

# Commentary

## The Expanded Freshwater and Terrestrial Environmental Observation Network (EFTEON)

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The Expanded Freshwater and Terrestrial Environmental Observation Network (EFTEON) is a research infrastructure that is being developed under the South African Research Infrastructure Roadmap (SARIR) program of the Department of Science and Technology. EFTEON is conceived as a modular, highly-networked, research infrastructure to support studies on coupled ecological social systems in South Africa.

The design concept is based on distributed nodes, each with responsibility for a core landscape representing an important South African Ecosystem/Human complex. The nodes are intended to include representatives of major biomes in South Africa and human transformed ecosystems such as urban areas and agricultural systems. The nodes are supported by a central co-ordination and data management facility (shared with the Shallow Marine and Coastal Research infrastructure (SMCRI) and general SAEON operations). Each of the nodes is planned to have a heavily instrumented core site for fresh water and terrestrial observations and a network of instrumented subsidiary sites, to provide supporting data at a broader spatial scale.

Each of the landscape sites will have:

- A standard set of automated instruments, measuring:
  - The exchange of carbon, water and energy through the use of Eddy covariance measurements
  - The water cycle (flow and quality) at connected freshwater monitoring locations within the landscape
  - Meteorological measurements
- A suite of standard repeated manual measurements, covering:
  - Biodiversity, productivity, ecosystem condition
  - Ecosystem service provision and use, and
- A systematic collection of a comprehensive set of remotely sensed data and
- Socio-ecological data for each landscape

Potentially one of the EFTEON sites will have a “catchment-to-coast” approach and link to a coastal long term ecological research site in South Africa or one to the sites of the Shallow Marine and Coastal Research Infrastructure (SMCRI) which is also being developed under the SARIR program.

EFTEON is expected to offer a number of free and discoverable datasets and data products for the scientific community, such as:

- Long term, time series measurement data of:
  - The fluxes of energy, carbon dioxide and water,
  - Measurements of meteorology, soil moisture, soil temperature
  - River flow, daily groundwater recharge, continuous stream chemistry (Electro-conductivity, pH, dissolved N, P and O<sub>2</sub> monitoring)
  - Documentation of vegetation, soil and disturbance parameters.
- Landscape Scale (100km x 100km) observations of land use and land cover at 30m resolution
- Socioeconomic studies of human population, livelihoods, health and use of resources,
- Inputs and disturbances, such as deposition or fires
- Population dynamics of representative and important species in the landscape for both terrestrial and freshwater ecosystems.

EFTEON contributes to global research infrastructures by providing a terrestrial research infrastructure for socially-relevant ecosystems research based in Africa and the Southern Hemisphere, strongly linked to coastal and marine ecosystems research and global environmental data systems.