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# FOREST ECOLOGY OF GAUTAM BUDDHA WILD LIFE SANCTUARY OF BIHAR, INDIA

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## ABSTRACT

In India a bulk of Indian forest (about 174 mha of total land area) is degraded due to tremendous anthropogenic pressure and unsustainable practices. Even today protected areas (PAs) are also facing deteriorative great human impact. The Gautam Buddha Wildlife Sanctuary (GBWS) is one of the PA of Bihar State notified on the line of the Project Tiger. The Sanctuary possesses mixed biodiversity features due to its unique geographical conditions. It has northern tropical dry deciduous type of main forest with a number of phytosociologically differed sub types. A variety of wild animals are found here that provide ecological integrity to its forests but due to anthropogenic pressure, the biodiversity of the Sanctuary is depleted to a considerable extent in last few decades that is adversely affecting its forest. Such ecological degradation requires a well planned strategy for conservation of biodiversity and habitats of the Sanctuary. In this regard ecodevelopment scheme may prove to be a success.

Figure : 00 References : 13 Table : 00

KEY WORDS : Ecological stability, Forest, GBWS, Human impact,

## Introduction

The word 'forest' conjures up an image of large areas under heavy tree cover, an area which has evolved naturally over hundreds of years. Ecologically it is an intricately interwoven community of plants, animals and also other organisms playing a unique role in sustenance of life on the earth. Forests are regarded as Earth's lungs and that provide great ecological services to nature such as regulation of water flow and rainfall. Ecologically forests can sustain and renew itself endlessly supporting the web of life.[3,5]

At present the total forest cover of India is 690,899 sq. km. which is 21.02% of the total geographical area of the country. Due to tremendous anthropogenic pressure and unsustainable practices, it is estimated that about 174 mha of country's forest of 329 mha of total land area is degraded. Per capita availability of forest in India is 0.08 ha which is much lower than the world average of 0.8 ha. Ecologically stabilized major part *i.e.* about 15.3 mha (about 4.66% of the country's total geographical area) of forest lies within protected area (PAs)-National Parks and Wildlife Sanctuaries.[4,8,9]

On the line of the Project Tiger (1973), notified as a Wildlife Sanctuary on 14 September 1976, the Gautam Buddha Wildlife Sanctuary (GBWS) having originally been designated a Protected forest in 1972. It lies in the South-East part of the sacred city Gaya on either flanks of the Grand Trunk Road (NH-2) covering an area of about 259 sq.km. with an expansion within Jharkhand State.[6,12,13]

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The GBWS is one of the best floral and faunal area in the Bihar State. Its amazing geography is marked by ecological conditions and rich species diversity found there. The vegetation is of tropical dry deciduous type that sustains life of a number of animal species. The Sanctuary also has a large population of human and livestock that have tremendous biotic impact on the natural wealth leading to loss of biodiversity and ecological degradation. Human activities, reduce and exercise selective pressure on biodiversity which try to modify ecosystem.[11] The ecological effect of geology, rock and soils on the distribution of vegetation offers an interesting field study which is of great importance.

## Materials and Methods

The Gautam Buddha Wildlife Sanctuary has been visited several times with the help of local people and personnels of concerned forest department. The aim was to observe different forest types and their vegetation. The information on the study area is also gathered from standard literatures cited there in the text.

## Results and Discussion

The GBWS contains the northern tropical dry deciduous type of main forest. Its soil is sandy loam and mixed with murrum at places. Clay patches are also present. Geologically the Sanctuary possesses Schist, Quartzite, Granite and Alluvium rocks. With a number of perennial pools (Dah) it is traversed by Mohane river and all four typical seasons prevail here.[12] Geographically the Sanctuary possesses characteristics of both the Gangetic plain as well as Chhotanagpur plateau, hence showing mixed biodiversity features.[13]

Flora of the Sanctuary are more or less similar in different places but concentration of different plant species vary phytosociologically or from ecological point of view the Sanctuary has six local types of forests. These forests inhabit a number of diverse Angiospermic flora of different taxonomic groups which sustain the wildlife of the Sanctuary and make the ecological balance.[7,12,13] These Forests are –

**(1) Dry peninsular Sal forest** – It occurs along stream banks of Mohane river and in protected ravines ( Mangra, Sahor, Sankhwa *etc.*). It inhabits about 30 % Sal trees ( *Shorea robusta* Gaertn.) which are localised at few places. Besides, it also contains other plants species as associates, mainly which are –

**Trees :-** Asan ( *Terminalia tomentosa* W.&A.), Kendu (*Diospyros melanoxylon* Roxb), Dhautha (*Anogeissus latifolia* Wall), Sidha ( *Lagerstroemia parviflora* Roxb.), Piar ( *Buchanania lanzan* Spreng), Karam ( *Adina cordifolia* Benth. & Hook f.), Gurika (*Mitragyna parvifolia* Korth.), Palas (*Butea monosperma* Taub.)

**Shrubs:-** Manphal ( *Randia dumetorum* Lamk.), Kanod (*Carissa opaca* Stapf.), Khonta (*Ixora arborea* Roxb.), Mansondha (*Croton oblongifolius* Roxb.), Jirhul ( *Indigofera pulchella* Roxb.), Harsingar(*Nyctanthes arbor-tristis* Linn.).

**Grasses :-** Choranth (*Heteropogon contortus* Beauv.), Chorkanta (*Chrysopogon aciculatus* Trin.) *etc.*

**Climbers :-** Mahulan (*Bauhinia vahlii* W.&A.), Ratend (*Combretum decandrum* Roxb.) *etc.*

**(2) Northern dry mixed deciduous forest** – Major part of the forest of the Sanctuary comes under this type which occurs throughout the Sanctuary area. It has a mixture of different vegetation. The main plants of this forest are-

**Trees:-** Asan (*Terminalia tomentosa* W.&A.), Bahera (*Terminalia belerica* Roxb.), Dhautha (*Anogeissus latifolia* Wall.), Sidha ( *Lagerstoremia parviflora* Roxb.), Salai (*Boswellia serrata* Roxb.), Kendu (*Diospyros melanoxylon* Roxb.), Bel(*Aegle marmelos* Correa.), Karam (*Adina cordifolia* Benth. & Hook f.), Jhingan (*Lannea coromandelia* Merr.), Piar ( *Buchanania lanzan* Spreng.), Kajh (*Bridelia retusa* Spreng.), Kachnar (*Bauhinia vriegata* Linn.) Paisar (*Pterocarpus marsupium* Roxb.), Mahua (*Madhuca indica* Gmel.), Khair (*Acacia catechu* Wild.), Palas (*Butea monosperma* Taub.)

**Shrubs :-** Banber (*Zizyphus nummularis* W.&.A.), Harsingar (*Nyctanthes arbor– tristis* Linn.) Dhawai ( *Woodfordia fruticosa* Kurz.), Khonta *(Ixora arborea* Roxb.), Papara ( *Gardenia latifolia* Aiton.), Koraiya (*Holarrhena antidysentrica* Wall. )

Grasses and climbesrs are same as in Sal forest.

**(3) Dry deciduous scrub forest** – It occurs in plain and moderately undulating areas of the Sanctuary. Its vegetation is mostly shrubs. The predominant species are – Khair (*Acacia catechu* Wild. ), Katia (*Flacourtia indica* Merr. ), Lajwanti (*Mimosa pudica* Linn. ) Banber (*Zizyphus nummularis* W.&A.), Karaunda ( *Carissa opaca* Stapf. ), Sij (*Euphorbia* sp.) *etc.*

**(4) *Boswellia* forest** – It occurs on hill tops and high reaches of hills throughout the Sanctuary. The

predominant plant is Salai (*Boswellia serrata* Roxb.) and its main associates are Asan ( *Terminalia tomentosa* W.&A.), Kendu (*Diospyros melanoxylon* Roxb.), Bel (*Aegle marmelos* Correa.) *etc.* Vegetation of mixed forest are also found here.

**(5) *Butea* forest**- It occurs in heavily grazed area near habitations or villages like Khaira, Shahor, Pathel, Nawadih Murtiya, Tetariya *etc.* It also occurs in areas having clayey soil . The predominant plant is Palas (*Butea mononsperma* Taub. ) and its associates are mainly shrubs such as Banber (*Zizyphus nummularis* W.& A.), Manfal (*Randia dumetorum* Lamk. ), Karaunda (*Carissa opaca* Stapf.) *etc.* This forest is heavily infested by *Lantana* species and provides resting place for wild animals. The pet animals also get their food from this forest.

**(6) Dry Bamboo brakes** – These occur throughout the Sanctuary area as understory . The main plant is Bamboo (*Dendrocalamus strictus* Nees.). Its incidence is heavy at many places which provides an ideal home and shelter to the tigers. Its associates are similar to vegetation of mixed forest.

Different forests of the Sanctuary inhabit a number of wild animals predominated by Cheetal – *Axis axis* Erxleben, Sambhar- *Cervus unicolor* Kerr., Sloth Bear- *Melursus ursinus* (Shaw.), Nilgai – *Boselaphus tragocamelus* Pallas., Fox – *Vulpes bengalensis* (Shaw.), Red Jungle Fowl - *Gallus gallus murghi* Robinson & Kloss., Tree frog – *Hyla arborea* Linn. *etc.* The presence of keystone species Tiger *Panthera tigris tigiris* Linn. is the special feature of the Sanctuary which is fighting last battle for existance. [6,12]

The Study reveals that the geography and environmental conditions of the Sanctuary make it fit ecologically for sustenance of its species richness. Although in last few decades it has lost its ecological stability to some extent due to depletion in biodiversity mainly through negative anthropogenic pressure.[6] At present also such depletion and deterioration is rapidly going on in absence of a well planned conservation strategy. The basis – the very foundation of a forest is its tree. So, the illicit fellings must be prohibited in and around the Sanctuary area. Here biodiversity is under pressure because of multicornered utilization and human impact on biodiversity is a major point of conflict between economy and ecosystem.[6,11] Anthropogenic activities also result Global Warming and Climatic Change and a marginal rise in atmospheric temperature due to Climatic Change may seriously upset the ecological balance.[2] In the present deteriorating conditions, the Ecodevelopment scheme based on participatory approach may prove to be a success in restoration of the forest ecology of the GBWS. [1,6,10] It could help divert pressures from core and buffer areas (Sabalpur, Sankhwa *etc*) of the Sanctuary.

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