

Environmental Futures Centre

PPBio: Program for Planned Biodiversity & Ecosystem Research

Associate Professor Jean-Marc Hero and Dr Guy Castley

Project Outline

The Program for Planned Biodiversity and Ecosystem Research (PPBio) is a platform for long-term biodiversity and biophysical research. The program facilitates integrated multidisciplinary research designed to answer targeted questions (e.g. management and ecosystem response to climate change).

The system is based on a hierarchical network of permanent plots (terrestrial and aquatic) that are systematically spaced in grids (e.g. 5 km x 5 km) and modules (e.g. 5 km x 1 km) within a long-term ecological research (LTER) network. Plots follow contour lines which facilitates orthorectification and validation of satellite imagery.

Metadata and data collected for biodiversity and biophysical research is stored and publicly available to facilitate ongoing integrated multidisciplinary research at local, mesoscale, landscape and global scales.

The strength of the PPBio approach is that it facilitates multi-disciplinary research to assist managers to monitor both the impacts associated with local management practices, and the long-term responses and adaptive capacity associated with global climate change.

PPBio - Karawatha, Brisbane

The Karawatha LTER was established in early 2007. Many projects have been completed and the database system is now available to managers online.



PPBio - Lake Broadwater, Dalby

Lake Broadwater LTER establishment began in 2008, with annual trips to complete the permanent infrastructure underway.



PPBio - Chitwan National Park, Nepal

The Nepal LTER was initiated in 2007 with a research grid in Chitwan National Park, Nepal.



PPBio: Program for Planned Biodiversity

A research platform for collecting, storing & sharing biological information: contributing towards a global strategy for monitoring biodiversity

PPBio Australasia is part of an international meso-scale, multidisciplinary program designed for cost-effective and efficient ecological research and data collection. It provides a new model for biodiversity research, monitoring and assessment using Long-Term Ecological Research Sites (LTERS), that can be replicated in any environment, providing an innovative foundation for enhancing environmental management and monitoring the impacts of climate change in the future.

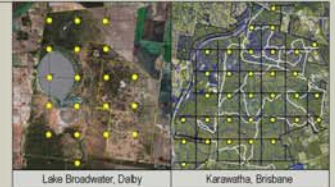


Research & Monitoring Approach

1. 250m transect/plot following contours



2. Plots evenly spaced in a 5km x 5km grid, with extra plots and modules as needed.



4. Data outcomes available to managers and public. Data collection repeated through time provide a long-term basis for monitoring and condition assessment, contributing towards Global and Local Biodiversity Assessment

Project METADATA
E.g. woody stem density (# / ha)

Species	Plot	C		E		H	
		1	2	1	2	1	2
Acacia sp.	1	2	1	1	1	1	1
Allocasuarina illinoensis	1	1	1	1	1	1	1
Alphitonia excelsa	1	1	1	1	1	1	1
Angophora lanceolata	1	1	1	1	1	1	1
Banksia sp.	1	1	1	1	1	1	1
Corymbia strictata	1	1	1	1	1	1	1
Corymbia goniodora	1	1	1	1	1	1	1
Corymbia lasiocarpa	1	1	1	1	1	1	1
Corymbia micrantha	1	1	1	1	1	1	1
Corymbia trichocarpa	1	1	1	1	1	1	1
Eucalyptus amoenula	1	1	1	1	1	1	1
Eucalyptus latifolia	1	1	1	1	1	1	1
Eucalyptus kanehirii	1	1	1	1	1	1	1

Example: Within each plot, woody plants were tagged and identified between Jan - Jun 2007. Plot width varied with stem diameter: 1ha for DBH >30cm, 0.5ha for DBH 10-30cm DBH, and 0.1 ha for DBH < 1cm.

3. Data and Metadata are compiled and publicly available on the internet

Results - Vegetation

Question: What factors influence tree assemblages at the meso-scale, in a subtropical eucalypt forest?

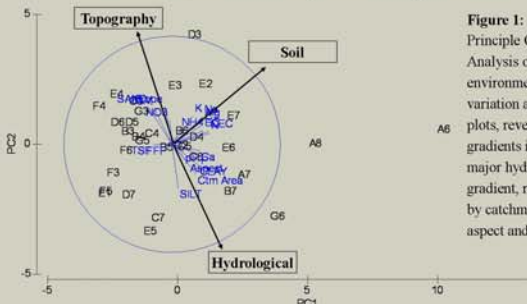


Figure 1: Principle Component Analysis of the environmental variation among plots, revealing three gradients including a major hydrological gradient, represented by catchment area, aspect and clay.

Results: Large heterogeneity in species composition and density at the mesoscale was found among plots. Species composition and density also differed among size classes, although there were significant overlap ($P=0.01$). Within size classes, 69% of the variation in large trees were explained by catchment area, elevation and pH ($P=0.01$), although catchment area alone explained 52% of the variation ($P=0.01$). The intermediate sized tree assemblages were also explained by catchment area, elevation and pH, although soil sodium content was also important ($52.7\% P=0.01$). Similar results were found for small sized trees, although fire frequency and electrical conductivity was also in the best model ($R^2 = 39.4\% P=0.02$).

Conclusions: These results demonstrate the overriding importance of the landform gradient from valley floors to ridge tops to the patterns of trees in subtropical eucalypt forest irrespective of tree size, where this gradient influences soil nutrients and thereby influences tree assemblages at the mesoscale. (Butler, S., J.-M. Hero and G. Castley, unpublished)

Projects

- Amphibian Response to Climate Change within Karawatha Nature Reserve
- Mesoscale avian assemblages
- Mesoscale vegetation, soil and fire
- Koala density estimation and population viability analysis
- Political ecology, socio-economic benefits of Karawatha to the surrounding community
- Selection of invertebrate taxa as indicators of climate change and fire.
- Dynamics of Tree Hollows and their inhabitants, for long-term management.

Vision

The long-term objective of the PPBio Australasia is to expand this network along ecological gradients throughout the Australasian region.

There are currently three PPBio LTER Research Grids: Karawatha (Brisbane), Lake Broadwater (Dalby) and Chitwan National Park (Nepal).



Management outcomes

- ◆ Condition Assessment
- ◆ Monitoring for Climate Change
- ◆ Macro and Mesoscale assessment of ecological processes

PPBio Australasia is inviting industry and research partners. Please contact A/Prof Jean-Marc Hero: m.hero@griffith.edu.au OR Dr Guy Castley : g.castley@griffith.edu.au

For more information see our website: www.griffith.edu.au/ppbio

Or view:

Hero, J.M, Castley, J.G., Malone, M.M, Lawson, B. and Magnusson, W.E. 2009. Long-term ecological research in Australia: innovative approaches for future benefits. *Australian Zoologist*. in press.



Dedicated to a better Brisbane



Poster prepared by A/Prof Jean-Marc Hero, Dr Guy Castley, Mikalah Malone and Sarah Butler



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