

The North Australian Tropical Research Zone (TRZ) – An informatics platform to enable Tropical science knowledge innovation and discovery.

Trina Myers, Ian Atkinson.
e-Research Centre, James Cook University
{Trina.Myers; Ian.Atkinson}@jcu.edu.au.

Abstract

The Tropical world is an important but sometimes unrecognised component of the “world”. Biodiversity is not distributed evenly on Earth; a high proportion of the world’s biodiversity is located in the tropics, including up to 80% of animal and plant species and 92% of world’s coral reefs [1]. Population growth and urbanisation have led to biodiversity loss on a massive scale in many tropical countries, a process exacerbated by climate change. High population density and growth are similarly linked to poor health outcomes and to the emergence of new infectious diseases [2].

The North Australian Tropical Research Zone (TRZ) is a platform to serve data sets related to Tropical research from a single virtual location that will enable researchers, managers and decision-makers to collaborate around the data. The Tropical world has unique challenges that are becoming particularly apparent with the impacts of climate change. To resolve and manage these issues in the Tropics the integration and coordination of data is of great importance.

The focus of the North Australian TRZ is on the Tropical sciences, knowledge and innovation spanning the geographic range across the top-end of Australia (Figure 1). However, over time the initiative is planned to cover a greater area of the world’s tropics. The North Australian TRZ is initially being established to support data intensive research on the effects of climate change on tropical environments, in particular the discovery of flora and fauna *refugia* and biodiversity hotspots that can be used as locations of last resort for species under periods of intense climate anomalies (e.g. extended drought or heatwaves) [3, 4].

The philosophy of the North Australian TRZ is to span traditional ‘vertical’ research disciplines and enable ‘horizontal’ research (Figure 2). Specifically, vertical research is the traditional discipline and data-specific research paradigms are conceptual silos of concentrated research efforts. In contrast, horizontal research spans a cross-connect through disciplines, research methods, data resources and experimental techniques to enable synthesis of a diverse range of disciplines and data.

The tropical data hub is intended to complement existing data repositories and stores and be a banner under which research interests in the Tropical world can be concentrated. The hub will provide a data hosting infrastructure to host significant national and international data sets, but significantly also be portal through to other primary data sources. Notably, a key functionality of the portal will be the amalgamation of disparate data exposed for the purpose of harvesting metadata, facilitating search across all data sources. Interested parties such as Australian state, commonwealth and university research programs and/or management groups will then benefit from the synthesis of cross-discipline data, information and knowledge available via the North Australian TRZ.

An implementation of the North Australian TRZ is a portal for the visualisation and assessment of significant land use and species distribution data in Northern Australia. For example, a GeoNetworks [5] based service currently incorporates geo-hydrological data (vector data) and bird species distribution (raster data) in the wet tropics of North Queensland. The Geographic Information System (GIS) will enable search facilities to overlay primary data on river attributes such as stream reaches, sub-catchments and catchment areas. The information derived from these hydrological datasets are essential components in the management and conservation decision-making of stream ecology natural resources. The first purpose of this service is to map the migratory movement and refugia of hundreds of bird species over a period of time in correlation with the changing climate [6]. In addition, visualisation over time and space on the topography and land-use of rivers and the surrounding landscapes add a more powerful real-time view of the environment.

The future development of research in Tropical science will be an important tool in the discovery of phenomenon such as climate change impacts, the study of endangered or noxious flora and fauna, decision-making for land use and marine management. The North Australian TRZ is proposed as an

‘open’ portal, with contributors submitting data sets and other content in an open and collaborative way. Over time it is expected that the Hub will incorporate elements that go beyond research data, and have a role in public dissemination of research to government, industry and the public. Our vision is a Tropical Hub that will be the centre of a range of eResearch services and outputs from organisations such as the Australian National Data Service (ANDS) [7] and universities involved in Tropical research and development.

KEYWORDS

eco-informatics, Tropical science, research hub

REFERENCES

- [1] M. Spalding, C. Ravilious, and E. Green, *World atlas of coral reefs*. London, England: University of California Press, 2001.
- [2] J. A. Patz, D. Campbell-Lendrum, T. Holloway, and J. A. Foley, "Impact of regional climate change on human health," *Nature*, vol. 438, pp. 310-317, 2005.
- [3] O. Hoegh-Guldberg, "Climate change, coral bleaching and the future of the world's coral reefs," *Marine and Freshwater Research*, vol. 50, pp. 839-866, 1999.
- [4] IPCC, "Climate change 2007: the physical basis," Cambridge Univ. Press, Cambridge, U. K. 2007.
- [5] GeoNetwork, *GeoNetwork opensource*, 2010. World Wide Web site: <http://geonetwork-opensource.org/>.
- [6] S. Januchowski, J. E. VanDerWal, A, and B. Pressey, "Characterizing errors in surface models and associated costs," *International Journal of Geographical Information Science*, vol. in press, 2010.
- [7] ANDS, *The Australian National Data Service*, 2010. World Wide Web site: <http://ands.org.au/>.



Figure 1 – The geographic span of the North Australian TRZ

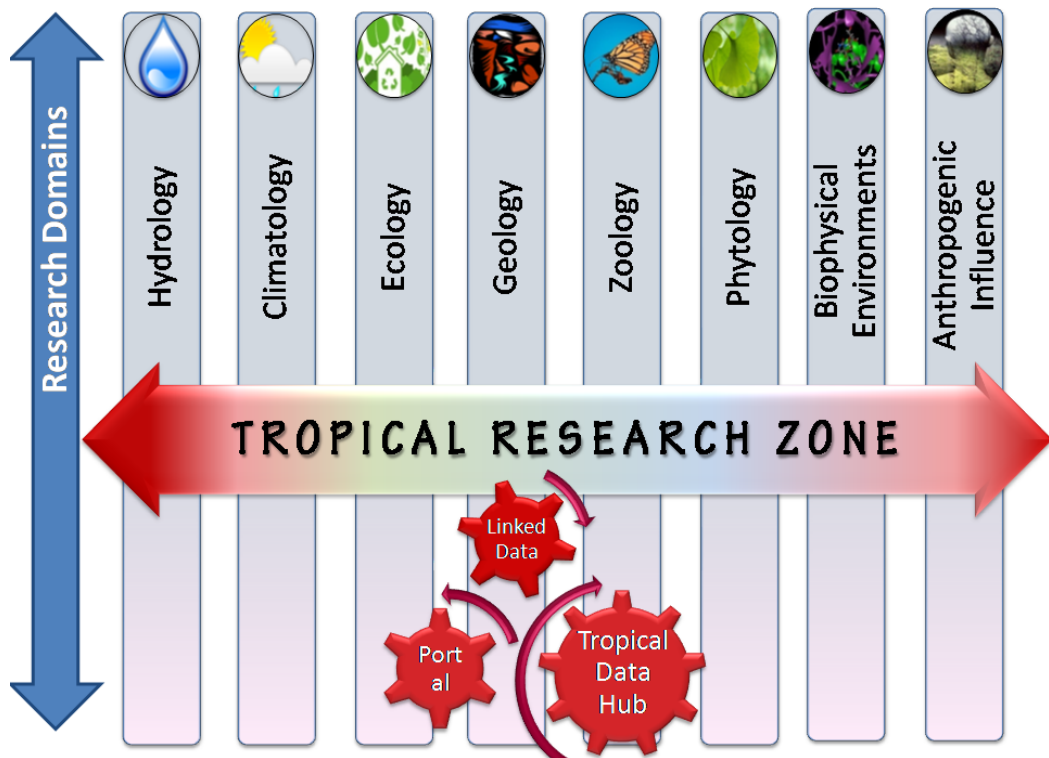


Figure 2 – The vertical research scope of the North Australian (TRZ)