Asian Journal of Multidisciplinary Studies

ISSN: 2321-8819 (Online)
2348-7186 (Print)
Impact Factor: 1.498
Vol. 4, Issue 3, February 2016

" Conservation Status Flora of Nawegaon National Park and Nagzira Wildlife Sanctuary (Dist.-Gondia) Maharashtra, India".

D.N.Patil

B.J.S.College , Wagholi, PUNE-412207.

ABSTRACT

*The Studies on 'The Flora of Nawegaon National Park and Nagzira Wildlife Sanctuary' was carried out during 2001-2009. Nawegaon National Park & Nagzira Wildlife Sanctuary lies in Tirora range of Bhadara forest division in Gondia district (M.S.). These forest are with great diversity of plants and animals, Thousands of visitors visit this area every year. so far no detailed account of the vegetation of the area was known. Based on extensive plant exploration in the areas and literature, the study resulted enumeration of **715** species among **440** genera, and **122** families of Angiosperms in thesis form.*

The detailed flora includes methodology, rare, endemic and threatened plants, key to the family, genera, and species etc. Each species include latest nomenclature morphological description, phenology, distribution and important uses. The critical study has also revealed that there are number of plants (c 300) used economically for food, shelter for wild animals & birds, fodder, fuel, fibre, timber, agriculture impliments, dyes, beverages, paper industries, tannin, gums, resins, bio-fuel and medicines.

The present paper deals with the conservation status of this areas, Environmental impact of the vegetation of the protected areas are discussed.

Key Words : Plant diversity, Utility, factors, conservation.

Introduction

India with an area of about 3,287 million sq. km. and a coast line of over 7500 km is very rich in biodiversity and consider as one of the twelve mega diversity center ranking third in Asia and Eleventh in the world. India harbours over 45,000 species of plants amounting about 11 percent of world's flora.

STUDY AREAS

A. Nawegaon National Park, Maharashtra, India. (Map-3)

The National park (Biogeographical 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 it is tribute to founder of the Kolasur island ("Maldongar") (PLATE:A-1) 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 Maharashtra 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 Maharashtra 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 (cf. Table-I and Graphs 1-3).

Vegetation: The vegetation of the area is of South Indian moist deciduous type (Champion & Seth, 1968) (PLATE:A-3).The plants are distributed in three different zones.

In top storey,the trees are close, rather tall spread out in tall 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) (PLATE-B-4), *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* (ChowN. P. Singha, 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.

B. Nagzira Wildlife Sanctuarty,Maharashtra ,India. (Map-4)

The wildlife Sanctuary (Biogeographical Provience 6D) was constituted as per the notification No. WLP/1669/22860/Y/dt.3/6/1970, covering an area *152.81 sq. km*. The Sanctuary is miraculously preserved as 'Green Oasis' in the eastern most part of the Maharashtra State and has a great importance from bio-diversity conservation point of view. The name Nagzira Wildlife Sanctuary is based on idol Nagdev and Nagzira lake.

Location: The Sanctuary is situated in Sakoli tahsil of Bhandara district and Arjuni (Sadak), Goregaon & Tiroda tahsil of Gondia District (Maharashtra State) under the Nagzira range at 79^{o} 58' E to 80 ^{o} 11'E longitude and 21 ^{o}12' N to 21 ^{o} 21' N latitude.

Bio-geographic Zonation: As per the wildlife Institute of India, Dehradun, This Sanctuary is classified as follows: 1)Bio-geographical Kingdom- Paleotopical. 2)Sub-Kingdom-Indomalyosian. 3) Bio-geographical Zone-6-Deccan peninsula. 4)Biotic Province -6B-Central Deccan. The Bio-geographic zone is one of the least protected zone in India though rich in floral and faunal diversities. Hence it needs tall degree of protection.The entire area [152.81 sq. km,old Reserved Forest] of this Sanctuary is covered by 4 Topo-sheets bearing numbers 55(0/15), 55(0/16), 64(C/3) & 64(C/4).

Boundaries: The total length of external boundary is 104.53 km out of which 74.93 km is an artificial boundary and 29.60 km is natural boundary as under.

On the north: Revenue village boundary of the village Kursipar, Berdipar, Belapur, Hamesha, Kodebarra, Mangezari.*On the East*: Railway line Gondia to Chandrapur, broad guauge section of S.E. Railway.*On the South*: Pitezari fazal forests and Sakoli range, village boundaries of Jamdi, Kosamtondi and Reserved forest boundary.*On the West*: Village boundary of Bhajepar, Chorkhamara,

Chorkhamara-Pangdi cart track and Reserve forest boundary.

The Sanctuary is surrounded externally by the Reserve forests of Gondia forest division and Bhandara Forests Division on the Northern and Eastern side and by Reserve Forests of FDCM of Bhandara Division on the Southern and Western side. The length of internal range of boundary is 104.53 km. 'Thadezari' is the only village geographically situated inside the Sanctuary, coincide the Compartment boundry. Ecologically, the forest area surrounding the Sanctuary is a self sufficient ecosystem with it's living fauna & flora.

Area of Nagzira was declared as Wild life Sanctuary vide Govt. Notification No. WLP/1669/228601-y dt.3/6/70. As per the memo. no. WLP/Gen/HPA/ 45(7071/B/8360, dt.23/7/70) from Chief Conservator of Forests, Maharashtra State, fellings have been suspended in the coupes falling within the area of Sanctuary and Grazing is also prohibited. Shooting of tigers is prohibited vide Govt. Resolution No.WLP/1570/45404-Y, dt.25/7/1970.

Geology, rock and soil : The Sanctuary exhibits amazing diversity of terrain and altitude ranges from nearly 30 m to 560 m above sea level. The typical geological formations are Sakoli series having number of formations comprising of Phyllites, Slates,Chiovites, Sauser series etc. Rocks of two groups show difference in chemical composition of lime bearing rocks with a diversity of terrain having steep ridges, narrow valleys, deep gorges and varying altitude.

Soil : Soils are laterite texture varys from sand to sandyloam in plains and lower slopes, sandy to Murram on the steep slopes and rocky on the precipitous slopes. Calcareous soils found in patches and foot hills along the nasal and near villages, where top soil is removed. The laterite soils are well suited for *Tectona grandis*.

Climate : The Sanctuary is indeed materials of priceless asset to enjoy it's picturesque landscape with its pure and fresh air. The climate is quite pleasant during greater part of the year. The temperature varies between 6^{o} c during December and 46^{o} c during May.

The mean annual rainfall observed is 1200 mm.The maximum rainfall about 1600 m occurs during July-August.Draught occurs approximately once per 10 years. Last draught occurred during 1997. Frost is not experienced in the area while about'Insultation'except rainy season, other season have predominant Sunny days.Maximum wind velocity is observed from June-August (cf. Table-I and Graphs 1-3).

Drainage: Here drainage is good so there is no accumulation of Water as such. The seven important lakes in the adjoining areas are Chorkhamara, Bodalkasa, Balapur, Ledezari, Malujunga, Murpar and Rangepar .There are two big water reservoirs within the Sanctuary at Nagzira and Thadezari lakes. These water reservoirs not only assure perennial water supply to wildlife in the area but also greatly add beauty to the landscape. Hence thousands of tourists visit this area every year.

Fauna: Nagzira Wildlife Sanctuary is located in the arms of nature and adorned with a picturesque landscape, luxuriant vegetation and serves as a living outdoor museum to explore and appreciate nature. The Sanctuary has a number of fishes, 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.

Vegetation : The vegetation of the area is of South Indian Moist deciduous type (Champion & Seth, 1968) and distributed in three different zonations. The top canopy of the forest includes tree species like *Anogeissus latifolia, Bridelia retusa, Cleistanthus collinus, Diospyros melanoxylon, Sterculia urens, Xylia xylocarpa* etc.

The second layer of the forest comprises a number of small trees and shrubs like *Clerodendrum serratum, Gardenia latifolia, Holarrhena pubescens,, Lagerstroemia parviflora* etc. and lianas and climbers like *Acacia pennata, Aristolochia indica, Aspidopterys cordata, Cocculus hirsutus, Dioscorea bulbifera, Hemidesmus indicus, Smilax zeylanica* etc.

Materials & Methods

To study the floristic composition of the forest, plant exploration tours were arranged in different seasons during 2001 to 2005. Flowering and fruiting specimens were collected and field observation on habit, habitat, colour of flower, local name, relative abundance, associated plants etc. were noted. Close up of flowering / fruiting material & habit along with associated plants were photographed. Plants were processed in customary way in the regional herbarium of Botanical Survey of India, Pune (BSI).

Floristic Diversity

The vegetation of the area is of mixed deciduous type (Champion & Seth, 1968) in the plant are distributed in three different zones. In top storey the trees are close, rather tall with spread out high canopy. The main deciduous species are *Albizia lebbeck, A. odoratissima, Mitragyna parviflolia, Tectona grandis etc* .Middle storey with small trees and numerous shrubs like *Bridelia retusa, Butea monosperma, Cleistanthus collinus,*

Holarrrhena antidysenterica, etc. Some slender climbers like *Olax scandens, Ventilago denticulata, Abrus precatorus. etc.* and stem parasites like *Dendrophthoe falcata.* and epiphytic orchids like *Vanda tessellate also* occur.

Ground flora with Carissa congesta, Lavandula bipinnata, Woodfordia fruticosa, number of grasses and sedges (Cyperous spp.) and aquatics in stagnant water eg. Bacoppa monierii, Limnophila indica, Nymphoides cristetum, Nymphea nouchelia, etc. occur. The general survey of floristic diversity is mentioned in table No. I

Table I – General survey

	No. of Families	**No. of Genera**	**No. of species**
Dicots	58	176	248
Monocots	14	46	72
Total	**72**	**222**	**320**

Utility of Plants

Edible plants : *Emblica officinalis, Tamarandus indica, Ziziphus jujuba, Z. oenoplia, Citrus arantium, Aegle marmelos, Carissa congesta, Cordia dichotoma, Maesa indica, Grewia tillifolia, Anona squamosa, Mangifera indica* etc.

Fooder plants: *Cleome monoplylla, Sida cordata,*

Eriolaena hookerinna, Desmodium trifolium, Indigofera glandulosa, Sesbania grandiflora, Tephrosia purpurea, Vigna triloba, Bauninia purpurea, B. varieagata, Tamarandus indica, Albizia lebbeck, A. odoratissima, Bidens biternata, Elephentopus scaber, Emilia sonchifolia, Vicoa indica, Pergularia daemia, Ipomoea aquatica, I. pestigridis, Anisomeles indica, Bridelia retusa, Curuligo orchioides, & all grasses as stable food for wild animals.

Timber Yielding plants:, *Acacia nilotica, A.*

chundra, Albizia lebbeck, Anogeissus latifolia, Dalbergia latifolia, Legestromia parvifolia, Ixora arborea, Grewia tiliifolia, Bombax ceiba, Kydia calycina, Mangifera indica , Erythrina indica, Boswellia serrata, Terminalia arjuna, T. bellirica, T. chebula, T. tomentoa, Madhuca indica, Bridelia retusa, Tectona grandis, Xylia xylocarpa, Delonix regia, Peltophorum pterocarpum, Dalbergia paniculata, Butea monosperma, Semecarpus anacardium, Diospyros melanoxylon, Buchanania lanzan, etc

d) Agricultural Implements : *Bauhinia purpurea,*

Pithecellobium dulce, Bridelia retusa, Anogeissus latifolia, Acacia leucophloea,

Tamarindus indica, Terminalia chebula, T. bellirica, Butea monosperma, Mitragyna

parvifolia etc

e) Paper industries: *Bombax ceiba* (Savar), *Ficus racemosa* (Umber), *Gnedia glauca* (Rametha), *Dendrocalamus strictus* (Bambu) etc.

f) Tannin: *Cleistanthus collins,Acacia latifolia,Acacia*

chundra,Bridelia retusa,Cassia fistula, Embelica officinalis etc.

g*)* Gums & resins - *Acacia nilotica(Babul), Butea*

monosperma,(Palas), Anoigessus latiolia, (Dhavada) Gardenia gummifera (Dikemali) Sterculia urens (Pandhuraki), Boswellia serrata (Uad), Mitragyna parvifolia(Kalamb)etc

h*)* Bidi wrappers – *Bauhinia racemosa* (Apta),

Diospyros melanoxylon (Tendu), etc.

i) Beverages and narcotics: *Borassus flabellifer*

(Tad), Madhuca indica (Moha) etc.

j) Fibre Yielding Plants: *Abutilon indicum(Petari), Bombax ceiba(Sawar), Gossipium herbaceum, Chorchorus oliotorius, Kydia calycia,(Waranga), Sida acuta(Bata), Urena lobata,(Ran bhendi), Helicteres isora(Muradphali), Ichnocarpus frutescens (Kalidudhi), Combretum decandrum, Cyperus iria, Vetiveria zizanioides, Dendrocalamus stritus, Aristida seatacea, Arundo donax, Musa paradisiaca, Dioscorea pentaphyla etc.*

k) Dye Yielding Plant: *Acacia catechu (khair), Butea monosperma (Palas), Mallotus philippensis, Woodfordia fruticosa(Dhayti), Terminalia tomentosa etc.*

l) Medicinal plant: *Rauvolfia serpentina, R. tetrafila, Terminalia chebulla , T. bellirica, Elephentopus scaber, Embelica officinalis, ,Cassia fistula, Abutilon indicum, ,Cissampelos Periera (Pahad vel), Cocculas hirsutus (Vasanvel), Hybanthus enneaspermum (Rattanpurus), Sida accuta Helicteres isora (Muradphalli), Corchorus aestuans, Grewia hirstua, Triumfetta rhomboidea (Anduli), T. rotundifolia (Mendurli), Aegle marmelos (Bel), Buchanania lanzans. (Charoli), Semecurpus anacardium(Biba), Abrus percatorius (Ganja), Alysicarpus vaginalis, Butea monosperma (Palas), Pseudarthria viscida, Rhynchosia minima, Uraria picta, Cassia absus, Acacia pennata (Bhabhul), Acacia pennata, Aammania baccifera, Xeromorphis uligenosa (Karingud), Emilia sonchiroli, Grangea mederasptanal, Spheranthus*

indicus (Gorakhmundi), Tridax procumbens (Ekdandi), Plumbago zeylanica(Chitramula), Hollarehena antidysenterica (Kuda), Hemidesmus indicus (Utarni), Asparagus racemosus (Shatavari) etc.

DISCUSSION AND CONSERVATION

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 Sanctuaries (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, taller 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) are actively working in India through 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* (N. P. Singh & N. P. Singh, 2002).

Environmental Impact on vegetation

Vegetation of Navegaon National Park is affected by number of biotic & abiotic factors.

Biotic factors**:** Biotic factors play very important role in affecting vegetation of the forest such as overgrazing, commercial exploitation, Illicit cutting, Tourists and tourists development, plant collectors

Commercial exploitation: There are many floristic elements in forest which are having great demand in the market shows their commercial value Viz. *Diospyros melanoxylon* (Tendu), Sphenostylis bracteata, *Madhuca indica (Moha), Semicarpus anacardium (Biba), Tectona grandis (sag), Anogeissus latifolia (Dhawada), Raufia serpentina (Sarpagandha), Sphenistykis bracteata (Thapati sheng)* etc. which gives valuable products are exploitated because of commercial value.

Illicit cutting of wood for fuel purposes

Abiotic factors: Abioticaaly forest fire, cyclone, flood due to heavy rainfall and land slides have affected the vegetation of the Nawegaon National Park.

Conservation

The Nawegaon National Park is not only rich in floristic diversity but it also supports carnivorous 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 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-37534 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 (Borivalli), Tadoba (Area 955.93 sq. km.) and 35 wild life sanctuaries (Area- 14747.84 sq. km.) (Singh & Singh 2002)

Now to save the biodiversity of the Nawegaon National park from above mentioned threats (biotic and abiotic) it is our moral duty to create awareness among people -starting from children education to stop destruction of all above biological wealth.

Literature cited

AHMEDULLAH, M.& M.P.NAYAR, 1986. *Endemic plants of Indian region* Vol..1.*Peninsular India.* Botanical Survey of India, Culcutta.

ANJANKAR & BARDEKAR, 2000. Working Plan of Nagzira Wildlife Sanctuary & Nawegaon National Park.

ARORA,R. K.& E. R. NAYAR, 1983. *Distribution of wild relatives and related rare species of economic plants in India in Assess. Threat. Pl. India* (eds. Jain, S. K.& R.R. K.M. Rao), Botanical Survey of India, Howrah, p.p. 287-290.

BATISSE, M. 1982. *The Biosphere: A tool for environmental conservation and management. Environmental Conservatuion* 9: 101-114.

BALAKR. 1993. in B.D. Sharma *et al. Fl. India 2: 381. f. 70.*

BANERJEE, 1993. B.D. Sharma *et al., Fl. India 2: 460. f. 87.*

.

CHAMPION, H.G.& S.K.SETH, 1968. *A revised Survey of Forest Types of India*, Managers of Pub., Delhi.

CHATTERJEE, D. 1940. *Studies on the endemic Flora of India and Burma*. *J. Asiat. Soc.Bengal* 5:19-57.

CHATTERJEE, D. 1962. Florestic patterns of Indian vegetation in *Proc. Summer School in Bot*. New Delhi, Darjeeling.32-42. Calcutta.

HOOK. F. & THOMS. in Hook.f. *Fl. Brit. India* 1: 190. 1872;

COOKE, THEODORE. 1901-1908. *The Flora of the Presidency of Bombay* vol-2 London (Repr.ed. 1958, 3 vols.).

DESHPANDE et al., 1993. *Fl. Mahableshwar* 1: 138.

DHARANKAR, C. M. 1976. *Checklist of Birds -Nawegaon National Park.*

DIXIT, R. D. 1984. *A census of the Indian Pteridophytes, Botanical Survey of India*, Diptt. of Environment, New Delhi.

DIXIT, R. D. & J. N. VOHRA, 1984. *A dictionary of Pteridophytes of India* , Botanical Survey of India, Howrah.

GADGIL, M. 1983. Conservation of plant resources through Biosphere reserves in *Conservation of tropical plant resources* (eds. S.K. Jain & K.L. Mehra)

Botanical Survey of India, Howrah pp. 66-77.

GILBERT, L.E. 1980. *Foodwebs organization on the Conservation of Neo tropical diversity in Conservation Biology* (eds. Soule, M.E. & B.A. Wilcox) pp. s11-33.

GUPTA, 1961 in *Bull.Natn.Bot.Gard.*Lucknow 54:t.18.

HAINES, H.H. 1916. *Descriptive list of trees, shrubs, and economics herbs of Northern Forest Circle*, Central Province. Allahabad.

ILLORKAR,V.M.& N.G.Totey 1999. *Regeneration Status of Nawegaon National Park* (Maharashtra) Indian J. Fores.Vol. 22 (3) : 203-209.

JAIN, S. K. & A. R. K. SASTRY, 1980.*Threatened Plants of India-A State-of-the-art Report.* New Delhi.

JAIN, S. K. & A. R. K. SASTRY, 1981. *National Parks and Biosphere Reserve in India Souv. Silver Jubillee Simp.Int.soc.Trop.Ecol.*50-56.

JAIN, S. K. & A. R. K. SASTRY ,1983. *Materials for a catalogue of threatened Plants of India*, Botanical Survey of India, Calcutta.

JAIN, S. K. & A. R. K. SASTRY, 1984. *Indian Plant Red Data Book*, Botanical Survey of India, Howrah.

KHOSOO, T. N. 1991. *Biological diversity a case for conservation Hindu p.* 125.

KOTHARI, M. J. & S. S. MOORTHY, 1993. *Flora of Raigad District (Maharashtra State),* Botanical Survey of India, Kolkata.

KOTHARI, M. J. & S. S. MOORTHY,1996. Ethanobotany in Human Welfare of Raigad district, Maharashtra state,India in S. K. Jain(Ed.) *Ethanobotany in Human Welfare* pp.403-407.Deep.Public.,New Delhi.

KOTHARI, M. J.,C. R. C. R. JADHAV& N. P. N. P. SINGH, 2003. Ethanobotanical Wealth of two sacred Groves in Junnar Taluka , Pune, Maharashtra. *J. Econ. Taxo. Bot*.27 (3): 585- 591.

KOTHARI, M. J. & K. M. K.M. RAO, 1999. Ethanobotanical Studies in Thane district, Maharashtra . *J. Econ. Tax. Bot.* 23(2): 265 -272.

KOTHARI, M. J. & D. L. D. L. SHIRODKAR, 2004. Florestic diversity and Ethanobotany of Human river catchment area , Chandrapur (Maharashtra), In : Dr. V. Ghate (ed.) *Focus on Sacred Grove & Etanobotany*, Prism Pub.,*Mumbai, pp.*170-173.

KOTHARI, M. J. & D.L. D. L. SHIRODKAR, 2006. Florestic diversity of Kudali & Dhom Balkwadi (Tunnel) Catchment areas, Satara District, Maharashtra . *J. Econ. Tax. Bot*, 30(3):676-680.

KOTHARI, M. J..& N.P.N. P. SINGH, 1998. Mangrove diversity along the North-West coaof India. *J. Econ. Tax. Bot*. 22 (3): 571-585.

KOTHARI, M. J. & N.P.N. P. SINGH, 2002. Fragile ecosystems, Kutch in N. P. Singh, N. P. & K. P. N. P. Singh (eds) *Floristic Diversity and conservation Strategies in India* 2877- 2898. Botanical Survey of India,Kolkata.

MACKINNON, J.,C. MACKINNON, G. CHILD and J. THORSELL , 1986. *Protected Areas in the Tropics*.IUCN,Gland.

MADHUSUDAN *OP. CIT.* 60.

MAHESH., 1966. Illus. Fl. Delihi f. 9.

MALHOTRA , S. K. & K.M. RAO, 1980. A Vegetation Of Nawegaon National Park and its Environ. Maharashtra State. *Bulletin of Botanical Survey of India* Vol.22,(1-4): 1-11 .

MALHOTRA , S. K. & K.M. RAO 1981a. A contribution to the Flora of Bhandara District, Maharashtra State (India), *J. Econ . Tax . Bot* . 2 : 107-136.

MALHOTRA , S. K. & K.M. RAO 1981b. The *Vegetation of Nagzira Wildlife Sanctuary and its Environs.* Maharashtra State. Journal of Bombay Natural History Society Vol.78(3).

MALHOTRA , S. K. & S. S. MOORTHY, 1992. *Flora of Taroba National Park,* Chandrapur District, Maharashtra State, Botanical Survey of India ,Culcutta.

MALICK, 1993. *Fl. India in B.D. Sharma & et al*. 3: 420. F.117.

MATHEW, 1982. *IIlus. Fl. Tamilnadu Carnatic. t. 12.*

MYER, N. 1984. Problems and opportunities of habitat conservation.In : Anthony .V. Hall(ed.) *Conservation of thratened Natural Habitats*.S. African Nat. Sci. Prog. Report 92.

NARAYANASW. 1940. *Rec. Bot. Surv. India* 14(2): 20. f. 6. (*G. arborea*).

NAYAR , M . P.1984 . Extinction of species and concept of rarity in plants .*J.Econ. Tax.Bot. 5(1): 1-6.*

NAYAR , M . P..& A.R.K.SASTRY,(ed.) 1987-1990. *Red Data Book of Indian plants* Vols.1-3.Botanical Survey of India, Calcutta.

PATIL, D. N. , 2000. 'Karang' a useful tree from Nawegaon National park in *Krushi Sahitya* (Marathi) 7: 47 -49 (With a coloured photo).

PATIL, D. N. & Kothari 2006. Florestic Diversity and its Conservation in Nawegaon National Park,Maharashtra**,** presented in *International Seminar on Present Trends and Future Prospectus of Angiosperm Taxonomy* abstract , Published in Jovenier of MACS, Pune, Full paper Sent for publication in *J. Econ. Tax . Bot .*

PATIL, D. N. & M.J.KOTHARI, 2009. Floristic Diversity of Nagzira Wildlife Sanctuary, presented in *National Conference on Biodiversity, Sustainable Development & Human Welfare in* Jan. 10-11, 2009 at P.G. Dept., Ghogrey Science College, Dhule-5(M.S.). Abstract published and full Paper sent for publication in Prof . R .M . Pai Co-memoration volume of the symposium Professor R . M . Pai

RAGHAVAN, R. S. & N. P. N. P. Singh 1983. Endemic and threatened plants of Western India. *Plant Conservation.Bull*.3:1-16.

RANGARAJAN,L.N. 1992 . *Kautilya-The Arthashastra* Penguin...

RODGERS,W.A H. S. PANWAR and V. B. MATHUR 2002. Wildlife Proteced Area Network in India : A Review . WII, Dehradun

SAHARIA,V.B. (ed) 1981, *Wildlife in India*. Natraj Publishers, Dehradun.

SANKHALA, K, 1991, Future of National Parks of India. *India Forester* 117 (10): 791-798.

SHARMA, B. D., S. KARTHI KEYAM & N. P. N. P. SINGH (eds),1996. *Flora of Maharashtra State* (Monocot) Botanical Survey of India, Calcutta .

SINGH B. & P. Rethy,1995, Bearing a 'Jhum cultivation' in the Floristic diversity of Arunachal Pradesh in *National symposium on new Direction in Plant Biodiversity Research*, Tiruchirappalli, p. 24.

SINGH, N. P. & S. S. KARTHIK.EYAN 2000, *Flora of Maharashtra State* (Dicot) Vol. 1.,Botanical Survey of India, Culcutta, Prited by Flemingo press, Pune.2.

SINGH, N. P.,P. LAKSHMINARSIMHAN, S. S. KARTHIK.EYAN & P. V. PRASANNA, (eds.) 2001. *Flora of Maharashtra State* (Dicot.) vol. 2 .Botanical Survey of India, Calcutta, Flemingo press, Pune.

SINGH, N. P. & M.J.KOTHRI, 2000. Phytodiversity of India- an overview in conservation and Management of Biological Diversity, *Indian Forets &Environmental Managers Association (eds.*) A. S. K. Malhotra & A. N. P. Singh,Bhopal

SINGH, N.P.& D. K. SINGH, 2002, Protected Area Network in SINGH, N. P. & K. P. SINGH (eds.) vol In & Ex suit conservation Floristic Diversity and

Conservation Strategres in India 5: 2341- 2412, Botanical Survey 0fIndia , Kolkata

SINGH N. P. & P. P B.D. SHARMA, 1998.*Checklist of Ethanobotanically important plants in Biodiversity of the Western Ghats of Maharashtra* (ed. A. P. Jagtap) pp. 211-261. WWF, India, Pune.

STAFLERA, WCMC,1992. *Global Biodiversity*: Status of Earth's living resources. Champion and Hall, London.

SUBRAM, 1962 . Aq. Ang. 113, f. 1.

TALBOT., 1919. For Fl. Bombay Pres. & Sind. 1: 63, f. 41.

YADAV, S. R. 1997a. Endemic plants of Peninsular India with special reference to Maharashtra In: Pokale, D. S., Namir S. P. , Naik, V. N. (eds.), proc. VII IAAT-*Annual Meeting and National Conference* pp. 31-51. Aurangabad.

YADAV, S. R.1997b, Rare flowering species of Maharashtra their potential values, utilization and conservation in sustainable development. Poroc.Nat. Conf. Dimeens, Environ. Stree India, Geol. Deppt.; M. S. Univ., Baroda.