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# Diversity of trees in environmental Park, Raika, (Shivalik Hills), in the union territory of Jammu (J&K) India

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**Abstract**
In the present study, an inventory of trees has been prepared in Environmental Park, Raika in Jammu region of J&K Union Territory, India. A Total of 75 tree species belonging to 53 genera and 33 families have been recorded from the study area. Out of which 51 tree species were native while 24 tree species were introduced. Among the different genera present in the study area, F*icus* was represented by 8 species, *Acacia* by 5 species, while *Bambusa, Cassia, Eucalyptus & Terminalia* have been represented by 3 species each *Bauhinia, Salix & Stercularia* have been represented by 2 species each and rests of genera were represented by 1 species each. Moraceae has been observed to be the dominant family with 10 species followed by Fabaceae with 9 species; Meliaceae, Caesalpiniaceae, Myrtaceae & Euphorbiaceae (4 species each); Poaceae, Bignoniaceae, Salicaceae & Combretaceae (3 species each); Mimosaceae, Boraginaceae, Leguminosae, Ulmaceae & Sterculiaceae (2 species each) & remaining families have been represented by 1 species each.

**Keywords:** tree species, environmental park, introduced, native

## Introduction
Trees are precious gift of nature and are regarded as "Green lungs of earth". They play crutial role in the regulation of global climate and temperature and act as regulator of world climate and play an important role in enhancing the quality of environment. A famous Indian scientist Sir J.C. Bose had created a sensitive instrument to prove that plants also have life and they do feel pain, heat and fatigue as we humans do (Khajuria, 2011) [13]. Vegetation is the most precious gift that nature has provided to us, as it is meeting all kinds of essential requirements of the humans in the form of food, fodder, fuel, medicine, timber, resins, oil, etc. (Gaur, 1999) [7].

To reduce the risk of loss of genetic materials of wild and cultivated varieties, worldwide efforts are being made to conserve biodiversity. Protected areas such as national parks, wildlife sanctuaries and game reserves form the front line to conserve biodiversity (Chape *et al.*, 2003) [3].

In the present study attempt has been made to study the diversity of trees in Environmental Park located at Raika in Jammu district of Jammu and Kashmir UT which lies in the Western Himalayas. This Environmental Park, Raika is in the Shivalik ranges and geographically it is located at 32º73/ N latitude and 74º 90/ E longitude. It covers 226 ha area which is divided into various zones i.e. Sanctuary, Environmental museum, Children corner, Wildlife park, Endangered plant section. Trekking path is well maintained inside the park. Park is surrounded by well-defined Park boundary. From Outside, it is surrounded by Palpar Rakh forest, Dharanagari Rakh forest, Mahamaya mata, Raika village and Raika Rakh forest.

The Raika Environment Park was established in 1995 when the planning department in 1991 granted approval to the department of Ecology, Environment and Remote Sensing for the development of Environment Park in Maha Maya forests. So, the present study is extensive in approach and appropriate as it will make cognizant to the various stakeholders the different species of trees in the Raika park which in lieu will foster knowledge amid park viability among varied interested groups and researchers.

## Review of literature
Review of literature acts as backbone of any research. The in-depth and all-embracing review of literature was done in order to make the present research significant and sanguine.

Baruch and saikai (2000) [1] studied the biological spectrum of an extensively disturbed area under tropical monsoon climate and recorded a total of 425 species are distributed among 100 families. The spectrum includes phanerophytes (43.80%), chamaephytes (6.6%) hemicryptophyte (2.59%). They recorded leguminous family the largest family with 35 species followed by poaceae with 25 species.

Srivastava *et al*. (2000) [22] studied medicinal and aromatic value of threatened plants of north west Himalayas and revealed that 20 taxa of medicinal and aromatic values, distributed in north-western Himalayan region, extending from Jammu and Kashmir to western borders of Nepal, have entered the category of threatened plants due to large state and indiscrimination collection in the past. They highlighted the threats involved in each individual case and suggested remedial measures.

Kant and Sharma (2001) [12] worked on the medicinal plants of patnitop and adjoining hills (J&K) and their conservation. The study area is a storehouse of economically very important medicinal plants like *Digitatis purpurea, Taxus baccata* etc. They also suggested some conservation strategies and management practices to save this useful bio-resource of the area.

Belem *et al.* (2007) [2] addressed the issue of the use of non-wood forest products by local people bordering the 'Parc National Keberi Tambi' in Burkino Faso. They analysed the importance of park products. They also analyse the park vegetation structure and assess the degree of regeneration of the main useful species. They surveyed that people consider the park as their greenery, their pharmacy, their pasture, their posture, their place of religious worship and the source, the strength of their territory. They harvest the non-wood forest products (NWFP's) but the pattern of extraction of the products or some plants could destroy the resource base. Finally, they concluded that for the sustainable management of the park, the policy makers, technicians, local people, researchers and funding agencies play very important role.

Sambandan and Dhatchanamoorthy (2012) [21] studied on the phytodiversity of a sacred grove and its traditional uses in Karaikal district, U.T. Paducherry. The sacred groves are the representatives of climax vegetation and exhibit the diversity of species such as trees, climbers, epiphytes and other shade loving herbs. Well-preserved sacred groves are storehouses of valuable medicinal and other plants having high economic value and serve as a refuge to threatened species. There are 59 plants species of flowering plants which spreads in 55 genera and 30 families. Many rural people in the district were using the plants from the sacred grove to cure many common diseases. This kind of degraded sacred groves should be immediately restored or regenerated using appropriate technologies and by raising awareness among the rural people regarding the importance of sacred grove and its conservation

## Materials and Methods

The study area has been surveyed thoroughly for the floristic composition in order to obtain information about the general pattern and characteristics of vegetation of the area. The entire field visits were carried out well keeping in mind the different seasons and the flowering period. During field visit in most of the cases plant specimen were collected as the samples for the plant identification. Mostly the plants were photographed in their natural habitat for the purpose of identification.

In order to collect the primary or firsthand field data, floristic study of all the sample sites were undertaken for the period of approximately twelve months in order to enhance the viability of research. The area was having dearth of research related to different species of trees and that's why it was taken as basis of present research. Whole of the accessible area was well surveyed on the basis of regular field visits on monthly basis. For the identification of plants, various regional, local and national floras were used besides consulting taxonomic expertise who shared their valuable knowledge and thus promoting the sagacity of present research. Majority of the plants were identified on the spots by their vernacular names. Economic valuation of the plants was done on the spots with the consultation of some Forest officers, Range officers, Block forester and expertise present in the Environmental park using the simple method of questionnaire approach, cross questioning and by discussions.


**Fig 1:** Satellite image of the Environmental Park, Raika (Jammu)


**Fig 2:** Layout plan of the Environment Park

## Result and Discussion

Trees are very important resource from the biodiversity point of view and also for the life of the local people of the area whose life and livelihood is dependent on these resources. The vast biodiversity of earth's forests provide us trees for timber, fuel, food, industrial raw materials, pharmaceuticals, beverages and environmental stabilization. Trees improve the quality of human life by providing an aesthetic benefit in our homes, gardens, streets and also parks and country side.

The present study site, covering an area of 226 ha (2.26 $km^2$), revealed the presence of 75 tree species belonging to 33 families & 53 genera. Several studies have been carried out in different parts of India for various protected areas which include National parks, Sanctuaries, Biosphere reserves, Sacred groves. [Pradeepkumar & Prathapasenan (2001) [18]; Upadhaya *et al* (2003) [24]; Dhar *et al* (2004) [6]; Mishra *et al*. (2008) [16]; Pandey *et al*. (2009) [19]; Culmsee *et al*. (2011) [5]; Ihuma *et al*. (2011) [10]; Sobuj & Rahman (2011) [23]; Mishra *et al*. (2011) [17]; Sambandan and Dhatchanamoorthy (2012)] [21].

**Table 1:** Tree Species Present in the Environmental Park, Raika; Jammu.

| S. No. | Scientific Name | Common Name | Family | Native/ Introduced |
|---|---|---|---|---|
| 1 | *Acacia auriculiformis* | Earleaf acacia | Fabaceae | N |
| 2 | *Acacia catechu* | Khair | Mimosaceae | N |
| 3 | *Acacia farnesiana* | Needle bush | Fabaceae | I |
| 4 | *Acacia modesta* | Falai | Fabaceae | N |

| | | | | |
|---|---|---|---|---|
| 5 | *Acacia nilotica* | Kikar | Mimosaceae | N |
| 6 | Aegle marmelos | Bel | Rutaceae | N |
| 7 | *Albizia lebbek* | Siris | Fabaceae | N |
| 8 | *Alstonia scholaris* | Satpatra | Apocyanaceae | I |
| 9 | *Azardirachta indica* | Neem | Meliaceae | N |
| 10 | *Bambusa arundinaceae* | Thorny bamboo | Poaceae | I |
| 11 | *Bambusa nutans* | Bans | Gramineae | I |
| 12 | *Bambusa tulda* | Tulda | Poaceae | I |
| 13 | *Bombox ceiba* | Simbal/ Seemal | Bombacaceae | N |
| 14 | *Broussonetia papyrifera* | Paper mulberry | Moraceae | I |
| 15 | *Butea monosperma* | Palash | Fabaceae | N |
| 16 | *Bauhinia purpurea* | Kanair | caesalpiniaceae | N |
| 17 | *Bauhinia variegata* | Kachnar | caesalpiniaceae | N |
| 18 | *Cassia fistula* | Amaltas | caesalpiniaceae | N |
| 19 | *Cassia glauca* | Hedma | Leguminosae | I |
| 20 | *Cassia siamea* | Kasood tree | Leguminosae | I |
| 21 | *Cedrela serrata* | Hill toon | Meliaceae | N |
| 22 | *Celtis australis* | Kharik | ulmaceae | N |
| 23 | *Cinnamomum tamala* | Desi dalchini / tejpat | Lauraceae | N |
| 24 | *Cordia dichotoma* | Lasoora | Boraginaceae | N |
| 25 | *Crataeva religiosa* | Barna | Capparaceae | N |
| 26 | *Cupressus sempervirens* | Saru | Cupressaceae | I |
| 27 | *Dalbergia sisoo* | Shisham / Tahli | Fabaceae | N |
| 28 | *Dendrocalamus strictus* | Male bamboo / Banj | Poaceae | N |
| 29 | *Dilonix regia* | Gulmohar | Caesalpiniaceae | I |
| 30 | *Ehretia laevis* | Chamror | Boraginaceae | N |
| 31 | *Emblica officinalis* | Amla | Euphorbiaceae | N |
| 32 | *Eucalyptus cameldulensis* | Safeda | Myrtaceae | I |
| 33 | *Eucalyptus citriodora* | Safeda | Myrtaceae | N |
| 34 | *Eucalyptus hybrid* | Safeda | Myrtaceae | I |
| 35 | *Euphorbia royaleana* | Thor | Euphorbiaceae | N |
| 36 | *Ficus bengalensis* | Bhor /Bargad/ Banyan | Moraceae | |
| 37 | *Ficus elastica* | Rubber tree | Moraceae | I |
| 38 | *Ficus glomerata* | Gular fig | Moraceae | N |
| 39 | *Ficus hispida* | Gobla / Gudh khumbal | Moraceae | N |
| 40 | *Ficus palmata* | Phagwara/ wild fig | Moraceae | N |
| 41 | *Ficus racemosa* | Rumbal/ Goolar | Moraceae | N |
| 42 | *Ficus religiosa* | Peepal | Moraceae | N |
| 43 | *Ficus roxburghii* | Indian fig | Moraceae | N |
| 44 | *Grevillea robusta* | Silver oak | proteaceae | I |
| 45 | *Grewia optiva* | Dhaman | Tiliaceae | N |
| 46 | *Jacaranda ovalifolia* | Nele gulmohar | Bignoniaceae | I |
| 47 | *Kigelia pinnata* | African kakdi | Bignoniaceae | I |
| 48 | *Leucaena leucocephala* | Subabool | Fabaceae | I |
| 49 | *Mallotus philippensis* | Kamala | Euphorbiaceae | N |
| 50 | *Mangifera indica* | Amb/ Mango | Ancardiaceae | N |
| 51 | *Melia azadarach* | Drenk | Meliaceae | N |
| 52 | *Moras alba* | Mulberry /Toot | Moraceae | N |
| 53 | *Moringa oleifera* | Sohanjana | Moringaceae | N |
| 54 | *Parkinsonia aculeate* | Vilayti kiker | Fabaceae | I |
| 55 | *Phoenix sylvestris* | Khajur | Arecaceae | N |
| 56 | *Phyllanthus emblica* | Amla | Phyllanthaceae | N |
| 57 | *Pinus roxburghii* | Chir pine | Pinaceae | N |
| 58 | *Populas nigra* | Poplar | Salicaceae | I |
| 59 | *Pyrus pashia* | Wild pear/ kainth | Rosaceae | N |
| 60 | *Salix alba* | White willow | Salicaeae | I |
| 61 | *Salix tetrasperma* | Indian willow | Salicaeae | N |
| 62 | *Sapindus mukorossi* | Retha | Sapindaceae | N |
| 63 | *Sapium sebiferum* | Chinese tallow tree/ Tar charbi | Euphorbiaceae | N |
| 64 | *Sterculia alata* | Dung tree | Sterculiaceae | I |
| 65 | *Sterculia villosa* | Gud patra | Sterculiaceae | N |
| 66 | *Stereospermum suaveolens* | Padal | Bignoniaceae | N |
| 67 | *Syzygium cumini* | Jamun | Myrtaceae | N |
| 68 | *Tamarindus indica* | Imli | Fabaceae | N |

| | | | | |
|---|---|---|---|---|
| 69 | Tectona grandis | Teak | Verbenaceae | I |
| 70 | *Terminalia arjuna* | Arjun | Combretaceae | I |
| 71 | *Terminalia bellirica* | Bahera | Combretaceae | N |
| 72 | *Terminalia chebula* | Hared | Combretaceae | N |
| 73 | *Trema orientalis* | Charcoal tree | Ulmaceae | I |
| 74 | *Toona ciliata* | Toon | Meliaceae | N |
| 75 | *Zizyphus mauritiana* | Ber | Rhamnaceae | N |

**Table 2:** Total number of families and species found in Environmental park.

| S. No. | Family | No. of Species |
|---|---|---|
| 1 | Ancardiaceae | 1 |
| 2 | Apocyanaceae | 1 |
| 3 | Arecaceae | 1 |
| 4 | Bombacaceae | 1 |
| 5 | Boraginaceae | 2 |
| 6 | Bignoniaceae | 3 |
| 7 | Caesalpiniaceae | 4 |
| 8 | Capparaceae | 1 |
| 9 | Cupressaceae | 1 |
| 10 | Combretaceae | 3 |
| 11 | Euphorbiaceae | 4 |
| 12 | Fabaceae | 9 |
| 13 | Gramineae | 1 |
| 14 | Lauraceae | 1 |
| 15 | Leguminosae | 2 |
| 16 | Meliaceae | 4 |
| 17 | Mimosaceae | 2 |
| 18 | Moraceae | 10 |
| 19 | Moringaceae | 1 |
| 20 | Myrtaceae | 4 |
| 21 | Phyllanthaceae | 1 |
| 22 | Pinaceae | 1 |
| 23 | Poaceae | 3 |
| 24 | Proteaceae | 1 |
| 25 | Rhamnaceae | 1 |
| 26 | Rosaceae | 1 |
| 27 | Rutaceae | 1 |
| 28 | Salicaceae | 3 |
| 29 | Sapindaceae | 1 |
| 30 | Sterculiaceae | 2 |
| 31 | Tiliaceae | 1 |
| 32 | Ulmaceae | 2 |
| 33 | Verbenaceae | 1 |
| | Total | 75 |

Many of the species are native while some species are introduced in the park. About 24 species like *Bambusa tulda, Broussonetia papyrifera, Ficus elastica, Grevillea robusta* are introduced species, while 51 tree species like *Acacia nilotica, Azardirachta indica, Cassia fistula, Dalbergia sisoo etc.* are native in the park Ficus *is the dominant genera and is* represented by 8 species, followed by *Acacia which* is represented by 5 species. *Bambusa, Cassia, Eucalyptus & Terminalia* is represented by 3 species each. *Bauhinia, Salix & Stercularia* is represented by 2 species each and rests of genera are represented by 1 species each. Moraceae is the dominant family with 10 species followed by Fabaceae with 9 species; Meliaceae, Caesalpiniaceae, Myrtaceae & Euphorbiaceae (4 species each); Poaceae, Bignoniaceae, Salicaceae & Combretaceae (3 species each); Mimosaceae, Boraginaceae, Leguminosae, Ulmaceae & Sterculiaceae (2 species each) & remaining families were represented by 1 specie each.


**Plate 2:** Description of families in the form of Pie chart: Relationship between families and number of species present in the family.

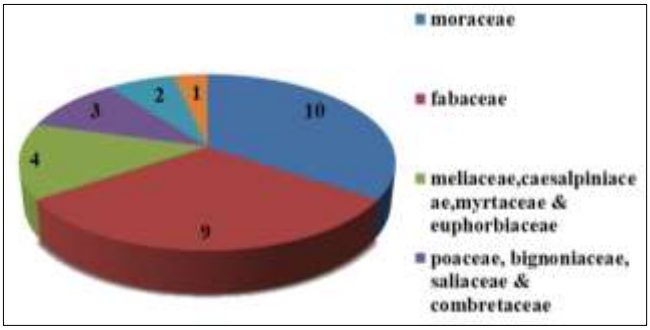


**Fig 1**

**Description of number of native/ introduced species (in Park) in the form of pie chart.**

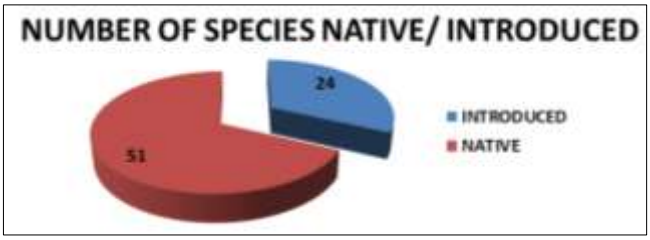


**Fig 2**

Thus, the given study area, Environmental park, Raika is rich in various tree species So, it become rich floral wealth.

A large number of diverse types of trees found in the Environmental Park, this diversity in the biological world is charming, fascinating and is a priceless treasure. The information collected in the present study will help in the management of these resources and will help in making the people aware about the status of these resources

However, this needs further supplementing in the form of quantification of these resources which will help in the conservation, cultivation, maintenance of all useful tree species and there is need for assessment of germplasm for future use.

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