

**NCCARF-TBN Collaborative Travel Grant Report**  
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**Supervisor:** Assoc. Professor Armando Apan  
**PhD Project:** “Development of Resolution Dependent Scaling Factors for Landscape Function Analysis Indices for measurement of Ecosystem Adaptation”

**Introduction:**

The following collaboration meetings were undertaken..

- Meeting with Dr John Ludwig on Wednesday 8 Dec 2010 at the Ecological Society of Australia (ESA) AGM, in Canberra.
- Technical poster presented at the ESA AGM with acknowledgement to NCCARF.
- Planned meeting with Mr David Tongway in the field on Saturday and Sunday, 11-12 Dec 2010 in Canberra was cancelled because his wife had become ill and he could not leave her unattended. Collaboration with Mr Tongway has been through 3 telephone calls, exchange of papers and email advices from him.
- Meeting with Dr Brett Abbott in Charters Towers on Mon.26 Sept 2011. He was in the field at the same time as I was also collecting field data.
- Meeting with Mr Robert Karfs at QDPI in Townsville on Wed. 28 Sept. 2011.
- Discussions and emails with Drs Bastin and Chewings, CSIRO Alice Springs. A meeting to discuss interpretation and application of results is planned in the future. Funds remain available for this.

**Major Findings:**

1. Retention of resources in an ecosystem markedly affects their ability to withstand the effects of climate change. The degree of resource conservation occurring in an ecosystem can be measured on a catchment scale through the analysis of satellite imagery and analytical procedures such as the CSIRO Leakiness Index Calculator (LIC).
2. The primary data required by the LIC are relative terrain elevations (DEMs) and the spatial distribution of ground cover. Reliable and consistent measurement of ground cover at different times is difficult because of its spectral heterogeneity and dependence on recent weather conditions. Despite these difficulties recent field work by CSIRO in the Queensland dry tropics has demonstrated that catchment and paddock scale LI calculations accord with field ground cover measurements and stocking rates.
3. Procedures such as the satellite based LIC offer an opportunity to manage production rangelands to reduce resource loss thereby increasing carbon sequestration, soil condition and habitat for ground dwelling animals.
4. Scale, timing, frequency, weather records and cost of satellite imagery influence the application of this procedure. Collaboration with CSIRO and QDPI staff clarified the importance of developing procedures to allow comparison between LI calculations using data from satellite sensors with different resolutions.

**Significance to Biodiversity Adaptation:**

1. Measurement of ecosystem functionality at a landscape scale offers a unique way to assess whether the ecosystem as a whole is improving or declining as a result of the combined effects of human activity and climate change. Reliable measurement methods are essential to determine the effects of change and management practices.
2. New satellite based image sensor technology has an increasingly higher resolution. To use these we need to know the effects of change in scale compared to the Landsat time series images because these are the primary reference images.
3. Land managers and Natural Resource Management Bodies are beginning to use ground cover measurements at the catchment scale to evaluate the environmental health of their properties.