



# Developing integrated assessment of biodiversity in secondary forest in Belize

Lindsay Maskell, Paul Walker, Ivis Chan, Zoë Goodwin, Normando Mora, Simon Smart, Emmerson Garcia, Adam Lloyd  
Defra Darwin Initiative

Partners: Wildtracks, Belize Audubon Society, Natural History Museum, University of Belize



## Objectives

To determine the biodiversity value of secondary forest tracts within and surrounding three protected areas, that are regenerating from past natural and anthropogenic impacts

To build capacity, establish facilities, set up database structures, GIS and provide training

To compare forest regeneration in naturally regenerated forests (e.g. post-hurricane) with that from anthropogenic landuse specifically post-agricultural

To relate past and present landuse to biodiversity and attempt to identify indicator species that could be used to demonstrate conservation status.



Fireburn Forest Reserve



3 study areas on a North-south gradient



Cockscomb Basin Wildlife Sanctuary



Crooked Tree Wildlife Sanctuary

## Methodology

Three study sites across Belize were chosen. Within these sites transects and plots were recorded in areas subject to different types of landuse. Landuse types: agriculture (shifting cultivation), selective logging natural forest subject to disturbance by hurricanes.

Field testing showed that 10m x 10m plots would be the most efficient for sampling vegetation. Within each 10m x 10m plot all canopy trees were recorded and voucher specimens taken for identification and confirmation. The tree DbH was measured. Additional measurements within a plot included foliage density, light meter readings, soil depth, pH and soil moisture.

Other taxa were also recorded; birds, reptiles and amphibians, bat recording with an ANABAT device was attempted but this has not been successful.

Vegetation analysis has begun using multi-variate techniques. DCA and CCA have been used to look at patterns in the botanical species composition to relate them to explanatory variables including Landuse (farmed, logged, hurricane-impacted) and physical parameters such as light levels.

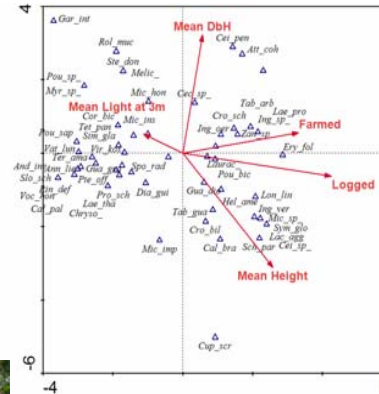


Figure 1. DCA of species at Cockscomb with explanatory variables projected.



## Training & methodological development



CEH staff have worked with Darwin project participants in Belize to enhance skills in GIS, database management, experimental design, analytical and fieldwork techniques.

## Results

Vegetation was recorded in 62 plots at Cockscomb, 86 at Fireburn and 27 at Crooked tree. Botanical specimens were sent to the UK for identification at the Natural History Museum, London. One set of duplicates will be deposited at the Forest Department herbarium in Belize. 382 different canopy species were identified across all three sites, of these 298 were identified to the species level. At Cockscomb there were 232 (184 identified to species), Fireburn 141 (111 to species), and Crooked Tree 105 (82 to species).

Preliminary analysis of the vegetation data at Cockscomb showed that logging (post 1961) and farming both had a significant effect on the species composition ( $p < 0.05$ ).

Some species e.g. *Lacistema aggregatum*, *Inga vera*, *Lonchocarpus lineatus*, *Tabaernaemontanum arborea* and *Heliocarpus americanus* showed a +ve association with logging and farming.

Others e.g. *Dialium guianense*, *Andira inermis*, *Terminalia amazonia* and *Tetragastris panamensis* showed a -ve association with logging and farming.

Logging significantly influenced species composition when species were classified by DBH class:

Species +vely associated with logging with a larger DbH include *Heliocarpus americanus*, *Ceiba* sp., *Schizolobium parahyba*, *Tabaernaemontanum arborea* and *Attalea cohune*.

-vely associated with logging with a larger DbH included *Dialium guianense*, *Pourouma bicolor*, *Simarouba glauca* and *Virola koschnyi*.

**Next steps:** Further analyses will differentiate between the effects of farming and logging, include the data from the other sites, incorporate more environmental data (soil samples have been taken and are being analysed) analyse the effects of Landuse on biodiversity across taxa and compare naturally vs anthropogenically impacted regeneration.

Please contact Lindsay Maskell at [lcma@ceh.ac.uk](mailto:lcma@ceh.ac.uk), Paul Walker at [office@wildtracksbelize.org](mailto:office@wildtracksbelize.org) or Ivis Chan at [research@belizeaudubon.org](mailto:research@belizeaudubon.org) for further information

