

## **BioAcoustics**

Recordings captured using acoustic sensors placed in the Australian SuperSites Network (SuperSites). These recordings provide an effective means for monitoring biodiversity at large temporal scales in significant Australian biomes.

## **BiolImages**

*BiolImages* provide visual records of state and changes over time in archetypical and important ecosystem types.

### **BiolImages: Leaf Area Index (LAI) images**

*LAI images*: Canopy images used to calculate LAIs. LAI is the preferred measure of cover for vegetation. It relates to the total one sided area of leaf tissue per unit area of ground. This is a key derived parameter that is associated with vegetation water and light interception, radiation transfer, water and carbon exchange. It is used in total vegetation biomass estimation and in carbon cycling prediction models.

#### **Box 1. BiolImages: Leaf Area Index images - Collection Methodology.**

Indirect measures of LAI calculated from digital photos. Camera mounted on a tripod, levelled, and upward facing looking at the nadir ( $0^\circ$ ). Images of the canopy or sky collected from points on a grid across 1 ha plot. The grid includes 100m transects from each axis. Photos are taken at the intersection points of the transects. The number of transects (and therefore the number of photo positions and their spacing) varies among SuperSite (typically. 9x9 transects with 10m spacing,

but in some SuperSites 6x6 with 20m spacing transects).

Two types of lenses are used:

- Standard lenses (*Digital Cover Photography*): for medium stature (4-8m) vegetation using 10m point spacing on the grid.
- Hemispheric lens (*Digital Hemispheric Photography*): for short (4-8m), tall (>40m), and complex (multi-strata) vegetation using 20m point spacing on grid.

LAI calculation follows MacFarlane et al.(2007, 2011) protocol (i.e. classification method of mixed pixels). Different software implementations of this protocol used for different SuperSites (as collected by different groups): DCP software version UTS (by S. Fuentes, modified by: R. Whitley and N. Boulain), or R-version (by R. Duursma).

## **BiolImages: Phenocam images**

*Phenocam images*: Time-lapse photographs taken by fixed digital cameras. They enable cost-effective long-term record of vegetation structure and condition in diverse and sometimes remote Australian biome. Thus, they allow the tracking of seasonal and unseasonal changes in vegetation and ground cover. Thus, they constitute crucial tools to: (1) monitor ecosystems; (2) record and analyse ecological responses to climate variability and extreme weather events; (3) in combination with OzFlux data study surface-atmosphere exchanges of carbon and water; and (4) calibrate and validate satellite-derived remote sensing data (*AusCover* facility links ground-based phenocam images with airborne and satellite data to effectively scale up from intensively monitored sites to larger spatial domains up to the continental scale).

## **BiolImages: Photopoint images**

*Photopoint images*: High quality digital photos taken from five set points to create reference images. Photos are taken annually to record natural phenomena and how sites changes over time.

### **Box 2. BiolImages: Photopoint images - Collection Methodology.**

High quality digital photos taken in 1 hectare plots. *Number*: 20 (4 photos at 5 points).  
*Locations* ('photo points'): Centre and 4 corners of plot.

*Orientation:* At corners photos taken in the 4 cardinal directions. At centre photos taken in the direction of 4 corners.

*Height:* Camera mounted on a tripod with the central part of the lens at ~1.3m.

*Time:* Between 10am and 4pm (where possible) to minimise sun and shadow effects.

*Preparation:* Vegetation within 1 m of the photo point removed or pushed aside.