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A preliminary report on the Flora of Eco-Sensitive Zones of Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand

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Abstract

The Gautam Buddha Wildlife Sanctuary (GBWLS) was notified as a Wildlife Sanctuary in 1976. The Sanctuary spreads in Gaya district of Bihar and Hazaribagh & Chatra districts of Jharkhand. It lies between 24°19'–24°31' N and 84°59'–85°17' E and covers an area of 259.46 sq km of which 138.33 sq km in Bihar and 121.13 sq km in Jharkhand. Furthermore, zero to 4 km around the Sanctuary in Bihar has been notified as Gautam Buddha WLS Eco-Sensitive Zone in 2017 covering an area of 149.25 sq km and zero to 5 km around the Sanctuary in Jharkhand in 2019 covering an area of 327.59 sq km. One field survey was conducted in Eco-Sensitive Zones in 2018. APG IV system of classification is followed in the present documentation. The most diverse families are Fabaceae (14%), followed by Cyperaceae (7%), Convolvulaceae (6%), Lamiaceae (5%), Apocynaceae (4%), Asteraceae (4%), Malvaceae (4%), Amaranthaceae (3%), Acanthaceae (3%) and Combretaceae (3%). These 10 families represent about 53% plant species of the study area. The life-form composition is dominated by herbs (45%), followed by trees (30%), climbers (17%) and shrubs (8%). Two individuals of *Dalbergia latifolia* Roxb., IUCN red list species (Vulnerable A1cd ver 2.3) from ESZs of GBWLS, Bihar, *Pterocarpus marsupium* Roxb., IUCN red list species (Near Threatened C1 ver 3.1) from ESZs of GBWLS, Jharkhand and *Boswellia serrata* Roxb. ex Colebr., an endemic species were recorded during the present study.

Keywords: Bihar, Eco-Sensitive Zones, Gautam Buddha Wildlife Sanctuary, Jharkhand.

Introduction

Eco-Sensitive Zones (ESZs) has been established to create "Shock absorbers" to the protected areas by regulating and managing the activities around such areas. These are the areas up to 10 km around Protected Areas (National Parks and Wildlife Sanctuaries). The width of ESZs may differ from Protected area to Protected area and even beyond 10 km depending on sensitive corridors, connectivity and ecological important patches and crucial for landscape linkage. They also act as a transition zone from the areas of high protection to the areas of lesser protection. The basic goal is to regulate certain activities around Protected areas so as to minimize the

negative impacts of urbanization and other developmental activities around Protected areas. ESZs help in in-situ conservation, which deals with conservation of threatened species in its natural habitat. Further, ESZs are not intended to hamper inhabitant's day to day activities, but instead, is meant to protect the precise forests/Protected areas in their locality from any negative impact, and also to improve the quality of environment around the Protected areas (MoEFCC, 2019).

Several workers (Hooker, 1848; Anderson, 1863; Haines, 1910, 1921–1925; Mooney, 1941, 1950; Bhattacharya & Sarkar, 1998; Paria & Chattopadhyay, 2000, 2005, Sharma & Sarkar, 2002; Aditya & al., 2009; Keshri, 2010; Ambasta, 2016) have extensively surveyed various areas and made significant contributions to the flora of Bihar and Jharkhand. But, the present contribution is the first effort to document floral diversity from ESZs of GBWLS, Bihar & Jharkhand after its establishment.

Materials and Methods

Study area

Gautam Buddha Wildlife Sanctuary (GBWLS) was notified as a Wildlife Sanctuary in 1976. The Sanctuary spreads in Gaya district of Bihar and

Hazaribagh & Chatra districts of Jharkhand. It lies between 24°19'–24°31' N and 84°59'–85°17' E and covers an area of 259.46 sq km of which 138.33 sq km in Bihar and 121.13 sq km in Jharkhand (**Fig. 1**). Furthermore, zero to 4 km around the Sanctuary in Bihar has been notified as Eco-Sensitive Zone in 2017 covering an area of 149.25 sq km and zero to 5 km around the Sanctuary in Jharkhand in 2019 covering an area of 327.59 sq km. There are a total of 58 villages including 21 enclave villages of the Sanctuary within ESZs in Bihar and 102 villages including 29 enclave villages of the Sanctuary within ESZs in Jharkhand. The ESZs falls under Northern tropical dry deciduous forest, which has been further classified into two sub-types, namely: i. Dry peninsular Sal forest and ii. Northern dry mixed deciduous forest (Champion & Seth, 1968).

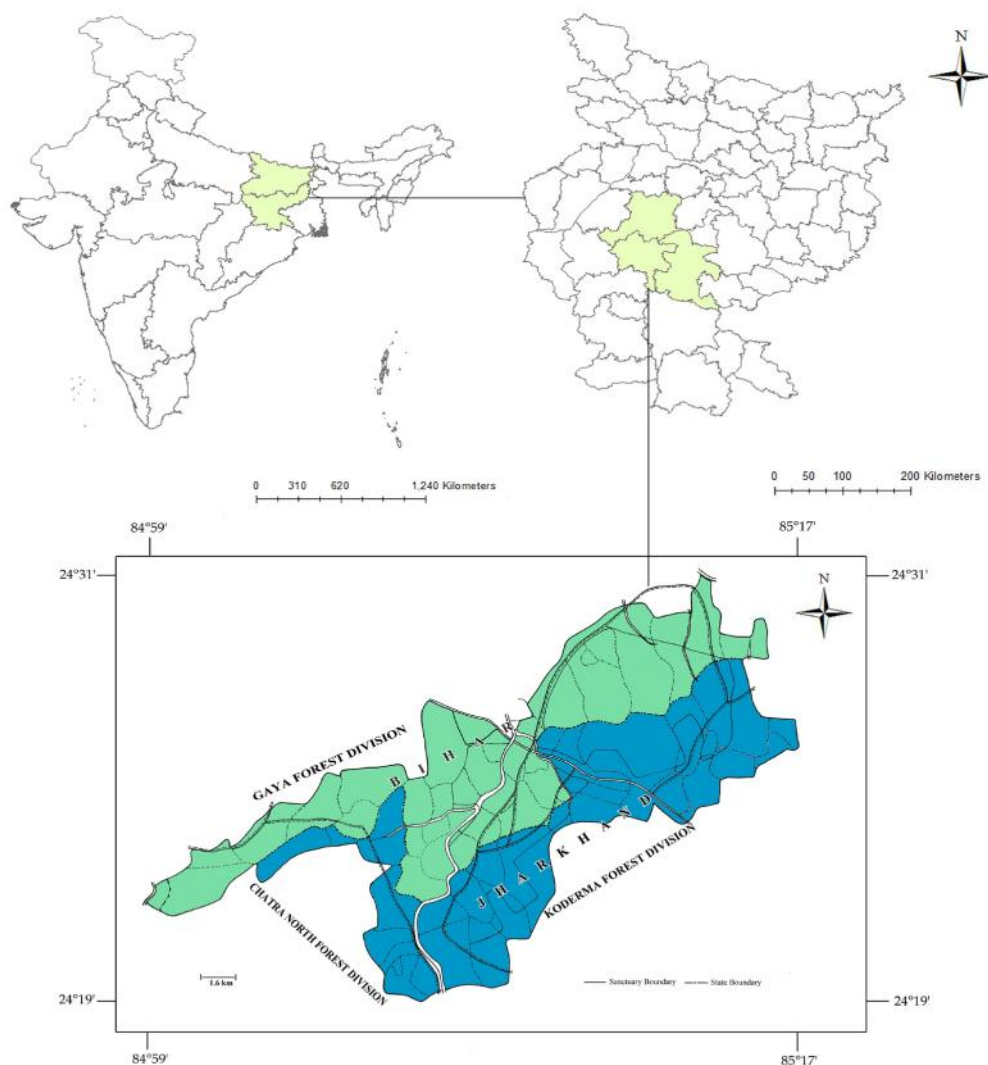


Fig. 1: Location map of Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand.

Data collection

The study is based on one field tour to Eco-Sensitive Zones of Gautam Buddha WLS, Bihar & Jharkhand from 25th October to 3rd November, 2018 (**Fig. 2**). Field details such as habitat, habit and height of the plant, colour and odour of the flowers and fruits and GPS reading were noted in the field book. Plants in

flowering and fruiting and different types of vegetation in the Sanctuary were photographed. The plant species were identified using regional floras (Prain, 1903; Haines, 1921-25; Paria & Chattopadhyay, 2000, 2005) and also compared with authentic specimens deposited at CAL. APG IV (2016) system of classification is followed in the present documentation.

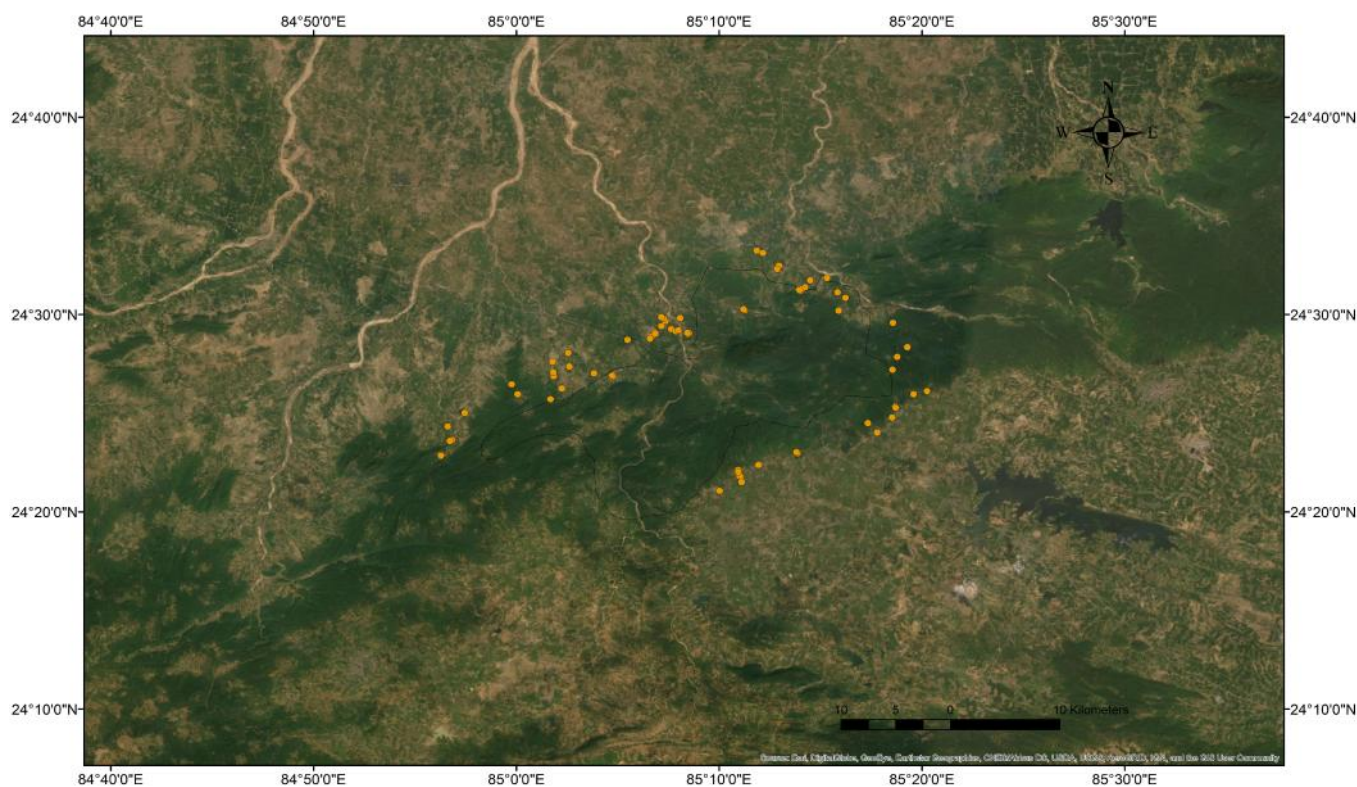


Fig. 2: ArcGIS map of ESZs specifying collection localities of all documented taxa.

Results and Discussion

The present study documents 205 taxa belonging to 165 genera and 65 families. The most diverse families are Fabaceae (14%), followed by Cyperaceae (7%), Convolvulaceae (6%), Lamiaceae (5%), Apocynaceae (4%), Asteraceae (4%), Malvaceae (4%), Amaranthaceae (3%), Acanthaceae (3%) and Combretaceae (3%) (**Fig. 3**). These 10 families represent about 53% plant species of the study area. The life-form composition is dominated by herbs (45%), followed by trees (30%), climbers (17%) and shrubs (8%) (**Fig. 4**). Two individuals of *Dalbergia latifolia* Roxb., IUCN red list species (Vulnerable A1cd ver 2.3) from ESZs of GBWLS, Bihar, *Pterocarpus marsupium* Roxb., IUCN red list species

(Near Threatened C1 ver 3.1) from ESZs of GBWLS, Jharkhand and *Boswellia serrata* Roxb. ex Colebr., an endemic species were recorded during the present study. *Ficus benghalensis* L., commonly known as “Bargad tree” or Large Banyan tree was also traced at Bhadan village which is about 100 years old.

Alangium salviifolium (L.f.) Wangerin, *Borassus flabellifer* L., *Buchanania cochinchinensis* (Lour.) M.R. Almeida, *Cyphostemma auriculatum* (Roxb.) P. Singh & B.V. Shetty, *Diospyros ebenum* J. Koenig ex Retz., *Phoenix acaulis* Roxb., *Phoenix sylvestris* (L.) Roxb. and *Terminalia chebula* Retz. are the common wild edible plants and its fruits are consumed by local communities.

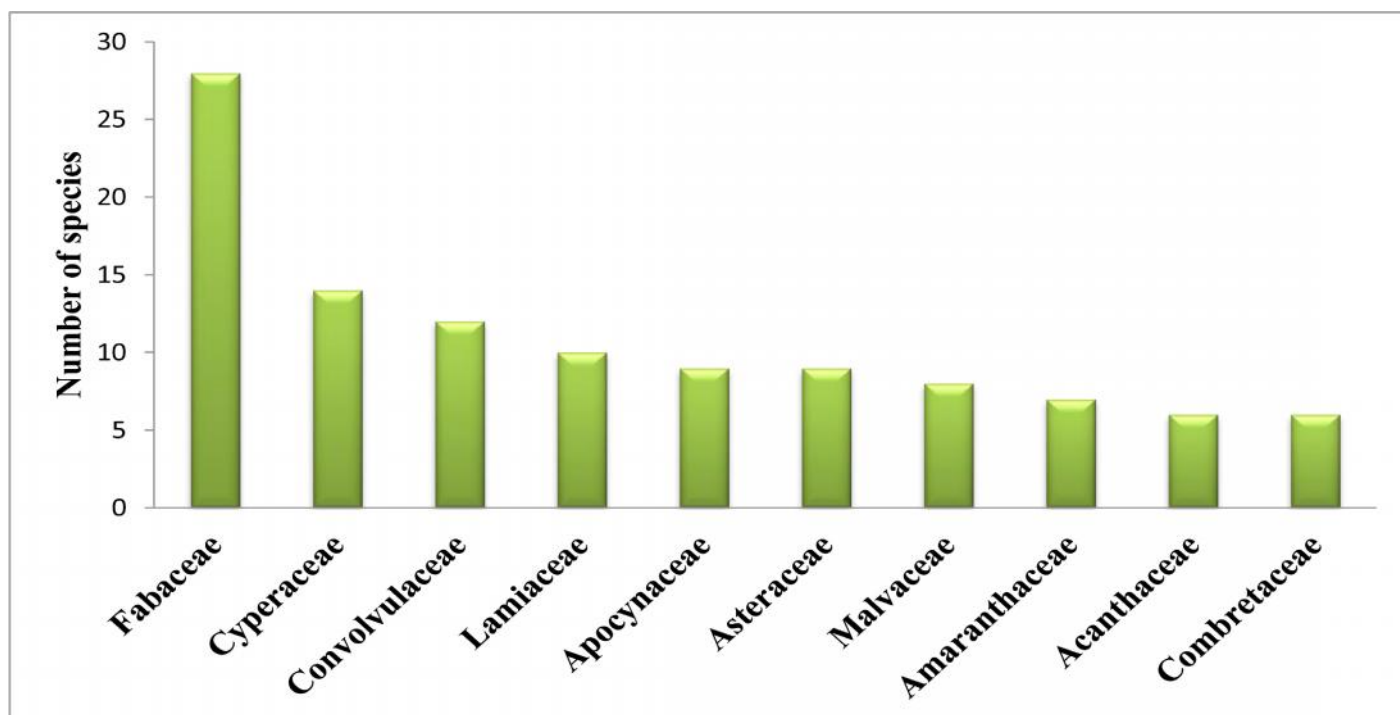


Fig. 3: Ten dominant families of ESZs of GBWLS, Bihar & Jharkhand.

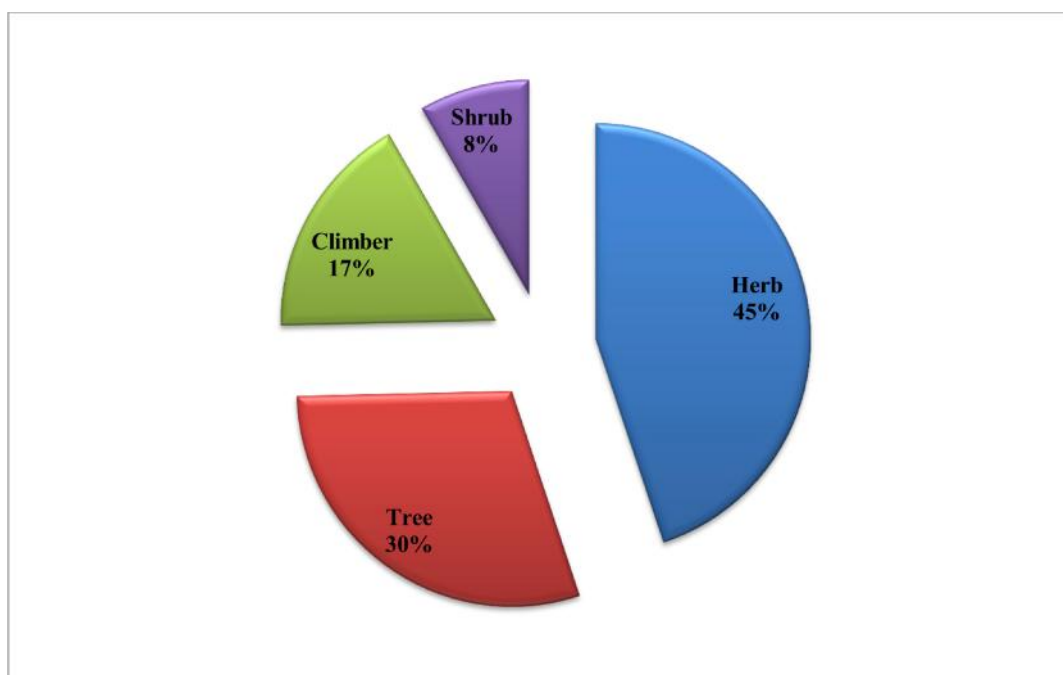


Fig. 4: Life form composition.

The common invasive species include *Acanthospermum hispidum* DC., *Acmella uliginosa* (Sw.) Cass., *Ageratum conyzoides* L., *Calotropis gigantea* (L.) W.T. Aiton, *Calotropis procera* (Aiton) W.T. Aiton, *Celosia argentea* L., *Chamaecrista pumila* (Lam.) V. Singh, *Chromolaena odorata* (L.) R.M. King & H. Rob., *Cleome viscosa* L., *Datura metel* L., *Distimake aegyptius* (L.) A.R. Simões & Staples, *Eclipta prostrata* (L.) L., *Evolvulus nummularius* (L.) L., *Fuirena ciliaris* (L.) Roxb., *Ipomoea obscura* (L.) Ker Gawl., *Ipomoea pes-tigridis* L., *Ipomoea quamoclit* L., *Lantana camara* L., *Leonotis nepetifolia* (L.) R. Br., *Leucaena leucocephala* (Lam.) de Wit, *Ludwigia octovalvis* (Jacq.) P.H. Raven, *Martynia annua* L., *Mecardonia procumbens* (Mill.) Small, *Mesosphaerum suaveolens* (L.) Kuntze, *Ocimum americanum* L., *Passiflora foetida* L., *Physalis angulata* L., *Sida acuta* Burm.f., *Tridax procumbens* L., *Triumfetta rhomboidea* Jacq., *Urena lobata* L. and *Xanthium strumarium* L. The invasive species *Distimake aegyptius* (L.) A.R. Simões & Staples (= *Merremia aegyptia* (L.) Urb.) was reported as new record for Bihar from GBWLS (Kumar & al., 2018) and in the present investigation, the species has been again relocated from ESZs area of GBWLS. Therefore, it is suggested to control the spreading of this invasive species at the beginning stage.

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