

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/336252451>

# Ecology & Natural Resources Monitoring in Cuc Phuong National Park 2015

Technical Report · January 2016

DOI: 10.13140/RG.2.2.35562.88009

CITATIONS

0

READS

72

9 authors, including:



**Pham Quang Duong**

IFEE

15 PUBLICATIONS 125 CITATIONS

[SEE PROFILE](#)



**Le Sy Hoa**

Vietnam National University of Forestry

21 PUBLICATIONS 53 CITATIONS

[SEE PROFILE](#)



**VIETNAM FORESTRY UNIVERSITY**

**FOREST RESOURCES & ENVIRONMENTAL MANAGEMENT FACULTY**



**FIEDWORK REPORT**  
**ECOLOGY & NATURAL RESOURCES MONITORING**  
**Cuc Phuong National Park 2015**

**Class: L01**

**Group 2:**

|                         |                   |
|-------------------------|-------------------|
| <b>Trần Quang Dũng</b>  | <b>1353091004</b> |
| <b>Phạm Quang Dương</b> | <b>1353091916</b> |
| <b>Đặng Mỹ Hạnh</b>     | <b>1353090994</b> |
| <b>Bùi Trung Hiếu</b>   | <b>1351050284</b> |
| <b>Lê Thị Như Hoa</b>   | <b>1353091909</b> |
| <b>Lê Sỹ Hòa</b>        | <b>1353091936</b> |
| <b>Phan Quốc Huy</b>    | <b>1353091030</b> |
| <b>Nguyễn Đăng Hùng</b> | <b>1353091927</b> |
| <b>Lê Thị Hường</b>     | <b>1353090987</b> |

**Supervisors: Assoc/Prof. Dr. Bui The Doi**

**Dr. Hai Hoa Nguyen**

**Dr. Ha Quang Anh**

**Bsc. Dang Hoang Vuong**

**Ha Noi, Oct 2015**



# TABLE OF CONTENTS

|                                                                                      |           |
|--------------------------------------------------------------------------------------|-----------|
| <b>Chapter I: INTRODUCTION</b>                                                       | <b>2</b>  |
| 1.1 Introduction:                                                                    | 2         |
| 1.2 Organization of our report:                                                      | 3         |
| <b>Chapter II: SURVEY GOALS, OBJECTIVES AND METHODS</b>                              | <b>4</b>  |
| 2.1 Survey Goal                                                                      | 4         |
| 2.2 Survey Objectives                                                                | 4         |
| 2.3 Methodology                                                                      | 4         |
| 2.4 Tools and equipments                                                             | 8         |
| <b>Chapter III: NATURAL CONDITIONS, SOCIAL CONDITIONS</b>                            | <b>9</b>  |
| 3.1 Natural conditions                                                               | 9         |
| 3.2 Social conditions:                                                               | 10        |
| <b>Chapter IV: RESULTS AND DISCUSSION</b>                                            | <b>11</b> |
| 4.1 Distinguish major types of Natural Forest in Cuc Phuong NP                       | 11        |
| 4.2 Applications of Geospatial tools to monitor and assess Natural Resources in CPNP | 12        |
| 4.3 Using GPS to calculate area:                                                     | 14        |
| 4.4 Creating contour and slope maps                                                  | 15        |
| 4.5 Forest species and integrating into ARCMAP                                       | 17        |
| 4.6 Natural resources measurement by using a sample plot                             | 20        |
| 4.7 Turtle Conservation Centre and Endangered Primate Rescue Centre                  | 37        |
| 4.8 SWOT analysis for Cuc Phuong NP                                                  | 38        |
| <b>CHAPTER V: CONCLUSION AND FURTHER STUDY</b>                                       | <b>39</b> |
| 5.1 Conclusion                                                                       | 39        |
| 5.2 Limitations                                                                      | 39        |
| 5.3 Further study                                                                    | 39        |
| <b>REFERENCES</b>                                                                    | <b>40</b> |
| <b>APPENDICES</b>                                                                    | <b>41</b> |
| 7.1 Sites of each forest types                                                       | 41        |
| 7.2 Sites of each found given points                                                 | 42        |
| 7.3 Raw data of plot 1 (Group 2)                                                     | 43        |
| 7.4 Raw data of plot 1 (Group 2)                                                     | 44        |
| 7.5 Raw data of plot 1 (Group 3)                                                     | 45        |
| 7.6 Raw data of plot 2 (Group 3)                                                     | 46        |
| 7.7 Distribution map of investigated trees in plot 1000m <sup>2</sup>                | 48        |
| 7.8 Distribution map of investigated trees in plot 500m <sup>2</sup>                 | 49        |
| <b>PHOTOS</b>                                                                        | <b>50</b> |

# Chapter I: INTRODUCTION

## 1.1 Introduction:

National park in Vietnam is a title acknowledged by the Vietnam's government. There are about 30 national parks in Vietnam now, with the area of 10,350.74 km<sup>2</sup> (620, 10 km<sup>2</sup> of those are the sea area) which cover about 2.93% of the land area. There are also four national parks acknowledged by the ASEAN which are Hoang Lien, Ba Be, Chu Mom Ray and Kon Ka Kinh . Some of them are acknowledged by UNESCO such as Phong Nha – Ke Bang, or Bai Tu Long of Ha Long Bay. Some others are the core of the preserved biosphere heritages.

In 1966, according to Decision No 18/QDLN of Vietnam Administration of Forestry was officially established and construction management of Cuc Phuong National Park. - The main tasks of the National Park are to manage and protect 22,480 hectares of forest, to conduct research, to serve tourist. It lies between Hoa Binh, Ninh Binh and Thanh Hoa Provinces between 20°14'N and 20 °24N latitudes and between 105°29' E to 105°44' E longitudes. The park covers about 222 km<sup>2</sup>, Ninh Binh (11350 ha), Hoa Binh (5850ha), and Thanh Hoa Province (5000ha). In the Park, the flora is various with 1.944 species. Diverse fauna includes 71 species of mammals, 300 species of birds, 33 reptiles and 16 amphibians. Besides, there have many animals such as: bears, horses, boars, tigers, leopards, ferrets, squirrels, monkeys... The half natural breeding area has deer, yellow monkey, Delacour's languor and flying squirrel... which serves the research of scientists and tourists can have opportunity to see animals as in the nature. Cuc Phuong is also the home of hundreds of birds, beautiful and strange butterflies.

We choose Cuc Phuong National Park because Cuc Phuong is the first National Park in VietNam. And in Park have protected areas plants and animals (Botanic Garden, Turtle Conservation Centre and Rescue ...) to serve the research purposes. Especially this Park , there are many types of terrain , forest ... to apply the method of field such as : distinguish some main status of natural forest , determine and establish a sampling plot in the field; know how to use the map and GPS receiver to find or locate sampling plot; to use satellite images/DEM to create maps and integrate findings into maps ,practice using some main measurement tools ,understand how to analyze the surveyed data, working group... We think that the Cuc Phuong National Park is a great place to practice this subjects

In 5 days in field trip, our survey contribute to further analysis of data on forest: species, diameter at breast height (DBH), total height, site quality, age, We also use the application of RS (Remote sensing) and GIS (Geographic Information System) techniques to deal with the location and other geographic features of study area. From the data collected we can calculate the density, total basal area, the volume of trees in area, biomass and carbon stock, Finally, the aim of the statically forest inventory is to provide comprehensive information about the state and dynamics of forests for strategic and management planning.

## **1.2 Organization of our report:**

Chapter I: Introduction

Chapter 2: Survey goals, objectives and methods

Chapter 3: Natural conditions, social conditions

Chapter 4: Results and discussion

Chapter 5: Conclusion and further study

References and appendices

## Chapter II: SURVEY GOALS, OBJECTIVES AND METHODS

### 2.1 Survey Goal

To better understand the management mechanism in Pas contributes to enhance management of natural resource ecology in Cuc Phuong National Park.

### 2.2 Survey Objectives

- To better understand management status of CPNP, natural resources, management mechanism (task 1)
- To investigate the forest types and their condition in CP (task 2 and 4)
- To build up the spatial databases of selected species construct their spatial distribution topographic context (task 3)
- To provide seaside solution for better management of CPNP (task 5)
- Get more information about two centers: turtle conservation and endanger primate rescues

### 2.3 Methodology

#### 2.3.1 Distinguish major types of Natural Forest in Cuc Phuong NP

Distinguish main types of natural forest in Cuc Phuong National Park based on the **Loetschau's** classification, which is applied for evergreen board-leaf and semi delicious timber forests

#### 2.3.2 GIS and GPS Method:

##### 2.3.2.1 Establish the sample plot

- From the plot in the field, we use the GPS to get the location (longitude/latitude) of each of 4 corners and the center point.
- After getting location, put to the Cuc Phuong National Park digital map by using ArcMap (ArcGIS) and Google Earth.

##### 2.3.2.2 Using GPS to find out location based on x, y information given

- Put all points given in to the GPS
- Go to the all points which are found by GPS
- Note special things around found point and check it by using Google Maps
- Using GPS to calculate area A1 field
- For given place to calculate area, we find the starting point and ending point.
- By using option Area Calculation of GPS, begin at starting point and go to around the A1 field. Be sure that starting point is estimating identical with starting point.
- After going around, choose the Calculate button on the screen and get results.

##### 2.3.2.3 Creating contour and slope maps

- Use the ArcGIS software:
- Create contour map with 10 meter, 20 meter, 30 meter - interval map.
- Create slope map: Choose option slope in degree, note that with 20° longitude we use z equal 0.00000956.
- Identify where hilltop, saddle, ridge and draw are

#### 2.3.2.4 Integrating forest types and forest species are identified into Arc MAP

By coordinates of each point on GPS, using the methods are the same with putting plot location into Arc MAP and Google map.

#### 2.3.3 Natural resources measurement by using a sample plot

##### 2.3.3.1 Sampling method

- Before conducting study activities, researchers have to choose sampling method to use. In practicing, our group using simple random sampling to apply in the two sample plots: (25m x 40m) and (20m x 25m).
- Simple random sampling: is a subset of individuals (a sample) chosen from a larger set (a population). Each individual is chosen randomly and entirely by chance, such that each individual has the same probability of being chosen at any stage during the sampling process, and each subset of  $k$  individuals has the same probability of being chosen for the sample as any other subset of  $k$  individuals.
- Our group applies this method in counting the number of woody plants in plot and shrubs, bush, and grass in subplot to calculate the density, quantity, and distribution of tree in the survey area. The results will be used to estimate the density, distribution, and the quantity of tree in Cuc Phuong National Park.
- Plot Establishment for tree measurement
- Find the sampling areas (at least 10 m far from the road, convenient for working). Use the GPS device to find location of the plot and directions reflected on base map. Set up sample plots of 1000 m<sup>2</sup> (40 x 25 m) and 500m<sup>2</sup> (20m x 25m). We use right triangle solution (Pythagoras Rule: ratio of right triangle is 3:4:5)

##### 2.3.3.2 Measure height and diameter

Using caliper and Blume Less to measure diameter and height.

All data will collect as the following table.

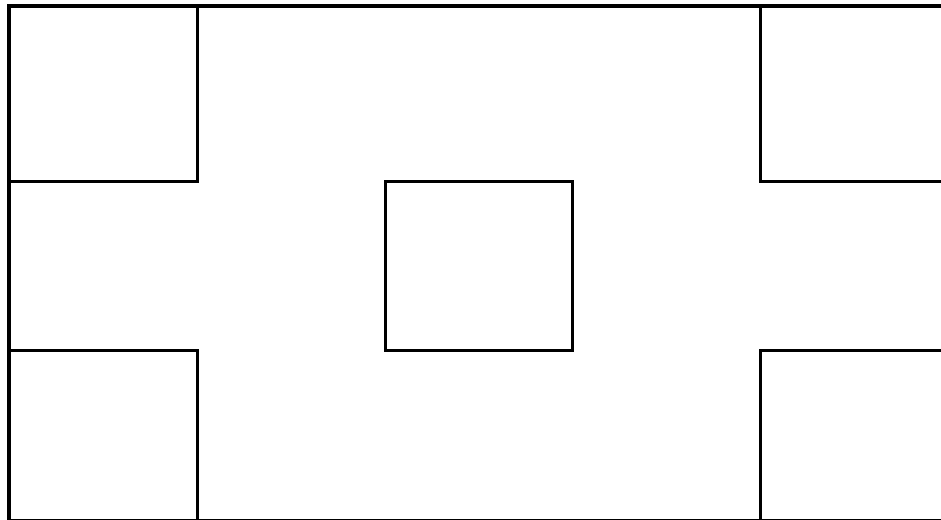
| No | Species | DBH |     | Height       |                     | Canopy diameter |     | Note |
|----|---------|-----|-----|--------------|---------------------|-----------------|-----|------|
|    |         | E-W | S-N | Total height | Under canopy height | E-W             | S-N |      |
|    |         |     |     |              |                     |                 |     |      |

##### 2.3.3.3 Shrub investigate records

- Set up 5 sub-plots (2m x 2m). 4 sub-plots in 4 corners and the last sub-plot in the center.
- Investigate about all shrubs in sub plots: Main species, Average high, growth availability, cover density ...etc.

| Subplot | Specie | High |      | Original |      | Quality |          |      | Note |
|---------|--------|------|------|----------|------|---------|----------|------|------|
|         |        | < 1m | > 1m | Sprout   | Seed | Good    | Moderate | Poor |      |
|         |        |      |      |          |      |         |          |      |      |

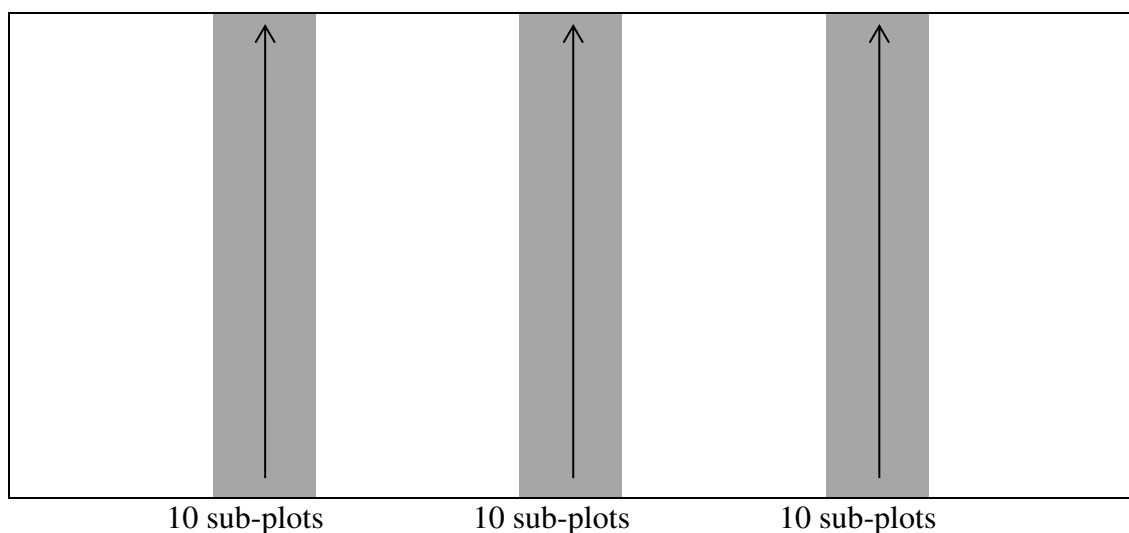
- Plot Establishment for tree measurement and Shrub investigate records model



#### 2.3.3.4 Regeneration investigate records

- Set up randomly 30 mini plots (1m x 1m) in the plot 1000m<sup>2</sup>, and 15 mini plots (1m x 1m) in the plot 500m<sup>2</sup>.
- Investigate all saplings in mini plot: number of species, height, original, quality...as the following table:

| Subplot | Main special | High | Growth | Cover | Note |
|---------|--------------|------|--------|-------|------|
|         |              |      |        |       |      |





- 30 sub-plots are distributed in 3 middle columns of plot 1000m<sup>2</sup> or 5 sub-plots are distributed in 3 middle columns of plot 500m<sup>2</sup>.

#### 2.3.4 Data processing

##### 2.3.4.1 Statistical analysis

- Put all raw data into the excel sheets work
- Generate the height and diameter of trees to average value.
- Use some tools, functions (Sort & Filter, =Count (, =Sum (...)) to create the tables which contain parameter of Height and Diameter then insert the Frequency charts of each tables.
- Use data analysis tool to show descriptive statistics for diameter and height variables.
- Compare diameter and height variables then conclude growth between two plots, using 0.5 confidence level by z-test:
  - + If  $|Z| \leq 1.96$ : accept  $H_0$ +, tree growth between plots is not significant difference (same growth).
  - + If  $|Z| > 1.96$ : accept  $H_0$ -, tree growth between plots is significant difference (different growth). Plot, which has greater mean, is better growth.

##### 2.3.4.2 Regression

- The relationship between height and diameter in each plot by following conclusion:
  - + R square: always ranges from -1 to 1.
  - +  $R = -1$ : perfect positive relation between x, y.
  - +  $-1 < R < 0$ : negative relation between x, y.
  - +  $0 < R < 1$ : positive relation between x, y.
  - +  $R = 1$ : perfect positive relation between x, y.
- R expresses the relation between x and y variables:
  - +  $|r|$  is close to 1: strong regression.
  - +  $|r|$  is close to 0: weak regression.
- Scatter graph to choose the best function for the relation.

##### 2.3.4.3 Calculate the Biomass, Carbon Stock Estimation, BA and density

- Biomass = AGB + BGB
  - + Above Ground Biomass:  $AGB = 0.1386 * DBH^{2.3358}$  (UN-REDD + FAO, 2013). For evergreen broadleaf forest in North Central Vietnam.
  - +  $BGB = AGB * R$ . Default value for R used for estimation of BGB is 0.275 (FAO 2008).
- Carbon = Biomass \* 0.47 (IPCC, 2006); and  $CO_2 = Carbon * 44/12$
- Calculation of Density, Basal Area and Volume
  - + Tree density:  $\frac{n}{area\ in\ meter \div 10000}$  (Trees/Hectare)
  - + The basal area (BA):

- +  $BA = \sum g_{tree}$  ; Where  $g_{tree} = \frac{\pi}{4} \times DBH^2$
- + Volume of individual:  $V = g \cdot h \cdot f = \frac{\pi}{4} dbh^2 \cdot h \cdot f$
- + Where, f is form factor,  $f = 0.50$  in plantation,  $f = 0.45$  in natural forest.

## 2.4 Tools and equipments

| No. | Items           | Purpose                                                                                         |
|-----|-----------------|-------------------------------------------------------------------------------------------------|
| 1   | Compass         | Determine the direction, align all sides of plot, navigation and measure changing in elevation. |
| 2   | Caliper         | Measure diameter of trees                                                                       |
| 3   | Blume less      | Measure height of tree                                                                          |
| 4   | Topographic map | Accurate work as design in planning, habitat area identification.                               |
| 5   | Linear tape     | Measure distance.                                                                               |
| 6   | Poly rope       | Determine the boundary of plots                                                                 |
| 7   | GPS             | Boundary survey, area calculation, points finding, stratification, and locating plots.          |
| 8   | Chalks          | To mark out the trees are investigated                                                          |
| 9   | Plastic bags    | To contain litterfall                                                                           |
| 10  | Pens, note book | Taking notes and recording data                                                                 |
| 11  | Calculator      | To calculate                                                                                    |
| 12  | Base map        | Plot navigation                                                                                 |
| 13  | Laptop          | Data processing, GIS software.                                                                  |