bio-innovation: **Indigenous Knowledge integration**

3. Skills and Human Capital: **Future-proofing skills and STEM graduation**

4. Economic Transformation & Inclusion: **Circular Economy** (2024-2034)

5. Global and Continental partnerships – **strategic partnerships** to boost competitiveness

South African Environmental Observation Network

Sustainable Development Goals

SAEON's core contribution towards SDG obligations

- ✓ Environmental observation / data
- ✓ Transformed staff & student cohort
- ✓ Outreach & engagement
- ✓ Socio-ecological observation / data
- ✓ Business model

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Rationale











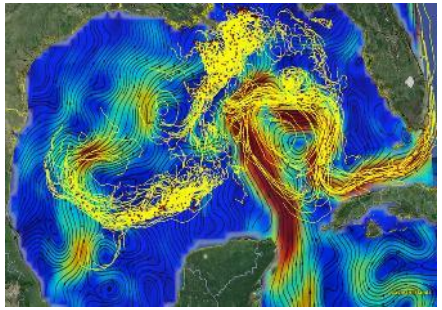



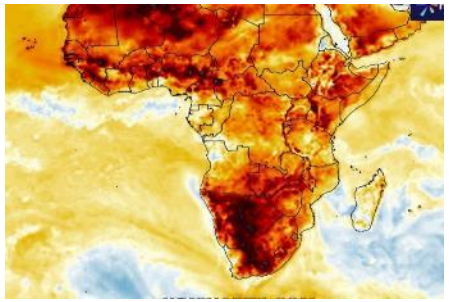

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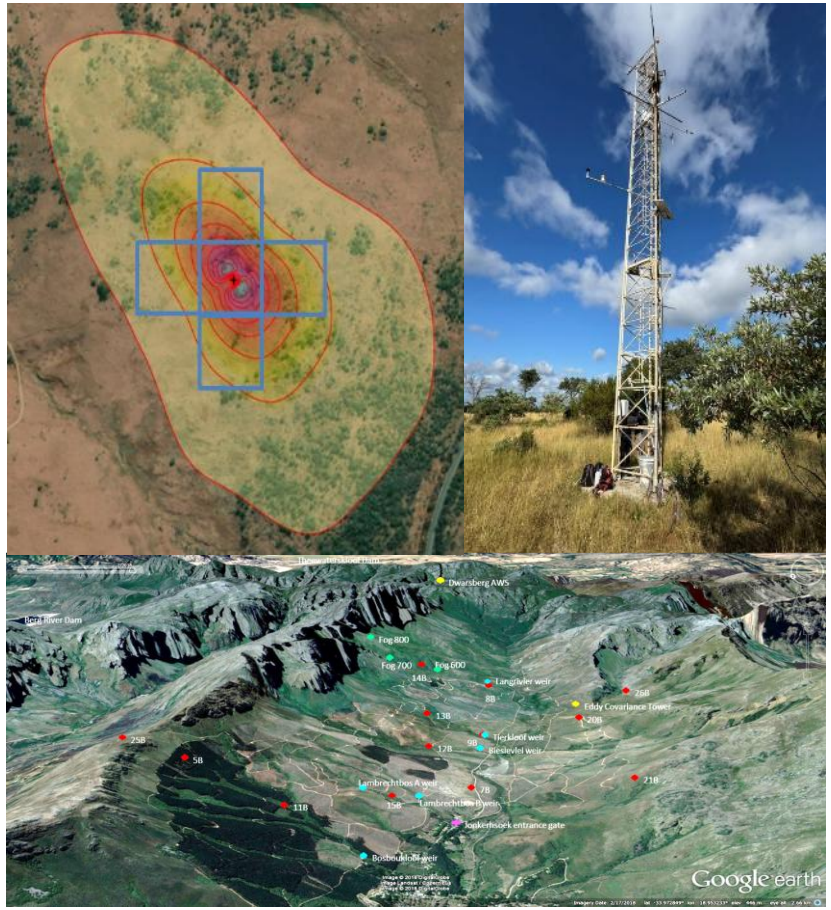
Design

‘World class environmental research platforms for a sustainable society’



Environmental Observation

Establish and maintain representative, geographically distributed, instrumented observatories, research platforms and field stations

Data Management

Long-term reliable data to help scientists and policymakers understand, detect, and predict environmental change

Education and Outreach

Integration of research into activities to improve understanding of long-term and large-scale ecological processes

Societal Benefit

Translate scientific data into informed decisions and policy that improve the quality of life and create a sustainable society.

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Distribution

Distributed network of 7 nodes covering the major terrestrial and marine ecosystems in South Africa

Marine: 28 platforms, >1600 sampling sites on S-W coast
Terrestrial: 25 platforms, >1000 sampling site across all biomes

Centralized administration

115 (in 2023) full-time staff

>100 external researchers and students annually

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Research Infrastructures

Hosts 3 research infrastructures developed by the DSI as part of the South African Research Infrastructure Roadmap:

1. Expanded Freshwater & Terrestrial Environmental Observation Network (EFTEON)

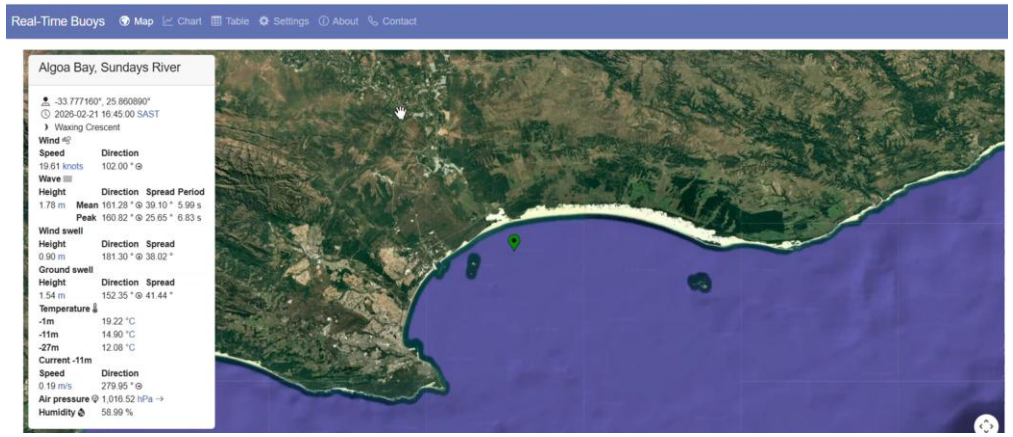
Operates 6 terrestrial socio-ecological landscapes

2. South African Polar Research Infrastructure (SAPRI)

Coordinates South African marine and Antarctic research, including the sub-Antartic islands

3. Shallow Marine & Coastal Research Infrastructure (SMCRI)

Develop an array of instruments and physical research platforms serving SA coastal regions



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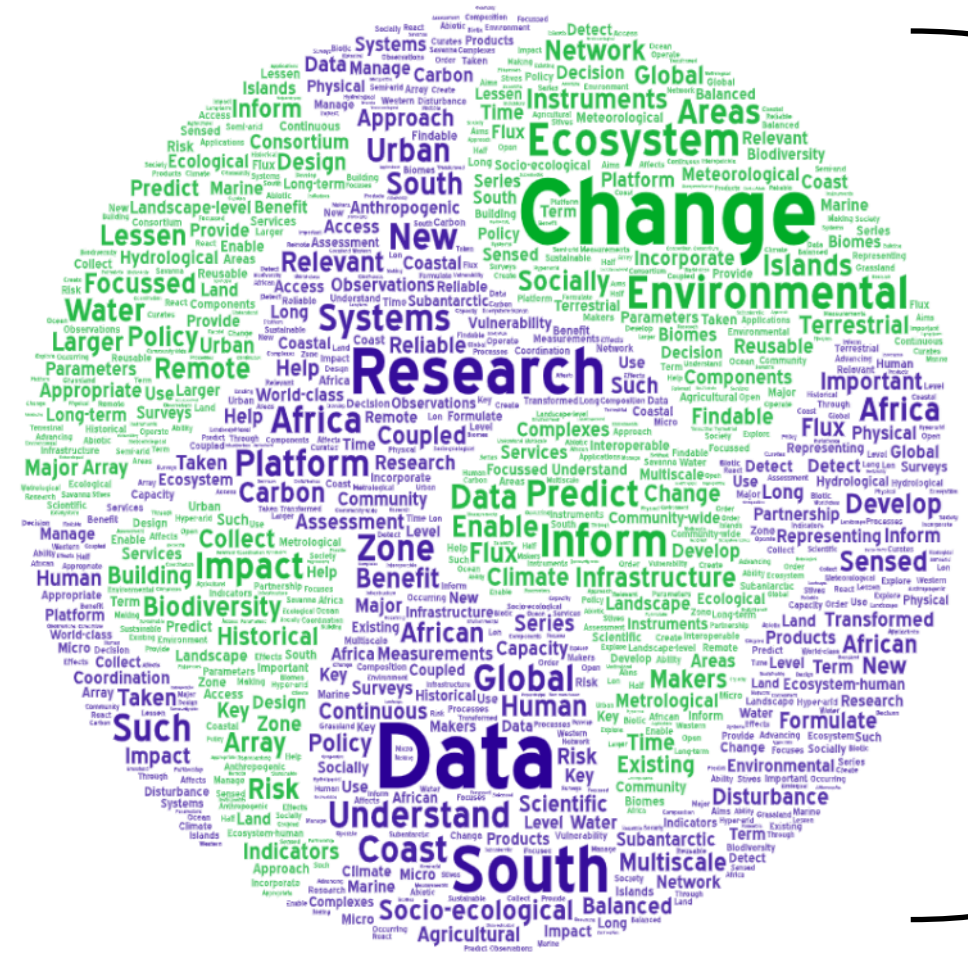
Scope



SAEON serves as a national platform for detecting, translating and predicting environmental change through scientifically designed observation systems and long-term social-ecological research.

'Causes and consequences of global change'

African	Ecosystems	Platform
Balance	Environmental	Policy
Benefit	Impact	Relevant
Capacity	Indicators	Research
Change	Inform	Risk
Data	Instruments	Socio-ecological
Develop	Long-term	South Africa
Disturbance	Multi-scale	Systems
Ecological	Partnership	Understand

Excellence & relevance

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Capacity

Internal	External
Administrators	Citizen scientists
Analysts	Collaborators
Assistants	Government departments
Coordinators	Grant holders
Curators	Higher education institutions
Developers	Honorary research associates
Education officers	Interns
Modellers	Learners
Operators	Platform custodians
Science officers	Postdoctoral research fellows
Scientists	Postgraduate students
Technicians	Research assistants

Broad, interdisciplinary & diverse

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HEI partnership

Postdoctoral researchers & postgraduate students

- MSc and PhD
- Supervision / co-supervision
- Co-developed proposals for locally impactful research
- SAEON platforms / EFTEON landscapes
- Existing long-term infrastructure & data sets
- Network partners (specialised facilities, equipment)
- Endorsement of funding applications
- Access to program-specific funding
- Graduate Student Network

Higher Education Institutions

- Local and global partners
- Honorary associations (visiting researcher / lecturer – full professorship)
- Upper-level MoUs
- Shared resources
- Established, high-performing research groups
- Student pool

South African Environmental Observation Network

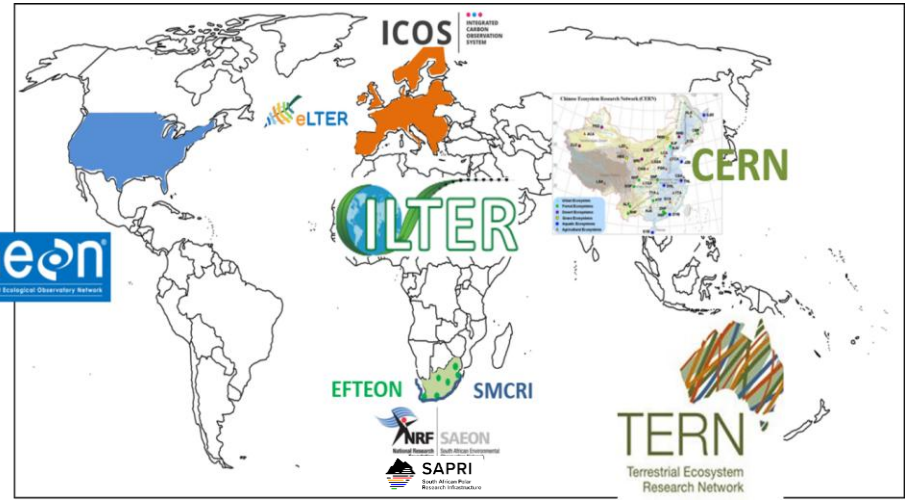
Scale of Influence

… '*a networked environmental observation and coordination platform, a data infrastructure provider, a science-policy interface, a global open-science contributor, and a critical southern hemisphere node in global observation networks*'...

Alignment with global observation networks, a contributing partner to global monitoring and research consortia, a contributing partner to international data sets.

*reproducible, DOI-assigned data, interoperable metadata systems across multiple open-access repositories

External researchers, Secondary schools, National departments, Research institutes, HEIs, Municipalities, communities and traditional councils, National & provincial conservation agencies, NPOs



South African Environmental Observation Network

Local presence: SAEON Ndlovu node

Located in NE South Africa, Limpopo & Mpumalanga

Focus on long-term research and monitoring on the causes and consequences of major environmental changes occurring in ecosystems in savannas, grasslands, and rivers in the region

Mesic savanna, montane grassland and embedded river catchments

Leverage long-term treatments/manipulations, and natural environmental gradients
Leverage long-term data sets

Partners

- Industry, landowners, custodians/stewards, communities, conservation areas (SANParks and private), NGOs, WRC, DFFE, DWS (national), LEDET, MTPA, NWPT (provincial)
- HEIs - UniVen, UniLim, WITS, UKZN, UFS QwaQwa, TUT, NWU, SU, UCT, UNISA & UMP

South African Environmental Observation Network

Local presence: SAEON Ndlovu node

Northeast Mountain Observatories



Lowveld Savanna Observatories



Lowveld River Observatories



Drivers

Fire, herbivory, woody encroachment, bush clearing, biome shifts, invasive species control, land-use & land-cover change (protected area vs. communal, abandonment), rainfall, extreme disturbance, resource use & sustainability (wood harvesting), erosion.

- Long-term (decadal e.g. KNP fire history, river flow, remotely sensed imagery)
- Current (since 2006)

Responses

Ecosystem services, river flow & groundwater, water chemistry, soil chemistry & moisture, biodiversity, system productivity, forage quality, passive restoration, targeted population demographics, plant traits, disturbance impacts, indicator species, resistance & resilience

- Data resolution – continuous (instrumentation) to multi-year

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Local presence: EFTEON Lowveld Landscape

A highly-instrumented landscape-level platform focused on socially-relevant landscapes and their coupled hydrological systems

- Savanna biome, including human-transformed ecosystems
- Core and subsidiary sites
- Critical zone approach (ground water > atmospheric boundary layer)

<u>Continuous time-series data (instrumentation)</u>

- Biogeochemistry - C, N and P flux
- Hydrology
- Meteorology & Atmospheric Science
- Remotely-sensed imagery

<u>Field sampling (manpower)</u>

- Biodiversity indicators
- Records of disturbance
- Socio-ecological surveys – health, resource availability & value

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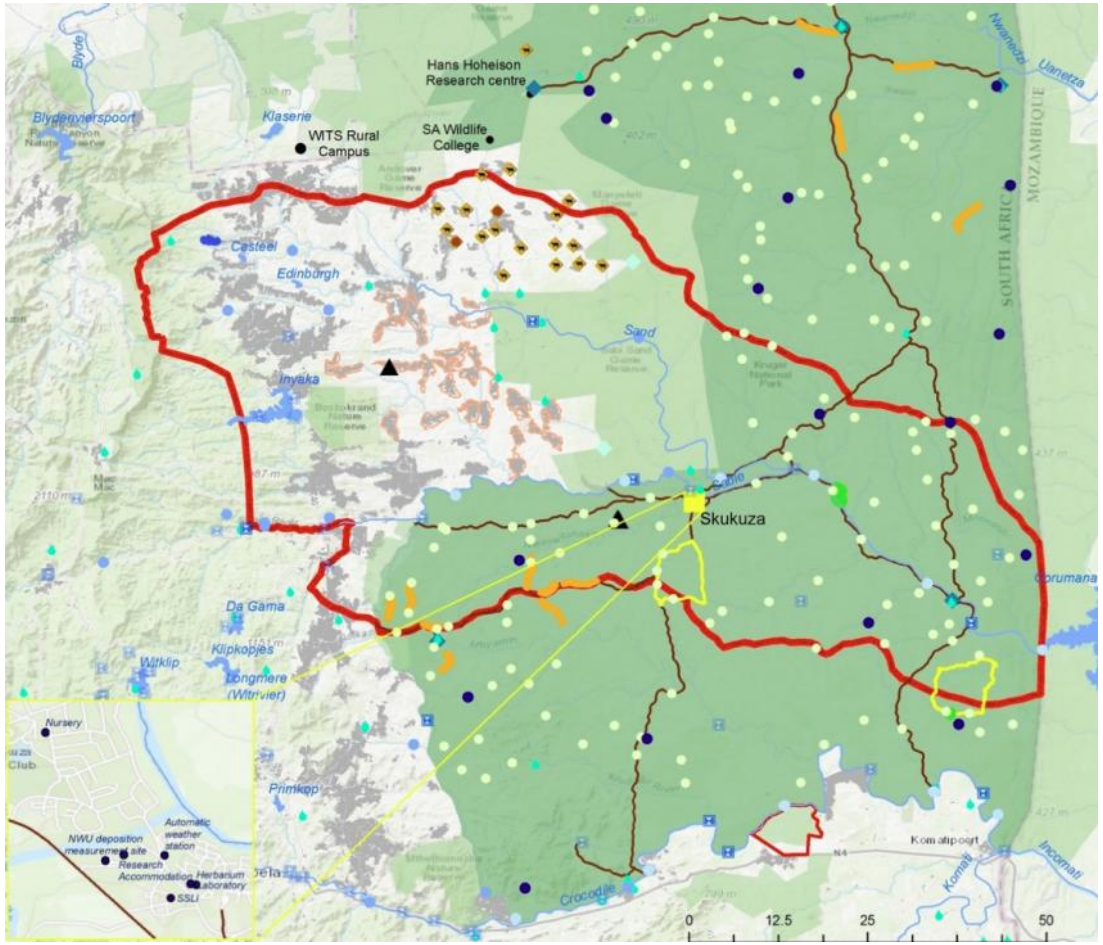
Local presence: EFTEON Lowveld Landscape



Geographic footprint

~ Bushbuckridge municipality

- Protected areas, river catchments, communal rangelands, forestry, commercial & subsistence agriculture, schools, urban & peri-urban development, upstream water abstraction

Monitoring sites

Ground water, river health & flow, flux towers, vegetation assessment, weather stations, fire manipulation, livestock & wildlife densities, herbivore exclosures, human health, demographics & household wellbeing

Research support infrastructure

WRC, SA Wildlife College, Skukuza (data repository & collections), Hans Hoheisen Wildlife Research centre, KNP long-term landscape manipulations (fire, herbivory), Agincourt Health & Demographic Surveillance System

Support in principle

Mbombela and Bushbuckridge local municipalities, SANParks, K2C Biosphere, MTPA, Inkomati-Usuthu Catchment agency & UMP)

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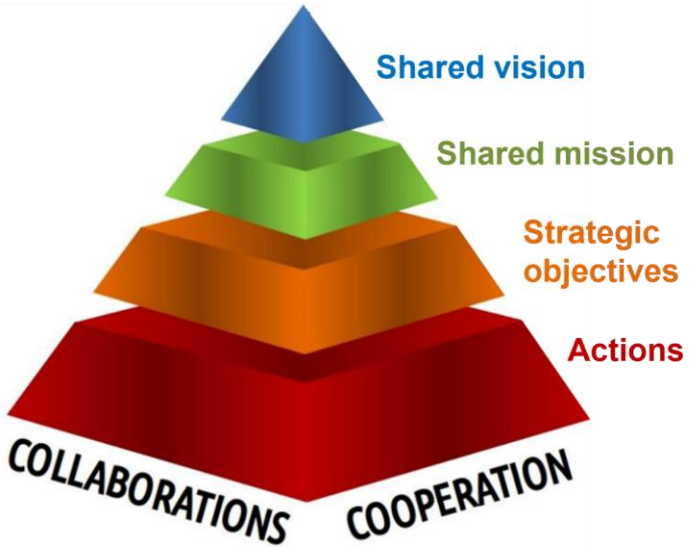
UMP Collaboration & Cooperation



UMP 'in principle' signatory of the EFTEON Lowveld Landscape proposal (2020)

UMP - SAEON MoU (2022) sets the basis on which the parties will identify areas of Cooperation and Collaboration (shared objectives, mission)

- sharing of resources, expertise & data

Enhance

- research capacity and societal relevance
- co-learning opportunities

Strengthen

- contribution to a cohort of knowledge producers in support of an environmentally-informed society

Initiate

- research projects which enhance society's understanding of a changing planet

Promote

- visibility and reputation in the scientific landscape
- postgraduate study and career opportunities in ecological sciences

UNIVERSITY OF MPUMALANGA
Creating Opportunities

NRF SAEON
National Research Foundation | South African Environmental Observation Network

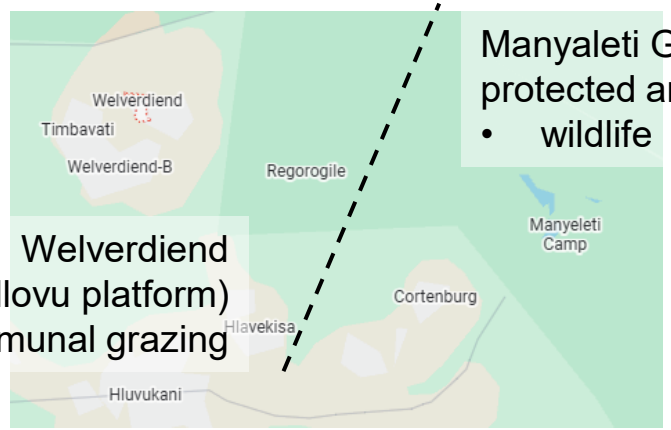
EFTEON
Expanded Freshwater Terrestrial Environmental Observation Network

South African Environmental Observation Network

MoU in action

Engagement with Prof Dan Parker, Dr Liaan Minnie & Dr Kath Forssman (School of Biology & Environmental Sciences)

- Tangible actions in support of shared objectives and vision

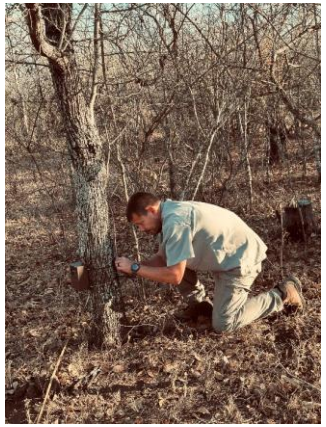


Manyaleti Game Reserve
protected area

- wildlife

Welverdiend
(SAEON Ndlovu platform)

- communal grazing



Ronald Thami Makubule
(MSc Ecology)
Drivers of large mammal communities

… 'a better understanding of human-modified savannas'…

… 'bring evidence-based conservation and management strategies'...

Fourman Manzini
(Hons Ecology)
Diversity and occupancy of meso-carnivores

… 'information on the impacts of land-use change, thus addressing a clear knowledge gap'...

Holokile William Mashamba
(MSc Ecology)
Wildlife-livestock contact and disease transmission

… 'support sustainable wildlife management, improve disease control strategies, and promote coexistence between rural communities and wildlife in shared landscapes'….

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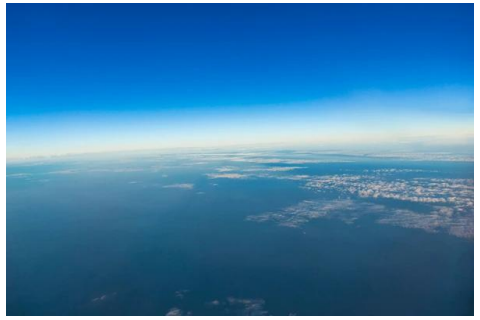

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SAEON
https://www.saeon.ac.za/

Data information & Management
https://ulwazi.saeon.ac.za/

Data Portal
https://catalogue.saeon.ac.za/

Education & Outreach
https://education.saeon.ac.za/

Graduate student network
https://gsn.saeon.ac.za/