

## **Conservational status of plant seedlings in Ayubia National Park, Pakistan**

Estado de conservacion de germinantes en el Parque Nacional Ayubia, Pakistan

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July 2005

Download at: <http://www.lyonia.org/downloadPDF.php?pdfID=121.368.1>

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## Abstract

During recent and past Centuries, nature reserves and National Parks have been cornerstone in preservation of species and natural areas. However, as humans modify more and more of the earth, the mismatch in scale between present nature reserves and natural dynamics of ecosystem becomes more pronounced. To predict such influences studies have been conducted to observe conservational status of all of the trees of Ayubia National Park, taking simple parameters of number of seedling and samplings of these plants in selected plots. In this study borderline area has been divided into twelve regions. Total 240 number of quadrates (0.25 x 0.25m) have been laid. On the basis of number of seedlings and saplings each region is specified a category. Except one region all have some sort of disturbances which hinder the proper growth of seedlings and consequently the relative tree species in that region. It shows that species used as fuel wood like *Quercus dilatata*, *Quercus incana*, *Abies pindrow*, *Taxus wallichiana*, *Aesculus indica* and *Picea smithiana* were in serious threats of extinction based on the number of seedlings and saplings in each region. The major reasons behind this dilemma are, firstly the people are unaware of the importance of the plant resources and there is no alternative source of fuel for them. Secondly their grazing animals destroy these seedlings and saplings despite of restricted area.

Key Words: National Park, Conservation, Sustainability, Fuel wood, Biodiversity, Density, gymnosperm, Conservation, Pakistan, Seedling, Sapling.

## Resumen

Durante los centenarios pasados, los parques nacionales ya estuvieron para la preservación de especies y áreas naturales. Sin embargo la población humana esta en constante proceso de modificar la tierra, y la discrepancia entre el tamaño de áreas protegidas y la dinámica natural de los ecosistemas se vuelve un tema más profundo. Para pronosticar estos impactos se estudio el estado de conservación de todas especies de árboles en el Parque Nacional Alubia. Contando el numero de germinantes y árboles pequeños en parcelas. En este estudio el área limite se ha dividido en doce regiones. El numero total de parcelas de 0.25 x 0.25m fueron 240. En base del número de germinantes cada región fue categorizada. Todas las regiones a excepción de una, muestran de alguna manera perturbación lo cual inhibe el crecimiento de germinantes y en consecuencia la afecta la regeneración de árboles en la región. Especies usadas como leña (*Quercus dilatata*, *Quercus incana*, *Abies pindrow*, *Taxus wallichiana*, *Aesculus indica* y *Picea smithiana*) se encuentran en peligro de extinción, basado en el numero de germinantes en cada región. Las razones más importantes por esta situación son, la falta de conocimiento de la importancia de estos árboles en la población local y la falta de alternativas para suplir combustible. En segundo lugar el numero elevado de ganado esta destruyendo los germinantes, dentro y fuera de la área protegida. Palabras claves: Parque Nacional, conservación, sostenibilidad, leña, biodiversidad, densidad, gimnospermas, Pakistán, germinantes

## Introduction

Pakistan is a sub-tropical country situated between 20 and 37 N latitude and 75 E longitudes. The forest area under the control of government is 4.3 million hectares that is 4.8% of the total area. The area of privately owned forest is 1.5 million hectares, which lies in the Northern area of Punjab and NWFP. These areas called -guzara or community forest". The study area (Ayubia National Park) is the only moist temperate forest in Pakistan with a high diversity of vulnerable plant and animal species. There are about 200 species of herbs and shrubs and about 10 species of Gymnosperm trees found in park area. It is situated in the Gallies Forest division of Abbottabad between 34-1 to 34-3.8 N latitude and 73-22.8 to 73-27.1 E longitude over an area of 1684 hectares. The area was declared as National Park in April 17, 1984. (Source: Work Plan for Gallies Reserved Forest). The park is located on range of hills running north to south in proximity of Abbottabad and northwestern end of Murree. Altitude ranges from 1220-2865m. Highest peak area Mirangani (i.e. 2228m) and Mukshpuri (i.e. 2865m) (Shinwari & Khan 1998). Mean annual

rainfall is above 1,500 mm, in addition to precipitation received in form of heavy snow in winter and mean annual temperature is 21 C and relative humidity is 66% (Khan 1998). Important villages around the park are Kundala, Toheedabad, Mallach, Lahurkas, Kalabun, Derwaza, Mominabad, Ram kot, Raila and Pasala. In Ayubia National Park the vegetation is extensively being impoverished due to heavy population pressure from surrounding villages. The resources of the Park are exploited by the people mainly in form of fuel wood, fodder, ethnomedicinal and grazing of animals. Fauna of park include Mammals like leopard, deer, fox and birds like Kestrel, Wagle owl, Indian cuckoo, Purple sunbird, Black bird. (Source: Wildlife Department WWFP). Although reserves have been crucial for preserving species and habitats in the short term, with few exceptions they have not incorporated in the long term and large scale dynamics of ecosystems (Groom 1992, Holling et al 1995). Reserves and National Parks are geographically defined areas protected by the law and in which human activities are restricted or prohibited (Caldecott 1996). Ecosystems are subject to natural and human induced disturbances at various spatial and temporal scales (Groom 1992, Khan 1984). Recent work shown that human tries to manage frequent and sometimes intermediately frequent disturbances. This will result in extinction or rareness of some species from nature. The main objectives of the study are to explore the conservation status of Gymnospermous species and suggest some methods for future re-forestation and conservation of natural resources.

## **Materials and Methods**

### **Study area**

#### **Ecology of the Park**

Ayubia National Park is situated in the Gallis Forest Division of Abbotabad District, North West Frontier Province (Fig. 1). As originally designated in 1984, it lay between 34°-1' to 34°-3.8' north latitude and 73°-22.8' to 73°-27.1' east longitude, covering an area of 1684 hectares. In March 1998, the park area was more than doubled to 3,312 hectares under the NWFP Wildlife Act of 1975 (Fig. 2). The forests of the park represent one of the best moist temperate forests in Pakistan, with a wide diversity of plant and animal species. The national park was established to preserve the ecosystem and its biodiversity for scientific research, education and recreation (Fig. 3 and Fig. 4).

The national park consists entirely of reserve forests, which spill out of the park area on the west and south sides. Beyond the reserve forests are "guzara" forests and waste land which is the communal or private property of the people. With increasing population, the pressure on land and its resources is enormous. The forests are a source of fuelwood, timber, fodder, medicinal plants and wild vegetables for the surrounding communities. As guzara lands become increasingly denuded the pressure on forests is increasing.

As evident in the map, the park is surrounded by dense population, with seven major villages consisting of a larger number of linked settlements. The total population in and adjoining the national park is about 50,000 and, in line with national statistics, is growing at the rate of 3% per year. Social services (schools, dispensaries, water supply schemes, roads etc.) are far below the national average, which, in turn, is below the South Asian norm. The high rate of illiteracy is a major constraint in spreading conservation awareness.



Figure 1. National Park System of Pakistan.

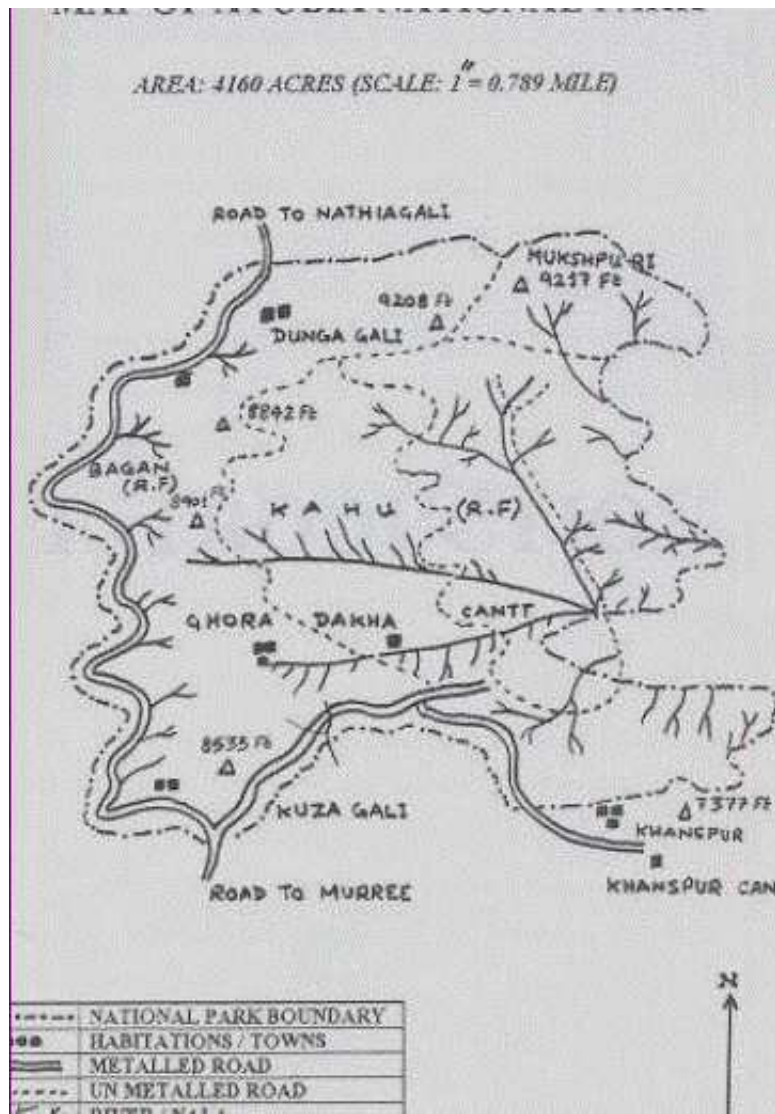


Figure 2. Study Area in Ayubia National Park.



**Figure 3. Panoramic View of Ayubia National Park Pakistan.**



Figure 4. Blue Pine forest in Ayubia National Park.

#### Stratification

The field work was carried out in the Park from Jan. 1999-Jan. 2000 and border line area has been choose as it facing major anthropogenic disturbance. This boundary area has been divided into twelve focused regions (FR) and each FR 20 quadrates (0.25 x 0.25m) have been laid randomly and number of seedlings and saplings of all tree species (i.e *Pinus wallichiana*, *Cedrus deodara*, *Prunus padus*, *Cornus macrophylla*, *Quercus dilatata*, *Quercus incana*, *Abies pindrow*, *Taxus wallichiana*, *Aesculus indica* and *Picea smithiana*) have been recorded.

On the basis of number of seedlings plus saplings, each focus region categorized into a class of disturbed or undisturbed patch.

**Table 1. Categories on the basis of Number of Seedlings and Saplings**

S.#	Number of Seedlings+Saplings/m2	Category
1	25-30	Undisturbed
2	20-25	Least Disturbed
3	15-20	Mildly Disturbed
4	10-15	Average Disturbed
5	5-10	Highly Disturbed
6	>5	Extremely Disturbed

## Results

On the basis of table one the results of trees like *Quercus dilatata*, *Quercus incana*, *Abies pindrow*, *Taxus wallichiana*, *Aesculus indica* and *Picea smithiana* for the twelve focused regions are shown in the table 2.

In FR 1 the total number of seedlings and saplings of trees (i.e. *Cedrus deodara* and *Pinus wallichiana* and *Cornus microphylla*) / m is 33 and thus it categorized as Undisturbed patch of the park.

FR 2 includes saplings and seedlings ( i.e *Abies pindrow* and *Picea smithiana*) falls in category of Highly Disturbed patch. While in FR 3 & FR 4 also includes in the same one and seedlings and saplings belong to *Abies pindrow*, *Taxus wallichiana* , *Pinus wallichiana*, *Quercus dilatata*).

In FR 5 & 6 four and three number of seedling plus sapling (i.e *Abies pindrow*, *Taxus wallichiana*, *Pinus wallichiana* and *Quercus dilatata*) are observed respectively and both of these categorized as extremely disturbed patches.

FR 7 & 8, both have values of number of seedlings and saplings (*Abies pindrow* and *Pinus wallichiana*) are twelve and hence include in Average Disturbed patch of the park.

While FR 9 is extremely disturbed with the value of seedling and saplings only 2/m (*Pinus wallichiana* and *Quercus dilatata*). Similarly the focused regions 10th and 11th are also very disturbed having value is 7 and 6 respectively (In this tree species are *Abies pindrow*, *Taxus wallichiana*, *Pinus wallichiana* and *Quercus dilatata*)

The twelveth region is also extremely disturbed.

**Table 2. Categorization of the FR (Focus Regions) on the basis of Number of Seedlings plus Saplings.**

FR	Number of Seedlings + Saplings	Category
1	33	Undisturbed
2	5	Highly Disturbed
3	8	Highly Disturbed
4	7	Highly Disturbed
5	3	Extremely Disturbed
6	4	Extremely Disturbed
7	12	Average Disturbed
8	12	Average Disturbed
9	2	Extremely Disturbed
10	7	Highly Disturbed
11	6	Highly Disturbed
12	4	Extremely Disturbed

## Discussion

As indicated in the results that only one FR is undisturbed and two are average disturbed. Remaining all either are highly or extremely disturbed . The species richness is focal component in nature conservation (Ulf 2004). It indicates that in almost all of plot there was no regeneration of *Cornus macrophylla*, *Abies pindrow* and *Picea smithiana*.

Damages includes illicit cutting. In the suburbs of the Park there are about 2311 households of the forest dweller with a population of 18,097 Individuals. The average weight of wood found to be stored per household during the period mid-June to mid-September was 2,385 kg. Families use an



average of 19.8 kg of wood per day in summer and 42.2 kg in winter. Assuming 150 days of winter and 215 days of summer, average annual consumption is calculated to be 10,578 kg. (Aumeeruddy 1998). As a result of the collection of such enormous quantity of the fuel wood especially by killing or damaging the trees, forest patches situated in about 5-6 km radius of each tribal colony shows clear sign of disturbance. Only about 10 % of the forest shows no sign of damage. However about 90% of trees in fuel wood collection areas showed clear sign of damage to their bole and branches.

Fuel wood consumption in Pakistan is more than 565 million cubic meters per year and is constantly increasing. A preliminary survey showed that more than 70 % of people all over the tribal areas use timber as fuel wood, 10 % use animal dung cakes for domestic use, 10 % use natural, 4 % use kerosene oil and less than 4 % use electricity. These people have no alternative but to cut plant if they want to cook their food (Shinwari et al 1996; Shinwari et al 2003).

Besides deforestation, overgrazing, rapid colonization thousands of families are totally dependent on the local plants for their daily domestic purpose (Shinwari et al 2003).

Khan et al (1996) studied the impact of fuel shortage on conservation of biodiversity of Hindu-Kush Himalayas Mountain region. They mentioned in their paper that northern areas of Pakistan are endowed with immense natural resources which are being rapidly unchecked and uncontrolled. The most serious crisis to the loss of the biodiversity is fuel shortage, which mainly affects firewood species.

In Margala Hills National Park, Islamabad over 35 species are used, among which *Acacia modesta*, *Acacia nilotica*, *Buxes papillosa* and *Dodonaea viscosa* were under high fuel wood pressure (Shinwari and Khan 1998). In Chitral district 15 species of gymnosperms used as local medicines Firewood was also a one of the factor for poor conservational status of the tree species (Rashid et al 1997). Human influence on the natural resources of Mount Aelum, Swat Analysis showed that land and ownerships conflict were the basic cause of the depletion of the natural resources and ecological degradation and poor conservational status (Rehman & Ghafoor 2000).

[Acknowledgements]

We wish to thank all of the staff of Quaid-I-Azam University for providing us opportunity to do this research and University fellows for providing us help in collecting literature and during fieldwork. We also pay words of gratitude to our field assistant Mr. Afzal, whose collaboration make this extensive filed data to be possible.

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