

Savanna Ecosystem Assessment: Belize Year One Report



Summary

This report summarises the activities undertaken during the first year of the Savanna Ecosystem Assessment: Belize project funded, by the UK DEFRA Darwin Initiative. Year one objectives have been to develop a new savanna ecosystems map for the country, providing an urgently needed baseline assessment of the savanna extent and condition nationwide. Botanical survey to develop the first savanna species checklist have begun, as have GIS capacity building initiatives. The support provided by Planet Action, including a number of SPOT images, GIS software and books, have greatly helped in the timely delivery of these objectives.

Introduction

The savannas of Belize occupy about 10% of the country's land area, furnishing distinctive landscapes of ecological and economic value. Despite their national biodiversity importance, Belize's lowland savannas remain neglected in comparison with forests in terms of both botanical research and level of protection. Gap analysis in 2005 revealed that savannas are under-represented in the National Protected Areas System. This needs to be addressed urgently because savannas are experiencing an increasing variety and severity of threats. There is pressure to burn and clear savannas for settlement and for infrastructure. Despite their unsuitability, savannas are being converted for agriculture. The Forest Department seeks to harvest pine, palms and other plant resources from savannas, but presently lacks the botanical information needed to ensure that harvesting does not target areas of high conservation value.

One of the key problems is the insufficient information available on which to base a national conservation strategy for this ecosystem. There is no comprehensive checklist of savanna species, information on species distribution is incomplete and little is known about patterns of endemism or the usage and value of the plant resources. Many savanna areas, particularly in the south, remain unexplored botanically and there is therefore no basis for making informed conservation decisions. Although some plant collections have been made, the national herbarium is under-resourced. Specimens are not correctly curated, named or data-based and are thus of restricted value.

This project responds to these needs by undertaking baseline botanical surveys, by producing a comprehensive new mapping of the nationwide extent and condition of savannas and by providing training of

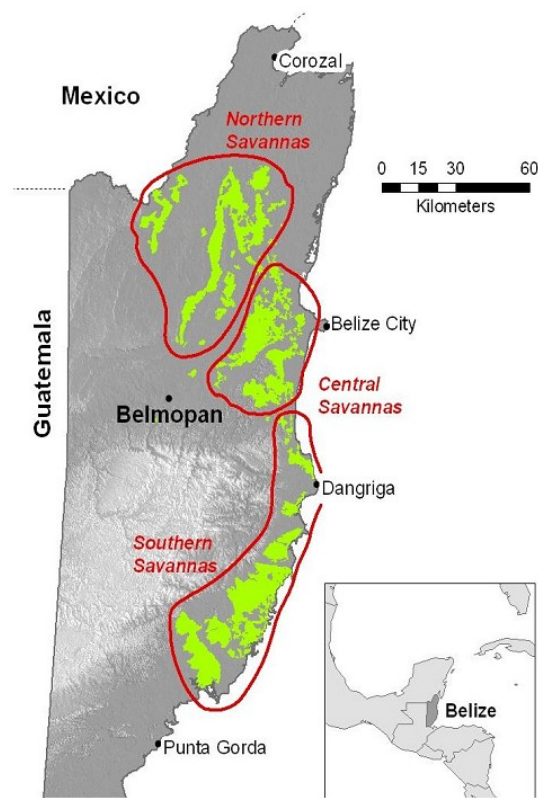


Figure 1: Remaining savannas, identified from new satellite data, have been grouped into 3 regions for survey.



staff and students that will enhance the capacity of local organisations in Belize to maintain and continue this scientific research in the future.

Overall project goals

The primary aim of this project is to develop a more detailed and up-to-date national mapping of the savanna composition and extent. In conjunction with ground surveys, this will enable priority areas for savanna conservation to be identified throughout Belize.

To achieve this outcome, the following objectives will be met:

- 1) Mapping of lowland savanna extent and structure. (Year 1; *Completed*)
- 2) Creation of a botanical checklist of savanna species. (Years 1-2; *Ongoing*)
- 3) Training and knowledge transfer with Belizean institutions to build local capacity for monitoring of the savanna ecosystem. (Years 1-3; *Ongoing*)

Satellite Image Analysis and Findings

The satellite imagery provided by Planet Action (7 SPOT images) was used to fulfil project objectives 1 & 2.

Objective 2

The initial purpose for the SPOT images was to guide the identification of priority areas where botanical collections should take place during the fieldwork periods. A variety of map products were created to assist with this task. A national map showing the main savanna areas has been published as an A0 poster and this has been presented at various research conferences. Two series of maps for use in the field have also been published at 1:40k and 1:20k scales. This mapping has been routinely used to help teams to navigate to different vegetation subtypes in the field, and is proving of great value for partner researchers based in Belize.

Objective 1

The primary purpose of the SPOT satellite imagery was to support development of a new, nationwide savanna ecosystems map. The new ecosystem map operates at two levels: 1) Savanna Landscape level, where the extent of savanna and associated ecosystems are mapped at a national level and 2) Savanna Patch level, which discriminates vegetation assemblages within the savanna landscape. This scheme has been formulated to allow us to meet the requirements of different end users with a single, coherent product. The result will be the first map showing the mosaic of savanna vegetation types discriminated and mapped for the whole country, with an accompanying statement of map accuracy.

The key steps used in the development of the Savanna Ecosystems Map of Belize: 2010 is shown in the figure below. Note that, in addition to the SPOT images kindly provided by Planet Action, we were also provided with a series of ALOS PALSAR scenes, courtesy of the Earth Observation Laboratory at Aberystwyth University, and three IKONOS images from the GeoEye Foundation. The ALOS images provided vital additional information of the internal composition of the savanna ecosystem, in particular allowing for accurate identification of savanna woodlands. The IKONOS imagery was used for ground-truthing of the savanna classification. A comprehensive technical report on the image analysis and techniques will be published on the project website (eeo.ed.ac.uk/sea-belize) and the Planet Action website once the final, ground verified version of the map is produced in Autumn 2010. Here we provide a summary of the major analysis steps is provided in figure 2, together with examples of the output savanna ecosystems map in figures 3 & 4.



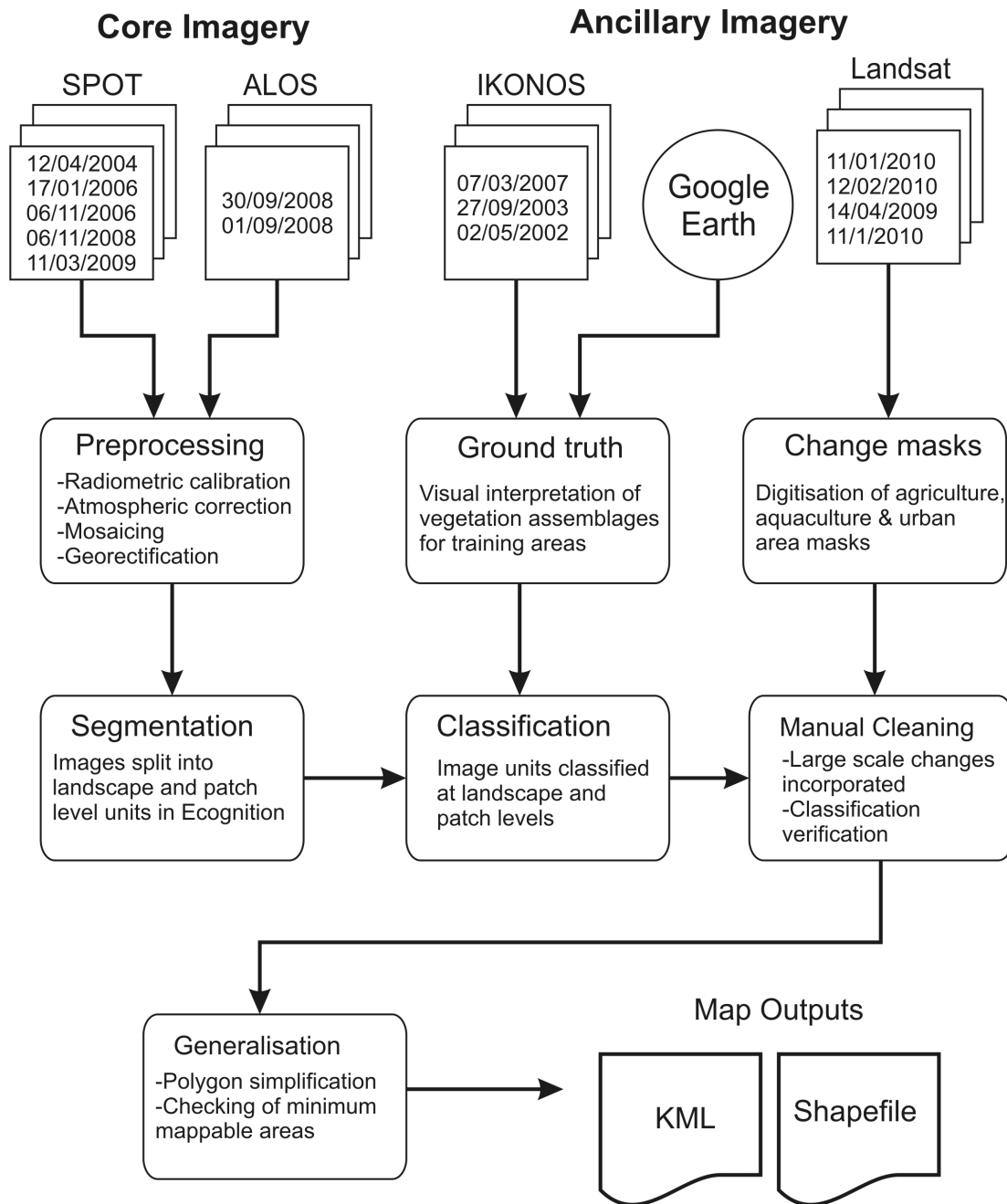


Figure 2: Main image analysis steps undertaken in the production of the Savanna Ecosystems Map of Belize: 2010.



Figure 3: The Savanna Ecosystems Map 2010
Landscape Level Classes, Northern Belize

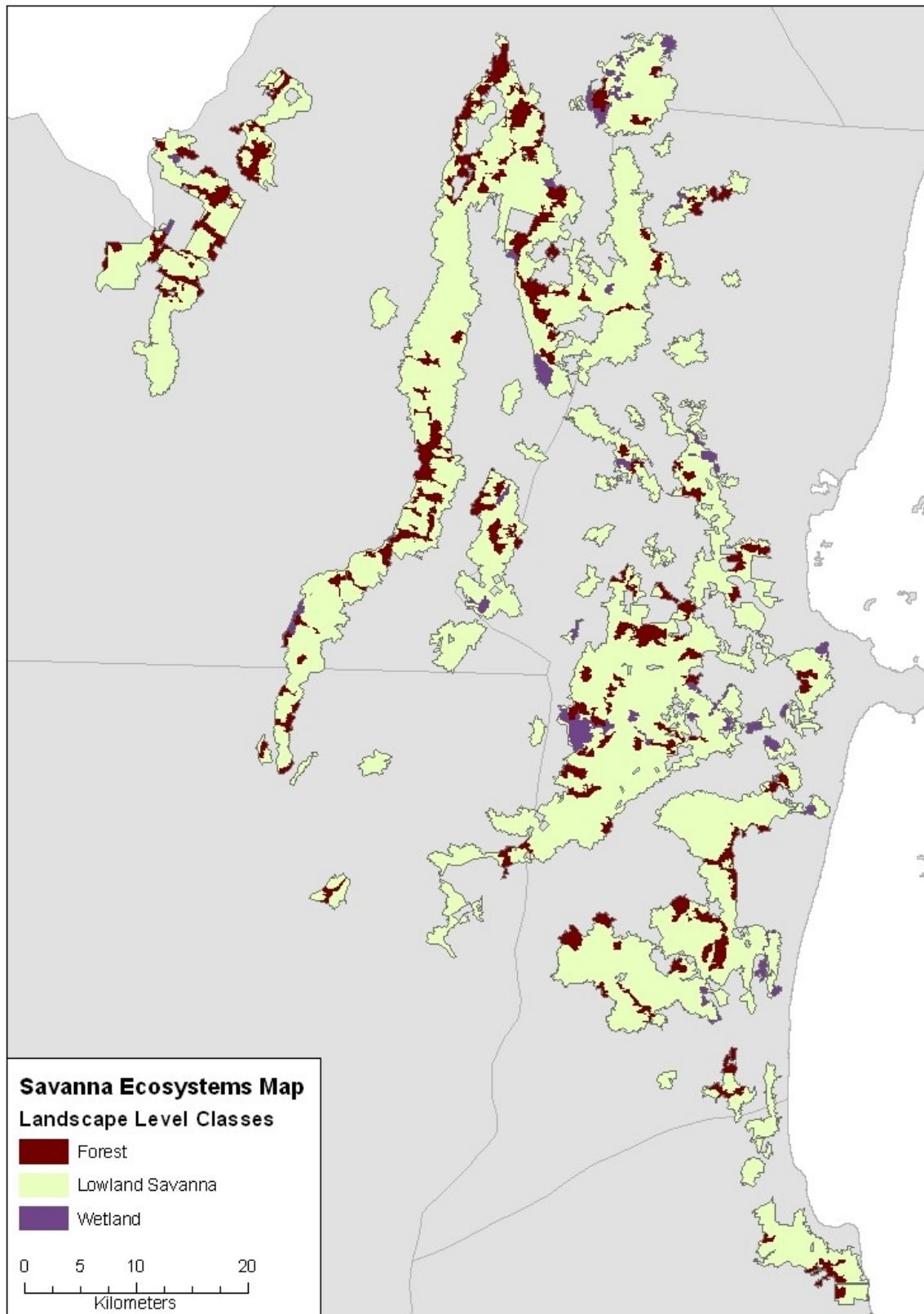
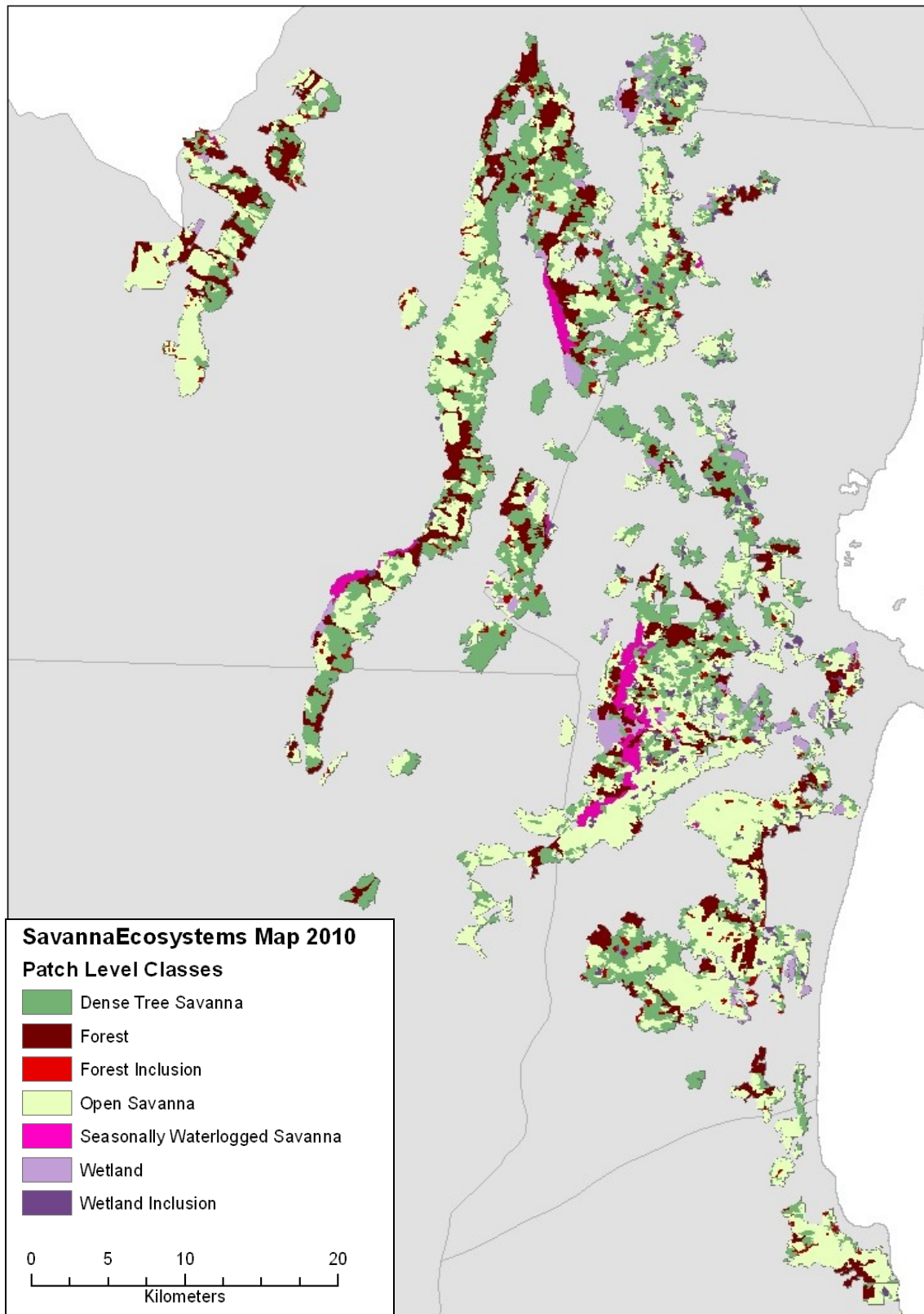


Figure 4: The Savanna Ecosystems Map 2010
Patch Level Classes, Northern Belize

Savanna Ecosystems Map: Northern Belize



Activities Undertaken

Various consultative and training activities have been carried out this year to begin the building up of a local capacity for handling geographic information at the University of Belize. This was one of the skills gaps identified in Belize's National Capacity Self-Assessment report to UNDP in 2005. Our project is timely since the University of Belize only recently installed its first teaching laboratory for GIS and until now has been relying entirely on overseas trainers to deliver all the teaching of this subject to its undergraduates. Our first objective for the initial year of the project was to identify local staff at the University of Belize who could be supported to develop their GIS skills, so that they could subsequently train others. Secondly, we began the process of providing these staff with training on specific topics that they identified through the consultation. To ensure that these staff had adequate resources, our third objective was to extend and enhance the quantity of books, manuals and other materials available at UB for teaching the principles and techniques of collecting and handling digital geographic information.

To fulfil the first and second of these objectives, we identified staff at UB who wished to receive training in GIS software. Dr Cameron consulted with these staff in Belize in September 2009 to understand the principles and techniques they most needed assistance with teaching. Between October to December 2009 he developed a series of short practical exercises at the University of Edinburgh to assist staff in Belize to teach some key GIS data input and analysis tasks. These exercises were delivered in draft form in December 2009 to UB for their staff to evaluate and review. This was then followed up in January 2010 with consultancy and training focused on meeting these teaching needs, which was delivered to a small group of lecturing staff at the University of Belize. The whole activity was collaborative in approach, with the UK staff first consulting with teaching staff in Belize to identify their requirements, then providing them with practical advice and materials in the form of draft exercises and data sets that staff could use to deliver the learning outcomes they had specified for their courses.

To tackle the third objective of improving the resources available for teaching GIS at the University of Belize, Planet Action have provided 20 copies of popular textbooks and training manuals and a full licence for the ESRI ArcGIS software. These resources have created a foundation which the teachers can use for designing their training materials.

As well as this training for trainers in GIS, we also identified a more pragmatic need to deliver field based training in how to use GPS to support vegetation mapping and when collecting plant specimens. Three Belizean students from the University of Belize's undergraduate programme in Natural Resources Management received two days of introductory GPS training, delivered as part of the field botany course in January 2010 in the Rio Bravo Protected Area. A further 15 Masters students were also trained in the basic principles and practical operation of GPS to support field botany and vegetation survey. This training covered the theory behind GPS technology, its practical use for navigation in the field and as part of recording botanical collections. In addition to this more formal practical training delivered on the field courses, customised training and guidance in procedures for using mapping-grade GPS receivers was provided to the Belize Darwin Botanist (GL) by Dr Ian Cameron, the projects GIS Officer as they worked together in country for 8 days gathering ground truth data to validate the mapping.

What is next?

Next steps are:

- 1) To continue the botanical survey and capacity building work specified under objectives 2 & 3.
- 2) To raise awareness of the savanna ecosystem and threats to it by developing teaching materials for school children & university students.
- 3) Identify key messages on savanna conservation that need to be taken to policy makers in Belize. This will be achieved by various consultations and project meetings planned in Belize over 2010 & 2011, a focal point of which will be the Savanna Ecosystems Map of Belize: 2010



Conclusion

The project has made good progress in its first year. We have delivered all year one objectives, including a new savanna ecosystems map. This map will be released in Autumn 2010 following final validation work currently being undertaken in country. The support of Planet Action has proved invaluable, with the satellite imagery and teaching/GIS resources provided already having a measurable impact in country. Over the next two years the project moves from a primarily science-focus, towards increased capacity and awareness building with the intention of improving the conservation status and viability of the lowland savanna ecosystem of Belize.



20 May 2010: Training course on Field Survey and GPS at the University of Belize



14 May 2010: Preview of Savanna Map at Annual Partner Meeting, University of Belize



11th June 2010: Field Season 2 Complete



3rd September 2009: Project Launch Event at the British High Commission, Belmopan Belize.

