

**Bangor University**

## **DOCTOR OF PHILOSOPHY**

### **Analysis of biodiversity and soil C storage in the south Konkan coast of Maharashtra (India)**

Gadekar, Kumarsukhadeo

*Award date:*  
2012

*Awarding institution:*  
Bangor University

[Link to publication](#)

#### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

#### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**ANALYSIS OF BIODIVERSITY AND SOIL C STORAGE IN THE  
SOUTH KONKAN COAST OF MAHARASHTRA (INDIA)**

**Kumarsukhadeo Prakash Gadekar**

B.Sc. Forestry, (Dr. BSKKV, Dapoli, India)

M. Sc. Forestry, (IGAU, Raipur, India)

A thesis submitted to the Bangor University in candidature for the degree of  
Doctor of Philosophy

**School of Environment, Natural Resources and Geography**

**Bangor University**

**Bangor, Gwynedd,**

**North Wales, United Kingdom**

**LL57 2UW**

PRIFYSGOL  
**BANGOR**  
UNIVERSITY



October 2012

## Abstract

This thesis presents an analysis of floral diversity, soil C carbon storage and bird diversity in the south Konkan coast of the Western Ghats of India. The objectives of the investigation were to study structure, composition, distribution, richness and diversity of vegetation under different land-use types, to determine soil organic carbon content and to determine species composition, richness and diversity of birds under different land-use types.

For the investigation, agricultural, forest, casuarina plantation, grassland, mango plantation, homegarden and mangrove sites were selected randomly over a 460 km<sup>2</sup> area. At the forest, casuarina, homegardens and mangrove sites quadrat sampling technique was used for phyto-sociological analysis. Soil organic matter was determined by the weight loss-on-ignition method on soils collected as selected sites. A point transect survey method based on distance sampling was used to study seasonal variation in bird species richness and diversity in different land-use types. The sample based rarefaction curves were computed using EstimateS 8.2.0 and Eco-sim version free software applications. The bird data was analyzed using Distance 6.2 release 2 software.

Floristic analysis revealed that the study area is home for 407 plant species belonging to different 104 families. The most dominating families are Fabaceae, Cucurbitaceae, Euphorbiaceae, Malvaceae, Apocynaceae, Asteraceae, Caesalpiniaceae, Convolvulaceae, Poaceae, Acanthaceae, Mimosaceae, Rubiaceae, Verbenaceae and Rhizophoraceae. The high species richness was recorded in the forest followed by homegardens and casuarina plantation, while it was lowest in the mangrove vegetation. The highest Shannon-Weaver index of diversity was recorded for the homegardens > forests > casuarina plantation > mangrove vegetation. The highest value of species evenness and Simpson's index of diversity was recorded for the forests and lowest in the casuarina monoculture. The highest total C storage up to 50 cm depth was found in forest soils > mango plantation > mangrove > agricultural land soils > casuarina monoculture soils. The study revealed that the top 30 cm layer contains about 61-69% of the total C stock. SOC content decreased vertically with increase soil depth. SOC content showed significant positive correlation with soil moisture content and soil salinity, and significant negative correlation with soil pH and bulk density. In a total of 4796 encounters, 9348 individual birds belonging to 114 species and 51 families were detected from seven habitats in two seasons during the study period. The highest species richness was observed in the monsoon season. Overall 72% bird species were common in the both seasons. The most dominating families are Accipitridae, Columbidae, Hirundinidae, Muscicapidae, Ardeidae, Corvidae, Cuculidae and Sturnidae. In the dry season the highest species richness and Shannon-Weaver diversity index was observed in the forest land. In the monsoon, season the highest species richness and Shannon-Weaver diversity index was observed in the grassland

The research findings on floral analysis of different land-use types suggest that the region is ecologically and ethno-botanically rich. The wide variety of floral and avian species indicates the high species richness and diversity in the study area. The region is prone to drastic anthropogenic land-use changes such as deforestation, conversion to agriculture, industrialization (especially, nuclear power generation), shrimp farming, construction works and chira mining. This study provides a basis for developing measures for the conservation and management of natural resources in south Konkan coast of Maharashtra. The present study conclude that land clearing, land breaking, nuclear power project installation will affect the floral and faunal biodiversity as well as carbon balance. Therefore, the study suggests that the nuclear power project should not be started on the site for future environmental health and safety, public health and security and to avoid future hazards of loss of biodiversity in the south Konkan coast of Maharashtra state.