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BIODIVERSITY OF NAWEGAON NATIONAL PARK AND ITS CONSERVATION STATUS.

Patil D. N.
B.J.S.,ASC College, Wagholi, Pune- 412207.
E-mail: dnpatil1970@yahoo.in

ABSTRACT:
The present study mainly deals with flowering plants of Nawegaon national park . It includes 715 species belonging to 440 genera spread over 122 families of Angiosperms. Besides the Angiosperms, 7 Pteridiophytes were also recorded from the study areas, all these Plants used for food, fodder, shelter for wild animals & birds and its habitat development. The Sanctuary has c 34 species of mammals, 166 species of birds, 36 species of reptiles and four species of amphibians. The invertebrate fauna includes, beside a number of insects and species, several species of butterflies. Nearly 35,000 tourists visit this Sanctuary annually. Wild animals to spot are the tigers, panthers, Bisons, Sambars, Nilgais, Chitals, Wild boars, Sloth bears and Wild dogs.

Keywords: Wildlife sanctuary, Plant diversity, fauna, habitat.

INTRODUCTION:

Plants have many and diverse uses which have direct or indirect bearing on the civilization of human society. India is a vast country with it's main land area about 3,287 million sq. km and a coastline of over 7,500 km and is the second largest country in Asia and seventh in the world Over and above, with diversity of climate, soil and topography with almost all types of ecosystems found anywhere in the world and hundreds of biotopes -each supporting rich characteristic floristic and faunistic elements with Eurasian , Afro tropical and Indo-Malayan floristic elements, India harbours over 45,000 species of plants (c 11 percent of world's flora). This includes Bacteria and viruses (850 spp.), Algae (6,500 spp.), Fungi (14,500 spp.), Lichens (2,021 spp.) Bryophytes (2,850 spp.), Pteridophytes (1,200 spp.), Gymnosperms (48 spp.) and Angiosperms (17,500 spp.). Among them are number of plants with botanical interest e.g. insectivorous (c 41 spp.), Orchids (c 1087 spp.) and Parasites (c135 spp.).Because of this rich diversity, India is recognized as one of the 12 mega diversity regions of the world (Kothari & Singh, 1998; Singh& Singh,2002).

The rich floristic diversity in India is not withstanding i.e. c 1700 spp. of Indian flowering plants are threatened with extinction to-day (c 7 percent of 26,106 globally threatened spp. are from India).During last 400 years c 654 spp. have become extinct (WCMC, 1992). During past two centuries, India has lost about 17 spp. like *Sterculia khasiana* and number of other spp. also could not be relocated due to natural (abiotic) and manmade (biotic) causes (Jain & Sastary, 1984; Nayar and Sastry, 1990).

Conservation of above mentioned biowealth in India initiated dates back to 4th century B.C.and is attributed to Acharya Kautilya who in Arth-shastra underlined the need for setting aside forested areas for not only protection of Wildlife, but also to provide goods and services to the society (Rangrajan,1992). Similarly, the Emperor Ashoka,in 252 B. C., laid down 'Stone edicts' for conservation of Wildlife (Saharia ,1981;ackinnon *et al.,* 1986). Since the vedic periods , every form of life was loved worshipped and even sheltered in the ashrams of sages (hermitages).there by nurturing the philosophy of nature conservation (Jain and Sastry, 1981). The importance of the forests in remote areas of Kutch (Gujarat , India) was realized much earlier by Maharaja (King) of Kutch who demarcated certain areas (Chadua Rakhal & Nadibaug) as reserved protected forests where biotic activities like hunting of wild animals, felling of trees, Grazing etc. were strictly prohibited(Kothari & Singh,2002).Therefore for *In-Situ* conservation of biological diversity under article 8, India to-day has elaborated network of c578 protected areas covering an area of c 1,55,508.54 sq.km including 13 Biosphere reserves, 89 National parks and 489 Wildlife Sanctuaries (Rodgers *et al.,* 2002) This includes 5 national parks and 35(41) wildlife Sanctuaries in Maharashtra.

Study Areas:

A. Nawegaon National Park, Maharashtra, India.

The National park (Bio-geographical Province 06D) was established on 22 November 1975 as per the Govt. Gazette Dec. 4,1975/ AP. Shake 1897, covering an area of *133.884 sq. km* under Wildlife Protection Act 1972. The name Nawegaon National Park is based on the

Nawegaonbandh lake, with water spread over 11 sq.km., surrounded by seven peaks of Nishani hill ranges known as the "Sat Bahini"or seven sisters. On the fringe of the lake is an idol of Hanuman, an island in the middle of the lake is Known as "Maldongar" and was used by 'Pindaris' (A tribe of professional robbers). The lake is a gift to bird watcher given by the Dongarwar family. Their descendants even today contribute towards Biodiversity conservation. Hence as a tribute to the Kolasur island ("Maldongar") with the Samadhi of Shri.Kolu Patil Dongarwar, who was the instrumental in establishment of this lake in the 13th centuary and is still revered by the local people. The area around the lake is known as 'Dr. Salim Ali Bird Sanctuary' in memory of the noted ornithologist.

Location: The area is located towards South of Bhandara in Maharastra State (India) under the Gondia forest division.between 29 º 9' to 29 º 27' latitude and 80 º 2' to 80 º 40' longitude. It includes a forest range viz. Pratapgarh and a few villages (Kawlewada, Zankargondi, Nishani, Tumdimendha and Malkazari) and 4 Reserve forest compartments.

The area is bounded *on the North* by Kohamara, Duggipar, Mogra, Rajguda and Khadki. *on the east* by Mehsuli and Palasgaon, *on the south by* Jamadi, Rampuri, Yelodi, Kholi and Nawegaon lake and *On the west by* Kosambi, Baki, Mendki, Kokna, Kaneri, Khoba, Parsodi, Raitwari and Pandarwani.

Geology: The National Park is popular forest Resort with picturesque low lying undulating hills fringing the lake of Nawegaon. Geologically the area has varied rocks ranging from Precambrian gneiss and granite to laterite and alluvium. The geological formation of the National park gives rise to numerous natural spings, streams, water holes which have maintained diverse living forms in the area. A few are- Bodrai, Badbada, Madhavzari, Ranidoh, Kamkazari, Telanzari, Agezari etc.

Soil: Most of the soil in Maharastra formed from Deccan trap.The soils are black, dark, brown or reddish in color (black cotton soils or Regurs) are derived from Vindhyan and Gondwana formations.

Climate: The climate is quite pleasant for the greater part of the year with only short Span of hot weather. The temperature ranges from 5 º C during January to 48 º C during May. May is the hottest month; December, January are the coldest. Mean annual temperature is 25.5 º c The average annual rainfall varies from 1100 to 1600 mm.

Vegetation: The vegetation of the area is of South Indian moist deciduous type (Champion & Seth, 1968). The plants are distributed in three different zones.

In top storey, the trees are close, rather tall spread out in high canopy. The main deciduous species are *Albizia lebbeck, A. odoratissima, Anogeissus latifolia, Butea monosperma, Cleistanthus collinus***,** *Diospyros melanoxylon, Mitragyna parvifolia, Pterocarpus marsupium***,** *Tectona grandis,* etc. Middle storey has small trees and numerous shrubs like*, Bridelia retusa, Holarrhena pubescens, Maytenus senegalensis* etc**.** Some slender climbers like *Abrus precatorius***,** *Lianas like Butea superba, Olax psittacorum and Ventilago denticulata***,** etc*,* stem parasite *Dendrophthoe falcata* and epiphytic orchids like *Vanda tessellata* also occur. Ground flora with *Carissa congesta, Lavandula bipinnata, Woodfordia fruticosa*, number of grasses and sedges (*Cyperus* spp.) and aquatics in stagnant water eg**.** *Bacopa monnieri, Limnophila indica, Nymphaea nouchali, Nymphoides hydrophylla ,* etc. occur.

Fauna: The hills have good growth of bamboo on the slopes and also provide special habitats like caves,chiff's, tableland and vallies. Due to total ban on exploitation, the area provides a good thickets and tall trees. It supports carnivores animals like *Cnon alpinus* (Wild-dog, Ran-kutra), *Felis chaus* (Ran-manjar), *Hyaena hyaena* (Taras), *Panthera pardus* (Bibtya), *Panthera tigris* (Wagh, Tiger), along with herbivorous like *Axis axies* (Chital), *Boa gaurus* (Gawa), *Boselaphus tragocamelus* (Nilgai), *Cauis aureus* (Kolha), *Cervus unicolor* (Samber), *Funambullus palmarum* (Khar), Herpestes *edwardsi* (Mongoose), *Lepus nigricollis* (Sasa), *Petaurista petaurista* (Udan-khar), *Presbytis entellus* (Wanar), *Rattus rattus* (Undir), *Melursus ursinus* (Aaswal), *Sus scrofa* (Ran-dukkar), *Tetracerus quadricornis* (Chowsingha, 4-horned Antelope) etc.Herpets like *Najanaja kaouthia* (Cobra, Naag), *Ptyas mucosus* (Dhaman), *Python molurus* (Ajgar), *Varanus bengalensis* (Ghorpad) etc. abound the area. There are also many species of fishes like *Mastacembelus armatus* (Vam), *Parastromateus niger* (Halwa), *Scomberumorus commerson* (Surmai) etc. Butterflies like *Danaus chysippus* (Common tiger), *Euploea core*, *Neptis hyalus* (Common sailor) and insects.

The area is an ornithologist's paradise, with the large lake adjacent to the National Park. The water birds that are seen in the lake are also in the lake are inseparable. There are c 209 species representing 56 families of birds. To mentioned a

few, *Acridotheres tristis- tristis* (Myna), *Amaurornis phoenicurus* (Pankombdi), *Bubo bubo* (Motha-ghubad), *Centropus sinensis-parroti* (Bharadwaj), *Columba livia* (Kabutar), *Gallus sonneratii* (Ran-kombda), *Grus antigone* (Saras Crane), *Gyps bengalensis* (Gidhad), *Milvus migrans* (Ghar), *Pavo cristatus* (Mor), *Psittacula krameri* (Popat), *Pycnonotus cafer* (Bulbul), *Vanellus indicus-indicus* (Titwi) etc. are the commonly found in protected area and one can see many nesting's of birds while moving in the forests, One can also notice activities of uncommon birds like Shama, Racket tailed drongo, Paradise Flycatcher etc. near natural water holes like Badabya, Katethuwa, Bodrai, Madhavzari etc.

MATERIAL & METHODS:

To study the floristic composition of the Nawegaon National Park plant exploration tours were arranged in different seasons during 2001 to 2008. Flowering and fruiting specimens were collected. Field observations regarding habit, habitat, colour of the flowers, local names, relative abundance, associated plants etc. were noted .Close-up of flowering / fruiting material and habit along with associated plants were also photographed. Plants were processed in customary way and studied in the regional herbarium of Botanical Survey of India, Pune and deposited *(BSI)*.

Result and Discussions

The ground flora is rich after the monsoon. A number of herbs, grasses and undershrubs like *Abutilon indicum, Achyranthes aspera, Alternanthera sessilis, Alysicarpus vaginalis, Buchnera hispida, Crotalaria linifolia, Cyanotis cristata, Elephantopus scaber, Euphorbia hirta, Heteropogon contortus, Thespesia lampas, Peristrophe paniculata* etc.are common.

In waste places common plants found are *Amaranthus spinosus, Cassia absus, Corchorus aestuans, Cyperus tenuispica, Datura inoxia, Sida cordata, Triumfetta rhomboidea* etc. while some marshy elements met in the area are *Ammannia baccifera, Commelina benghalensis, Hygrophila schulli, Polygonum plebeium* etc.

The General Survey of the plant diversity is given in Table-II as below.

General Survey –Table-I

Groups	Families	Genera	Species
Monocot	022	090	145
Dicot	100	350	570
Ptridophytes	**007**	**007**	**007**
Total	**129**	**447**	**722**

Environmental Impact:

The vegetation of Nawegaon National Park and Nagzira Wildlife Sanctuary is affected by number of biotic and abiotic factors.

Biotic factors : Biotic factors like 'overgrazing' by domestic and wild animals, indiscriminate illicit cutting of wood for fuel and building purpose, tourists and tourisum development to entertain thousands of visitors in the National Park and Wildlife Sactuary and plant collectors have affected the growth and development of the plant diversity. "Over-exploitation" of many economic plants like *Diospyros melanoxylon* (Tendu) for bidi leaves, *Madhuca longifolia* var. *latifolia* (Moha) for beverages, *Pongamia pinnata* (Karanj) and *Jatropha gossypifolia* for bio-diesel and medicinal plants like *Rauvolfia serpentina* (Sarpgandha), *Sterculia urens* (Karu) for its gum etc. have affected the distribution of the rare species in the Sanctuary as well as other places in Maharashtra and India. Because of this over-exploitation for commercial purpose, these species have become rare, threatened and species like *Sphenostylis bracteata* (Thapti-sheng) as vulnerable.

Abiotic factors: Abiotically, landslides due to heavy rainfall in the year 2002 and 2007 and forest-fire (natural as well as man-made) have resulted in the degradation of the floristic diversity. There are number of species recorded by earlier workers forest officials (Working plan of the National Park and Sanctuary) but could not be traced out. Perhaps these species have become rare, threatened or extinct due to abiotic as well as biotic factors. The greatest threat to the species in the present century is the habitat destruction of plant communities (Nayar, 1984).

DISCUSSION:

Khoshoo (1991) has described 'Biological diversity' as a sum total of species including number of plants, animals and micro-organisms living in a Ecosystem. To protect the Flora and Fauna from the above mentioned biotic and abiotic factors, Govt. of India has taken certain steps such as ban on export of plants like *Rauvolfia serpentina, Aconitum* spp., *Nardostachys grandiflora* and beautiful orchids for commercial purposes under Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which was organized in 1973 and activated in 1975.

To conserve plants in their natural habitat (*In situ conservation*) 13 biosphere reserves, 89 National parks and 489 Wildlife Sanctuaries including 5 National parks and 35 Wildlife Sanctuarirs (Area 14747.84 sq. km) in Maharashtra have been declared by Govt. of

India. However, Batisse (1982) and Gadgil (1983) concluded that National parks and Wildlife Sanctuaries have not yielded the desired results and hence biosphere reserves are the only remedy for conservation. Sankhala (1991) has also observed that "National parks are in great pressure due to grazing, human population and illicit felling of trees. Same is true for the present National Park and Wildlife Sanctuary.

The faunistic diversity depends on rich floristic diversity. This inter dependence was emphasized by Gilbert (1980) stating that loss of a Keystone mutalist (typical plant) would cause loss of mobile links (animals) followed by link of dependent plants. A noted conservationist Myer (1984) also concluded that at least one species is disappearing each day in tropical forests alone and in a few more years there will be species loss each hour. The disappearing plant can take with it 10-30 dependent species such as insects, higher animals and even other plants (Jain & Sastry, 1980). Hence to preserve the animal diversity, it is essential to preserve plant diversity.

Conservation: Conservation of wild flora and fauna and their habitat is now receiving attention all over the world. Certain endangered taxa and plants with horticultural and medicinal value as well as animals like Tigers, Rhinos etc. need particular attention. To conserve them, 14 tiger reserves and 9 other tiger habitats including Nawegaon National Park & Nagzira Wildlife Santuary in Gondia District (Maharashtra) have been established in India by Indian Wildlife Board, National MAB Committee, Central and State forest depts., Botanical Survey of India(BSI) and Zoological Survey of India (ZSI) etc. contribute to these efforts (Jain & Sastry, 1983). To conserve such rare Floristic & Faunistic elements various international organizations are also active. e. g: IUCN, BGCS , WWF, CITES, CGCR, IABG, WCMC, TPU etc.

The Nawegaon National Park and Nagzira Wildlife Sanctuary are not only rich in Floristic diversity but also support carnivores like tigers, leopards, wild dogs etc. along with herbivores like Sambar, Gaur, barking deer etc. The area is an ornithologist's paradise with large lake adjacent to National park. There are about 209 species of water-birds (Dharankar, 1976). Therefore for effective conservation of biodiversity, under article –8, Govt.of India has taken necessary action to elaborate network of 578 protected areas including 89 National parks (Area-37,534 sq. km.) and 489 Wildlife Sanctuaries (Area 1,17, 974. 53 sq. km.). In Maharashtra there are 5 National parks viz. Gugamal, ***Nawegaon,*** Pench, Sanjay Gandhi , Tadoba and 35 wild life sanctuaries including Nagzira Wildlife Sanctuary (Singh & Singh, 2002). An account of two National Parks has been published in bookform (cf. Pradhan *et al.,* 2005 ; (Malhotra & Moorthy, 1992.).

International Union for conservation of Nature & Natural Resources (IUCN) with the advice of co-operation & financial support of the United Nations, Enviornmental Programme (UNEP) and the World Wildlife Fund (WWF) has prepared a world conservation strategy on 5 March 1980 with 3 main objectives viz.**1)** Maintenance of essential ecological processes and life- support systems; **2)** Preservation of Genetic Diversity and **3)** Sustainable utilization of species and ecosystems. Through the efforts of IUCN, The Indian Wildlife (Protection) Act 1972 has also further been amended to include plants for their conservation.

Thus, to save the biodiversity of the Nawegaon National park and Nagzira Wildlife Sanctuary from above mentioned threats (biotic and abiotic) it is our moral duty to create awareness among the common people through all medias (Radio, Television, News papers), flower shows etc. starting from children education .To stop destruction of the above mentioned biological wealth, frequent seminars in regional and accepted national languages regarding conservation should also be organised for constant hammering among the intellectual people in particular and masses in general For conservation and awareness, Botanical Survey of India has published 4 volumes of the *Red Data books of Indian plants* (Singh & Singh, 2002)

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