

Spatial Assessment of The Species Composition of Jamaican flora

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Abstract

In 1988, Kelly produced a comprehensive list of endangered flora in Jamaica and classified them according to the International Union for the Conservation of Nature (IUCN) standard. These floras were mainly unique to Jamaica and were disappearing as a result of destruction of native Forest, illegal logging, land use pattern and climate change. As of now, the authorities do not know how much of these flora are left. This research will quantify this by spatially assessing the species distribution and detecting change in their spatial locations using Satellite imagery from Landsat Thematic Mapper (TM) for a period spanning 20 years from 1990-2009, in order to map the trend of this flora. This research will use remotely sensed data to quantify the rate of depletion of the flora, by mapping the spatial disappearance. This will enable relevant conservation measures to be taken as it will help relevant authorities develop policies and strategies for conservation.

Aim of the project and objectives

The aim of this research is to spatially assess the species composition of Jamaican flora and the rate at which they are disappearing or being depleted. The research questions which this research aims to answer are:

Are these floras and their species really disappearing?

Which flora and which species are the most affected?

At what rate are they being depleting? What their spatial locations?

Type of Fellowship

BioGeography.

Location

Jamaica includes latitude of 18 o 15' N and longitude of 77 o 30' W.

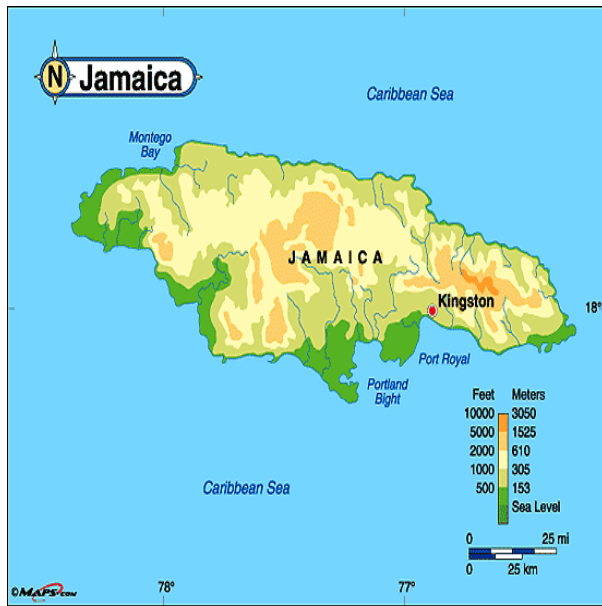


Figure 1. Map of Jamaica from maps.com

Research proposal

Jamaica is the third largest island in the Caribbean; it is 235 km long and 56 km wide. The total area is 10,991 square km. Jamaica has three major regions: the coastal lowlands, which surrounds the island and are highly cultivated; a limestone plateau, which covers 50% of the island; and the interior highlands, known for forested mountain. The Islands is dominated by its mountains, the highest peak reaches 2, 256 metres at Blue Mountain Peak. More than 50% of Jamaica is above 1 000 feet in elevation. The Upland plateaus form the most important part of this area (2000-3000 feet). In southern Jamaica the lowing coastal fringe comprises broad, flat and alluvial plains (Asprey et al, 1953). The native and naturalised flora today includes c. 3000 species of flowering plants, of which 827 species (27.6% of the total) are apparently endemic to the island (Adams, 1972; Proctor, 1982). 383 endemic species to Jamaica are recorded. 22 varieties endemic to Jamaica and 22 species endemic to the Greater Antilles. 131 taxa are assessed as Rare, 153 as Vulnerable, 91 as Endangered and 52 as Indeterminate (apparently extinct) (Kelly, 1988).

Jamaica is one the first and best botanised Islands of the Caribbean(Kelly, 1988). The first studies carried out on Jamaican flora was conducted and published by Sir Hans Sloane (1669, 1707, 1725). Later on, in 1756, Brown carried out its own. Preliminary acquisition of information about Jamaica in the literature revealed that Jamaica has a great ecological diversity. It has a considerable range of contrasted landscapes, plain, plateau, mountain, and also diversity in the climate. One of the singularities of this country is that it never had any subsequent land connection to the continents or to other islands. Although publications on the flora of Jamaica started in 1669 by Sloane, some of the flora on this island has still to be discovered as in 1982 Proctor added about 118 species to the flora of Jamaica, among those, 47 were entirely new to science. An exhaustive list of the endangered species would have been included, but for the explicit instruction not to by the Peter Flemming foundation not to add any supporting documents, a brief summary is however provided. (p.....)

Recently the remote sensors of various spatial resolutions has been applied to identify various vegetation types(Lee & Yeh,2009; Silvestri et al 2003) in diverse areas of the

research, especially in monitoring and can be used to get data on areas difficult to access by means of transport. Due to the territorial extent of this research (the whole of Jamaica), This research will use satellite images acquired from the Landsat Thematic Mapper(TM) which are stored in the archives for a 20 year period, from 1990 to 2009. This will involve a two stage analytical process. In the first-stage, a normalized difference vegetation index (NDVI) will be adopted to analyze Landsat, imagery to obtain the spatial distribution of species composition. In the second stage, a maximum likelihood classification (MLC) method will be used to classify the identified endangered species. Field work will also be carried out to determine the individual spectral signatures of these species and the morphological characteristics of these species. GPS will be used to locate the precise co-ordinates of species. known coordinates will be used to digitize training areas to instruct the idrisi software that will be used in the second phase of the analytical process. This is a very important process, as although the satellite images will show us the location over the 20 years time frame, the Idrisi software that will be used will need to be trained in order for it to successfully identify which the precise signatures are associated with each pixel. Also, other relevant spatial data and information will be gotten from the Jamaican Natural Resources Conservation Authority.

This research will provide necessary information to the relevant authorities as well as aid in the formulation of appropriate policies and strategies for the effective management of nature's resources. It will also have important implications for managing the rich and dynamic ecosystem in order to maintain a balanced ecosystem. It will also make available needed maps and charts. This research will set the basis for continuous monitoring as the foundations would have been set on completion of this research. This will all be used to study the spatial pattern and rate of depletion of these endangered species to detect change in the species composition. The use of remotely sensed imagery, has the advantages of monitoring long-term species changes especially monitoring flora in inaccessible areas (Silvestri et al 2003). It easily affords change detection on a large scale and it is relatively cheap and can be easily updated in the future.

References

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Wider Context

Jamaica is an island located in the Caribbean and is one of the top touristic destinations. The environment is affected by human interferences. By studying the extinction of species in Jamaica in order to understand how this process has taken place, future preservation and regeneration of the flora can be carried out. Conserving species is important; it is one of the aspects of biodiversity along with habitats and ecosystems. Species are an indicator of the health of the environment and is easy to monitor. Conservation also helps not only restoring the flora but prevent from other species to extinct.

International Union for the Conservation of Nature.....

Outline of plans for disseminating results

The results of this research will be published in [Journal of Biogeography](#), [Global Ecology & Biogeography](#). The results of this study will be available for publication by January 2011 when analysis will be completed. The results will be presented at the 5th International Conference from 7th to 11th January, 2011, in Crete, organised by the International Biogeography Society

S/N	ACTIVITY	PLANNED COMPLETION DATE
1	Acquisition of Imagery	02/05/2010
2	Field survey	07/06/2010-14/06/2010
3	Analysis	20/06/2010-20/08/2010
4	Writing of research findings	25/08/2010-24/09/2010
5	Submission to Journals	
6	Submission to conference	9/11/2010
7	Presentation at conference	9/01/2011

Risk Assessment

S/N	HAZARD	ACTION
1	Severe weather (heat)	Wear appropriate clothing, always apply sunblock when going outside.
2	Driving	Hire vehicle to commute to and from different sites on a daily basis. The vehicle is of international standards

		(fully air conditioned) with a functional first aid kit.
3	General Health	Doctor will be consulted before travelling to Jamaica for health advices.
4	Security	Montego Bay is relatively secure, however extra security measures will be taken when going to Spanish town, Negril, Clarks Town, Santa Cruz
5	Unnecessary exposure	Going to not secured places at night.

- Travel Insurance will be taken.
- Jamaica is a well known country for tourism and is relatively safe.

Budget

Landsat images: 32gbp per image. For 20 years of data the total cost is 3840gbp.

http://35.8.163.122/beta/access_v_2/access7/access6.asp?sensor=etm&Parow1=012047&tilesNum=1&cloud=10

Flights, Hotel and subsistence, 754gbp per person, based on a package with First Choice, quoted on the 10th February 2010. Total 2262gbp.

Travel Insurance, 124.47gbp for 3 people, based on a quotation from Mondial Insurance website, <https://www.magroup-online.com/tfc/gb?>

Car hire, 249gbp for 7 days, pick up from the airport and drop off at the airport with First Choice. Petrole 150gbp for 7 day, based on radio Jamaica website, <http://www.radiojamaica.com/content/view/18972/26/>

http://www.carhire.firstchoice.co.uk/liveOffers.aspx?Language_ID=2&Search_ID=9674173

GPS, TomTom XL Classic Euro Black Widescreen Sat Nav, 200gbp, based on PC World website.

Sunblock Elemis, 24gbp, based on <http://www.johnlewis.com/52770/Style.aspx>

Total amount requested from the researchers 6697gbp.