ADDRESSING NATURAL RESOURCES AND DISASTERS BY INTEGRATING SPACE TECHOLOGY AND ECOSYSTEM / EARTH SYSTEM SCIENCE

"Reliable and accessible data and information is key to managing future risks" **- Claire Davis-Reddy, Data Science, SAEON uLwazi Node**

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MANAGING DIRECTOR

SOUTH AFRICAN ENVIRONMENTAL OBSERVATION NETWORK (SAEON)

120 hazards relevant to South Africa

Technological

Breakdown of critical infrastructure & networks
Adverse consequences of technological advances
Structural collapse
Transportation accidents
Cyber-attacks
Lack of innovation including resistance to change
Impact of new technology (opportunity and risk)
Disruptive technologies (AI, internet of things, robotisation)
Information security: massive incident of data fraud / theft
Energy transition readiness

Environmental

Water-borne disease
Vector-borne disease
Air-borne disease
Animal incidents
Epidemics
Epizootics
Insect infestation
Pandemics
Plant disease
Invasive Species

Extra-terrestrial Impact
Space weather
Drought
Wild Fire
Fog
Tropical Cyclone
Earthquake
Mass movement
Geochemical hazards
Salinization
Soil Erosion

Extreme temperature
Strong winds
Flood
Wave Action
Salt water intrusion
Ocean acidification
Water pollution
Air pollution
Terrestrial pollution
Oil Spill

Chemical spill
Radiation contamination
Biodiversity loss
Ecosystem collapse
Sandstorm
Hailstorm
Lightning
Heavy rain
Tornado

Economic

Deflation in a major economy
US interest rate hikes
Asset bubbles in a major economy
Fiscal crises in key economies
Global political uncertainty/disruption
High structural unemployment or underemployment
Fiscal crisis and credit rating downgrades
Currency devaluation
Failure of a major financial mechanism or institution
State Companies' Debts
Failure/shortfall of critical infrastructure
Corporate governance fraud
Exchange Rate Fluctuations
Unmanageable inflation
Skills shortage including the ability to attract and retain top talent
Energy price shock
Illicit trade (e.g. tax evasion, organized crime, etc.)
Commodity prices
Business interruptions (e.g. production, supply chain)

Political

Failure of governance (private and public)
Failure of regional or global governance
Interstate conflict with regional consequences (e.g. US-China Trade War)
Unmanageable fraud and corruption
Government policy, legislative and regulatory changes and uncertainty
National political uncertainty/instability
Failure of state, a state crisis or a state collapse
Lack of leadership
Large-scale terrorist attacks
Weapons of mass destruction

Societal

Growing income disparity and inequality
Failure of urban planning
Failure of climate change mitigation and adaptation
Chronic disease burden
Social instability
Large-scale involuntary migration

Water crisis
Food insecurity
Inadequate and/or substandard education and skills development
Insufficient supply of electricity
Shifting societal values
Gender inequality

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SAEON'S ROLES RE NATURAL RESOURCES & DISASTERS

- User-facing **portals** integrating data, information and tools
- New **tools**, systems, and data products to assist with translation of scientific evidence into societal benefit.
- Earth and environmental **data** sets provided by SAEON and its stakeholders.
- Promoting **discoverability, accessibility and interoperability**

NCCIS – INTEGRATED CLIMATE CHANGE INFO

- Open-source, standards-based and integrated portfolio of systems to eliminate duplication of effort, limit multiplication of data sources and be reusable on **many levels of government**.
- **Monitors** climate change drivers, events, objectives, targets and strategies for climate change mitigation & adaptation.
- **Insights** into national progress in responding to climate change and achieving a low carbon economy.
- **Information** for reporting and positions in negotiating platforms.

NATIONAL CLIMATE CHANGE INFORMATION SYSTEM (NCCIS)

Climate Change Resources for Communities and for the Country https://ccis.environment.gov.za/#/

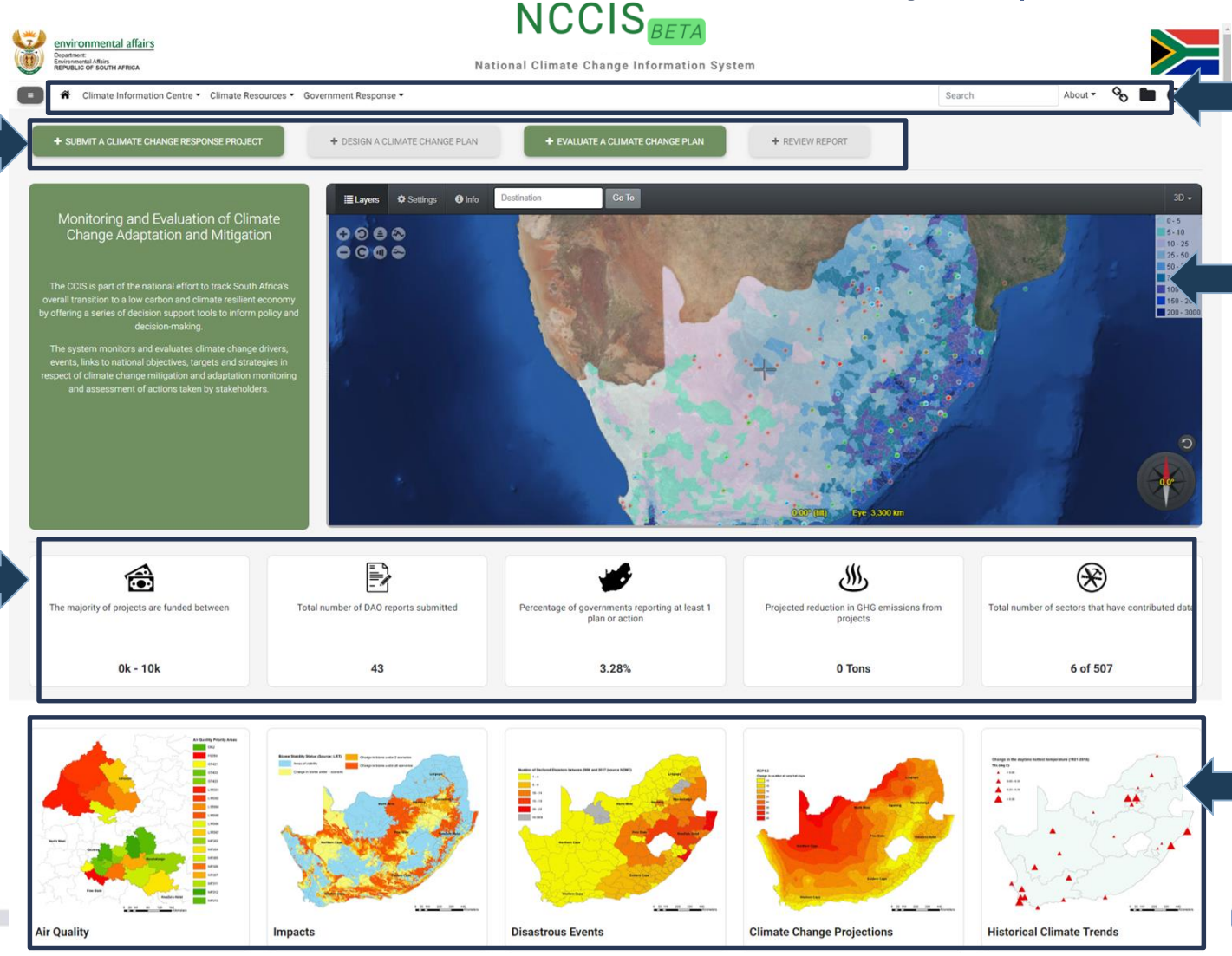
Action-driven navigation

Climate Change Resource

Interactive Atlas

Filterable summary of facts and figures from across all systems

Summary maps and resources covering the scope of the NCCIS



science & innovation
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REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation | SAEON South African Environmental Observation Network

PROJECTS OF SAEON ULWAZI NODE

HTTPS://ULWAZI.SAEON.AC.ZA

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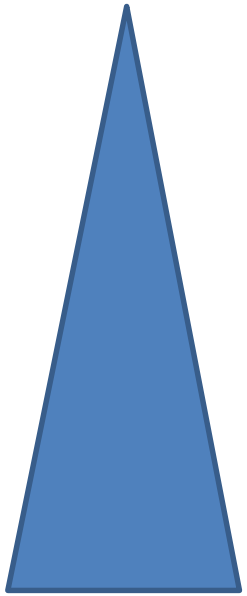
- South African Risk and Vulnerability Atlas III
- National Climate Change Information System
- South African Bioenergy Atlas
- South African Renewable Energy Atlas
- South African Carbon Atlas
- South African Sustainable Development Goals Atlas
- Support for MIMS (Marine Information Management System) and its integration with OCIMS (Oceans and Coasts Information Management System)

EFFICACY OF *IN SITU* OBSERVATIONS AND SATELLITE REMOTE SENSING FOR EARTH AND ECOSYSTEM SCIENCE

***In situ* observation systems**



EARTH SYSTEM SCIENCE
(PLANETARY PROCESSES)

ECOSYSTEM FUNCTION
(ECOSYSTEM BIOPHYSICAL PROCESSES)

ECOSYSTEM STRUCTURE
(ECOSYSTEM BIOPHYSICAL ARCHITECTURE)

Satellite remote sensing

INTEGRATION IS KEY

USE OF SPACE TECHNOLOGY FOR ECOSYSTEM AND EARTH SYSTEMS SCIENCE

- Long-term monitoring and predictions of earth systems and large-scale ecosystem dynamics (e.g. oceans, atmosphere, biomass & species response, geochemistry, hydrology)
- Land Cover changes, including invasive species and land use
- Monitoring of large-scale drastic events, including fires, floods, droughts, harmful algal blooms
- Predicting, adapting to and mitigating climate change
- Assimilation of data into models
- Validation of earth system model output
- Need for free and open data satisfied by Sentinel, Landsat, MODIS, EUMETSAT, Copernicus, AVISO, NOAA