Indian Journal of Plant Sciences ISSN: 2319–3824(Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jps.htm
2016 Vol.5 (1) January-March, pp.54-69/Ansari et al.
Research Article

VASCULAR PLANTS OF SURAJPUR WETLAND, NATIONAL CAPITAL REGION, INDIA

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ABSTRACT
The present attempt has been made for qualitative assessment of vascular plants of Surajpur wetland, National Capital Region, India conducted during March 2010 to February 2013 by intensive floristic surveys. A total of 257 vascular plants belonging 214 genera under 29 Orders and 65 families were documented. Poaceae and Fabaceae is the largest family represented by 32 species each followed by Asteraceae represented by 20 species. Herbs dominate the flora by 144 plant species followed by 39 trees, 31 grasses, 20 climbers, 12 shrubs and 11 species of sedges. The updated nomenclature, habit, habitat, nativity and threatened status have been provided for each species. Proper conservation and management plans are needed to save the natural resources, especially flora. The current status of floral diversity in Surajpur wetland ecosystem hitherto unreported is being attempted in the paper.

Keywords: *Surajpur Wetland, Floristic Diversity, Greater Noida, Uttar Pradesh*

INTRODUCTION
Vegetation forms an integral part of wildlife habitat in any landscape and hence the analysis of the diverse communities becomes a pre-requisite for better ecological understanding for preparing management plan of the conservation of the area (Singh and Rawat, 1999). Wetland ecosystem creates an important environment for aquatic, semi-aquatic and moisture loving floral and faunal associations (Adhikari and Babu, 2008).

Wetlands are referred as “biological supermarkets” because they support all life forms through extensive food webs and biodiversity (Mitsch and Gosselink, 1993). Surajpur wetland is an excellent example of urban wetland in Yamuna river basin (Bura *et al*., 2013). Being an urban wetland, it provides an opportunity to conserve and preserve the native flora, fauna and biodiversity without hindering the development of the area.

Through the ages, urban wetlands have been the lifeline of most cities in India. They provide multiple values for suburban and city dwellers (Castelle *et al*., 1994). The capacity of a functional urban wetland in flood control, aquatic life support and as pollution sink implies a greater degree of protection (Ramachandran, 2001).

The wetlands have been explored on various bio-ecological aspects but the studies on urban wetlands are at a nascent stage. Anecdotal references exist on studies attempted to investigate urban wetlands and the growing need for their conservation in India (Ehrenfeld, 2000; Rajashekariah, 2011; Urfi, 2006). Srivastava (2004) presented an overview of floristic diversity of Uttar Pradesh and observed 2711 angiosperm plant under 182 families and 1088 genera.

The floristic composition of the National Capital Region has so far received little attention (Maheshwari, 1963; Dash and Ahmedullah, 2012; Srivastava, 2004; Verdhana, 2007; Chaudhary *et al.*, 2012; Manral *et al*., 2013; Mishra *et al*., 2014) and there is no systematic study was conducted in Surajpur wetland, although it supports luxuriant growth of angiospermic flora and plays an important role in the plant species conservation. The present study is, therefore, the first attempt to make an inventory and analysis of the entire flora of Surajpur wetland based on copious field observations and available literatures with a view to contribute to the overall knowledge of Surajpur flora and to the management of this urban wetland.

MATERIALS AND METHODS

Study Area

Surajpur wetland (28°31.425'N; 77°29.714'E) is located in Dadri Tehsil of the district Gautam Budh Nagar, north-west Indian state of Uttar Pradesh and it comes under the purview of Delhi- National Capital Region (NCR) India (Figure 1). The NCR comprises an urban conglomerate including Delhi, Faridabad, Gurgaun, Ghaziabad and Gautam Budh Nagar (Noida and Greater Noida). The Greater Noida City is just 3 kilometers from Surajpur wetland is one of the best planned cities and is the largest industrial townships of Asia (Joshi, 2009). The study area falls in the Upper Gangetic Plain Biogeographic Zone (Rodgers *et al.*, 2002) at an elevation of 184.7m above MSL. The area is a reserve forest and spreads over 308 hectare (Bura *et al*., 2013). The area is mainly rain-fed and other sources for water recharge are Hawaliya drain which is attached to Hindon River and Tilapta irrigation canal. The climate is tropical monsoon type and maximum rainfall occurs from July to October ranging from 400-500 mm and normally the rain depends on north-west monsoon. The maximum temperature goes up to 47°C in summer (April-May) whereas the minimum falls to 2°C in winter (December-January).

Methods

Intensive floristic surveys were made during the period of three years from March 2010 to February 2013 on monthly basis in the Surajpur wetland. The entire study area was divided into 3 different habitats; woodland, grassland and wetland on the basis of dominant floristic composition. Field visits were planned to collect the plant specimen either in flowering or fruiting stage to facilitate the process of correct identification (Pal *et al*., 2014). Voucher specimen numbers for each collection were assigned and important field characters habit, habitat, flowering, fruiting period, etc. were recorded and processed using standard herbarium techniques from all the habitats to prepare a comprehensive herbarium following Jain and Rao (1977) and Singh and Subramaniam (2008). The plant specimens were identified based on field characters noted during the collection and consulting different floras and literatures, (Duthie, 1903-29); (Maheshwari, 1963); (Raizada, 1976); (Singh and Shetty, 1987, 1991, 1993); (Moulik, 1997); (Prasad *et al*., 1996); (Kehimkar, 2000); (Vardhana, 2007). The unidentified plant specimens were identified seeking help of experts in plant taxonomy. The voucher specimens collected for herbarium were submitted at Kumaun University, Nainital Uttarakhand, India for future reference.

Based on modern Angiosperm Phylogeny study, APG-III classification system (APG III 2009; Haston *et al*., 2009) was followed to classify the Angiosperm species and Pteridophytes were classified following Christenhusz *et al*., (2011). Taxonomical categories-genera and species within the family are treated alphabetically (Tutul *et al*., 2009) and species are described with usual citation, verified with International Plant Names Index (IPNI, 2013) and The Plant List (2013). The frequency of occurrence of plant species was assigned into 4 abundance categories; A= Abundant (>50); F= Frequent (30-50); O= Occasional (10-30) and R= Rare (<10). The threatened categories of plant species were assessed according to IUCN Red List Criteria 2012 (IUCN 2013). The nativity of the plants was determined with the help of published literature following Reddy (2008), Singh *et al.*, (2010) and Rather (2011).

RESULTS AND DISCUSSION

The floristic composition of the area is remarkable in its diversity and luxuriance. Altogether, 257 vascular plant taxa pertaining to 214 genera belonging to 29 orders and 65 families were recorded (Table 1). The Angiosperm plants represented by 254 species belonged to 28 orders, 62 families and 211 genera whereas Pteridophytes were represented by 3 species belonged to 2 orders, 3 families and 3 genera. The most represented orders in terms of families were Lamiales (9 families) followed by Caryophyllales (5 families), Malpighiales, Rosales, Myrtales, (4 families each order), Alismatales, Ranunculales, Brassicales, Gentianales (3 families), Commelinales, Poales, Sapindales, Solanales, Asterales, Salviniales (2 families) and rest 15 orders were represented by only a single family each. Whereas the most represented orders in terms of species were Poales (43 species) followed by Fabales (32 species), Caryophyllales (23 species), Lamiales (22 species), Asterales (21 species), Solanales (20 species), Malpighiales, Malvales, Gentianales (12 species each), Myrtales (10 species), Alismatales (7 species),

Rosales (6 species), Ranunculales, Cucurbitales, Sapindales (5 species each), Brassicales (4 species), Commelinales (3 species), Nymphaeales (2 species), Salviniales (2 species) and rest 11 orders were represented by only a single species each (i.e. mono-specific). Among 65 families recorded, the most dominant families were Poaceae (32 species) followed by Fabaceae (32 species), Asteraceae (20 species), Amaranthaceae (14 species), Convolvulaceae (13 species), Malvaceae (12 species), Cyperaceae (11 species), Apocynaceae (9 species), Euphorbiaceae (7 species), Solanaceae (7 species), Cucurbitaceae (5 species), Lamiaceae (5 species), Myrtaceae, Meliaceae, Acanthaceae and Verbenaceae (4 species each) being the richest families, covering over 71% of the total species. During the study period, a comprehensive herbarium of 267 plant specimens including 229 plant species was prepared and arranged family-wise alphabetically from Acanthaceae to Zygophyllaceae, indexed in 09 display files and was deposited at Department of Forestry and Environmental Science, Kumaun University, Nainital, Uttarakhand, India for future use.

The analysis of flora shows a comparatively higher representation of herbaceous species (144) followed by 39 trees, 31 grasses, 20 climbers, 12 shrubs and 11 species of sedges during the study period. The occurrence status of plant species recorded as Abundant by 51 % (n=130 plant species), followed by Frequent 19 % (n=50 plant species), Occasional as 16 % (n=42 plant species) and Rare as 14 % (n=35 plant species) of the total recorded plant species. The nativity of the each plant species were recorded, 193 plant species as native and 59 plant species as exotic/ invasive in nature to the Indian sub-continent. The inventory of the plant species includes 216 wild plant species and 41 cultivated plant species. Habitat association of each plant species was recorded. Woodland habitat recorded maximum of 157 plant species followed by 73 plant species in grassland habitat and 65 plant species in wetland habitat. The flowering and fruiting period of the plant species recorded for the all seasons. Monsoon recorded maximum plant species (177 plant species), followed by summer (87 plant species) and winters (74 plant species) in flowering and fruiting period. Based on IUCN Red List criteria of threatened species, 02 plant species viz. *Delonix regia* and *Jacaranda mimosifolia* rated as vulnerable (VU), 46 species as least concern (LC), only one species as data deficient (DD) and 208 plant species were marked under not evaluated (NE) category. However, none of the 257 plant species have been listed under the Indian Wildlife (Protection) Act (1972).

Mace (2004) feels that, the inventorying of species in a region is one of the very important conservation practices, which helps in setting priority based species cataloguing for conservation. Biodiversity inventories or checklists serve as repositories of baseline information on species occurrences, biogeography and their conservation status. They are essential tools for developing our knowledge and understanding of biodiversity and often the first step to undertake effective conservation action (Nayar and Krishna, 2013). This is the first scientific study in Surajpur wetland forms the basis of research for the long term planning and management of the area. This study also forms the first record of vascular plants for the district Gautam Budh Nagar. With the aim of inventorisation, the overview of floristic biodiversity of Surajpur wetland was recorded.

Surajpur wetland revealed a total of 257 vascular plants that represents about 47% of the total NCR flora (Maheshwari, 1963) and 10% of the total Uttar Pradesh flora (Srivastav, 2004) respectively. High diversity of vascular plants in the region is mainly attributed to climatic, topographic and edaphic factors. Similar floristic studies were also conducted in Indian region, Manral *et al*., (2013) reported 192 plant species in Okhla Bird Sanctuary in Noida, NCR; Chaudhary *et al.,* (2012) reported 95 species only from Poaceae and Cyperaceae family in Noida, NCR, Mishra and Narayan (2010) reported 129 plant species in Bakhira wetland Uttar Pradesh; Adhikari and Babu (2008) reported 178 plant species in Baanganaga wetland, Uttarakhand.

The species *Heliotropium europaeum* belong to Boraginaceae placed in Lamiid group, because the most developed Angiosperm Phylogeny Classification (APG III, 2009) have not assigned family Boraginceae to any of the order. Family Poaceae, Fabaceae, Asteraceae, recorded as the most dominant family in Surajpur wetland. Several authors have also reported these families as dominant families (Manral *et al.*, 2013; Islam *et al*., 2009; Mishra and Narayan, 2010; Mulchand, 2013).

Surajpur wetland represented by 40 invasive plant species as these plants is widely recognised as one of the most important threats to native plant biodiversity (Kolar and Lodge, 2001). Invasive species has caused major problems for many ecosystems. These plants grow aggressively and cause changes in the habitat (Manral *et al.*, 2013; Janick, 1979). Excessive growth of herbaceous weeds such as *Alternanthera philoxeroides* and *Eichhornea crassipes* are issues of concern in wetland habitat and *Parthenium hysterophorus* in woodland and grassland habitat. These weeds become a growing menace in India (Varshney *et al*., 2008). Preliminary studies reveal that over the years, the flora of National Capital Region (NCR) has undergone a tremendous change, with loss of earlier recorded native floral elements (Maheshwari, 1963, 1966) due to rapid urban growth and associated human activities and replenishment of the flora by way of latter-day introductions and migrations, particularly of invasive weeds (Dash and Ahmedulla, 2012). The geo-morphological changes from the developmental activities have modified the landscape thereby affecting the ecology of entire region. The present-day flora of NCR thus comprises a mixed composition of the indigenous with the introduced and naturalized plants (Dash and Ahmedulla, 2012).

Surajpur wetland has a mosaic of habitats that is responsible for a rich avifauna and other biodiversity. The mosaic of habitat types within a wetland help colonise a wide range of specialist and generalist species (Masing *et al.*, 2000). The record of 6 species of mammals, 186 species of avifauna, 13 species of herpetofauna, 15 species of fishes and 58 species of invertebrates from Surajpur wetland ecosystem corroborates the fact. There is a need to monitor these habitats for long-term protection and conservation of various groups of flora and fauna in the area. The present findings can be used as a baseline for future studies and a comparison with previous works suggests that steps should be taken to curtail the growth of invasive species and plantation of native species should be encouraged. Appropriate measures need to be taken to check the growth of invasive species. The diverse floral composition and the better management practices have made the site a safe haven for particularly water birds in the region. Since the hydrological regime is a major environmental factor controlling the vegetation composition of the site, the maintenance of natural flooding regimes is a vital component for the conservation and management of the diverse vegetation mosaic at Surajpur.

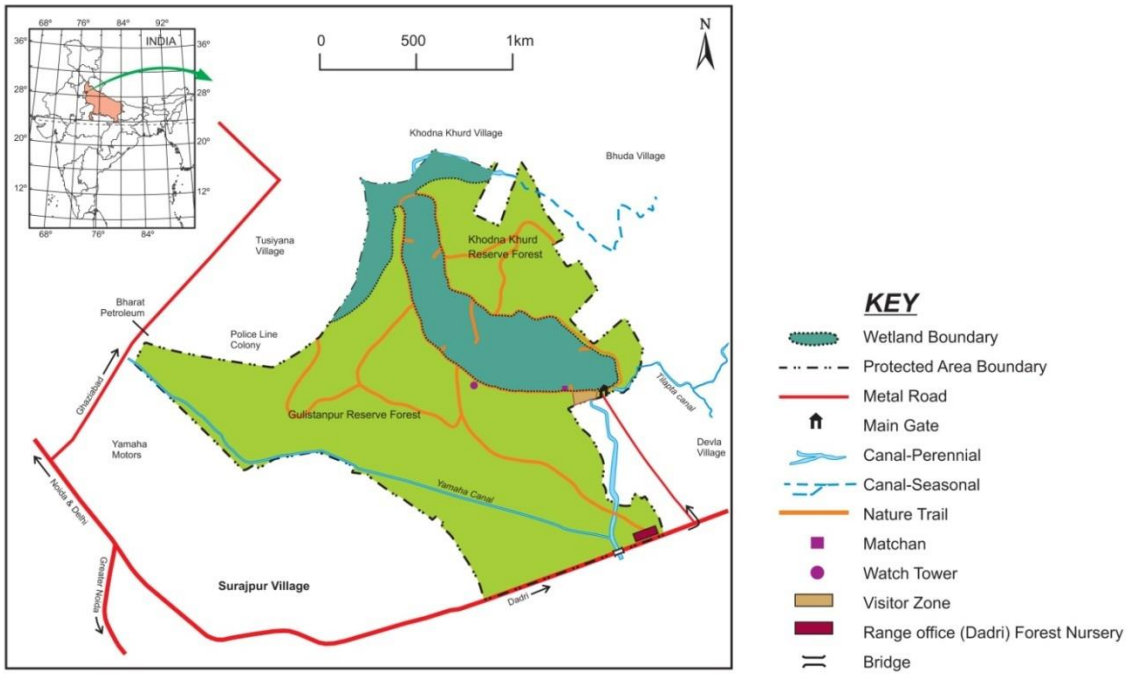

Figure 1: Map of the Study Area

Table 1: List of Vascular Plant Species in Surajpur Wetland, National Capital Region, India

S. No.	Order, Family and Species	Habit	Habitat	Flowering & Fruiting	Abundance Status	IUCN Status
	NYMPHAEALES					
	Nymphaeaceae					
1.	*Nymphaea nouchali* Burm.f.	Herb	WT	Jul-Oct	Abun	LC
2.	*Nymphaea pubescens* Willd.	Herb	WT	Jul-Oct	Abun	LC
	ALISMATALES					
	Araceae					
3.	*Lemna perpusilla* Torr.	Herb	WT	Jul-Oct	Abun	LC
4.	*Spirodela polyrrhiza* (L.) Schleid.	Herb	WT	Jul-Oct	Abun	LC
5.	*Wolffia arrhiza* (L.) Horkel ex Wimm.	Herb	WT	Jul-Oct	Abun	LC
	Hydrocharitaceae					
6.	*Hydrilla verticillata* (L.f.) Royle	Herb	WT	Jul-Oct	Abun	LC
7.	*Vallisneria spiralis* L.	Herb	WT	Jul-Oct	Abun	LC
	Potamogetonaceae					
8.	*Potamogeton crispus* L.	Herb	WT	Nov-Feb	Abun	LC
9.	*Zannichellia palustris* L.	Herb	WT	Jul-Feb	Abun	LC
	ASPARAGALES					
	Amaryllidaceae					
10.	*Zephyranthes candida* (Lindl.) Herb.	Herb	GR	Jul- Oct	Freq	NE
	ARECALES					
	Arecaceae					
11.	*Phoenix sylvestris* (L.) Roxb.	Tree	WD	Mar-Oct	Abun	NE
	COMMELINALES					
	Commelinaceae					
12.	*Commelina benghalensis* L.	Herb	WT	Jul-Oct	Abun	LC
13.	*Cyanotis axillaris* (L.) D.Don ex Sweet	Herb	WT	Jul-Oct	Freq	LC
	Pontederiaceae					
14.	**Eichhornia crassipes* (Mart.) Solms	Herb	WT	Mar-Oct	Abun	NE
	POALES					
	Cyperaceae					
15.	*Bolboschoenus maritimus* (L.) Palla	Sedge	WT, GR	Jul-Oct	Abun	NE
16.	*Carex fedia* Nees	Sedge	GR	Nov-Jun	Abun	NE
17.	*Cyperus alopecuroides* Rottb.	Sedge	WT, GR	Jul-Oct	Abun	NE
18.	*Cyperus alulatus* J.Kern	Sedge	WT, GR	Jul-Oct	Abun	LC
19.	*Cyperus compressus* L.	Sedge	WT, GR	Jul-Oct	Abun	NE
20.	**Cyperus difformis* L.	Sedge	WT, GR	Jul-Oct	Abun	LC
21.	*Cyperus laevigatus* L.	Sedge	WT, GR	Jul-Oct	Abun	NE
22.	*Cyperus rotundus* L.	Sedge	WT, GR	Jul-Oct	Abun	LC
23.	*Eleocharis dulcis* (Burm.f.) Trin. ex Hensch.	Sedge	WT	Jul-Oct	Abun	NE

24.	*Eleocharis palustris* (L.) Roem. & Schult.	Sedge	WT	Jul-Oct	Abun	LC
25.	*Pycreus flavidus* (Retz.) T.Koyama	Sedge	WT, GR	Jul-Oct	Abun	NE
	Poaceae					
26.	†*Avena sativa* L.	Grass	GR	Nov-Feb	Occa	NE
27.	*Brachiaria ramosa* (L.) Stapf	Grass	GR	Jul-Oct	Abun	LC
28.	*Cenchrus ciliaris* L.	Grass	GR	Throughout the year	Abun	NE
29.	**Chloris barbata* Sw.	Grass	GR	Jul-Oct	Abun	NE
30.	*Chrysopogon zizanioides* (L.) Roberty	Grass	WT, GR	Jul-Oct	Abun	NE
31.	*Cynodon dactylon* (L.) Pers.	Grass	GR	Jul-Feb	Abun	NE
32.	*Dactyloctenium aegyptium* (L.) Willd.	Grass	WT, GR	Jul-Oct	Abun	NE
33.	*Desmostachya bipinnata* (L.) Stapf	Grass	GR	Jul-Oct	Abun	NE
34.	*Dichanthium annulatum* (Forssk.) Stapf	Grass	WT, GR	Jul-Oct	Abun	NE
35.	*Digitaria ciliaris* (Retz.) Koeler	Grass	GR	Jul-Oct	Abun	NE
36.	**Echinochloa crus-galli* (L.) P.Beauv.	Grass	WT, GR	Jul-Oct	Abun	NE
37.	*Eleusine indica* (L.) Gaertn.	Grass	GR	Jul-Oct	Abun	LC
38.	*Eragrostis amabilis* (L.) Wight & Arn.	Grass	GR	Mar-Oct	Abun	NE
39.	*Eragrostis ciliaris* (L.) R.Br.	Grass	GR	Jul-Oct	Abun	NE
40.	*Eriochloa procera* (Retz.) C.E.Hubb.	Grass	GR	Jul-Oct	Abun	LC
41.	*Hemarthria compressa* (L.f.) R.Br.	Grass	WT, GR	Jul-Oct	Abun	LC
42.	*Hygroryza aristata* (Retz.) Nees ex Wight & Arn.	Grass	WT	Jul-Oct	Abun	NE
43.	**Imperata cylindrica* (L.) Raeusch.	Grass	GR	Jul-Oct	Abun	NE
44.	*Leptochloa panicea* (Retz.) Ohwi	Grass	GR	Jul-Oct	Abun	LC
45.	*Panicum antidotale* Retz.	Grass	GR	Jul-Oct	Abun	NE
46.	**Paspalum distichum* L.	Grass	WT, GR	Jul-Oct	Abun	NE
47.	*Pennisetum glaucum* (L.) R.Br.	Grass	GR	Jul-Oct	Abun	NE
48.	*Perotis indica* (L.) Kuntze	Grass	GR	Jul-Oct	Abun	NE
49.	*Phalaris minor* Retz.	Grass	GR	Nov-Feb	Abun	NE
50.	*Polypogon monspeliensis* (L.) Desf.	Grass	GR	Nov-Jun	Freq	NE
51.	*Saccharum ravennae* (L.) L.	Grass	GR	Jul-Feb	Abun	NE
52.	**Saccharum spontaneum* L.	Grass	GR	Jul-Oct	Abun	LC
53.	*Setaria pumila* (Poir.) Roem. & Schult.	Grass	GR	Jul-Oct	Abun	NE
54.	*Setaria verticillata* (L.) P.Beauv.	Grass	GR	Jul-Oct	Abun	NE
55.	*Sorghum halepense* (L.) Pers.	Grass	GR	Jul-Oct	Freq	NE
56.	*Sporobolus diandrus* (Retz.) P.Beauv.	Grass	GR	Jul-Oct	Abun	NE
57.	**Typha domingensis* Pers.	Herb	WT	Throughout the year	Abun	NE
	CERATOPHYLLALES					
	Ceratophyllaceae					
58.	**Ceratophyllum demersum* L.	Herb	WT	Jul-Oct	Abun	LC

	RANUNCULALES					
	Menispermaceae					
59.	*Cissampelos pareira* L.	Climber	WD	Jul-Oct	Occa	NE
60.	*Cocculus hirsutus* (L.) W.Theob.	Herb	WD	Mar-Jun	Rare	NE
	Papaveraceae					
61.	**Argemone mexicana* L.	Herb	WD	Throughout the year	Abun	NE
62.	*Fumaria indica* (Hausskn.) Pugsley	Herb	WD	Nov-Feb	Occa	NE
	Ranunculaceae					
63.	**Ranunculus sceleratus* L.	Herb	WT	Nov-Jun	Abun	NE
	PROTEALES					
	Proteaceae					
64.	†*Grevillea robusta* A.Cunn. ex R.Br.	Tree	WD	Mar-Jun	Occa	NE
	VITALES					
	Vitaceae					
65.	*Cayratia trifolia* (L.) Domin	Climber	WD	Jul-Oct	Abun	NE
	ZYGOPHYLLALES					
	Zygophyllaceae					
66.	**Tribulus terrestris* L.	Herb	WD, GR	Jul-Feb	Occa	NE
	OXALIDALES					
	Oxalidaceae					
67.	**Oxalis corniculata* L.	Herb	WD	Nov-Feb	Abun	NE
	MALPIGHIALES					
	Euphorbiaceae					
68.	*Acalypha indica* L.	Herb	WD	Mar-Jun	Rare	NE
69.	**Croton bonplandianus* Baill.	Herb	WD	Jul-Oct	Abun	NE
70.	*Euphorbia heterophylla* L.	Herb	WD	Jul-Feb	Rare	NE
71.	*Euphorbia heyneana* Spreng.	Herb	WD	Jul-Feb	Freq	NE
72.	**Euphorbia hirta* L.	Herb	WD	Jul-Feb	Freq	NE
73.	†*Jatropha curcas* L.	Tree	WD	Jul-Oct	Occa	NE
74.	*Ricinus communis* L.	Tree	WD	Throughout the year	Rare	NE
	Malpighiaceae					
75.	†*Galphimia glauca* Cav.	Shrub	WD	Jul-Oct	Occa	NE
	Phyllanthaceae					
76.	†*Phyllanthus emblica* L.	Tree	WD	Mar-Jun	Occa	NE
77.	*Phyllanthus fraternus* G.L.Webster	Herb	WD	Jul-Oct	Abun	NE
78.	*Phyllanthus reticulatus* Poir.	Shrub	WD	Mar-Jun	Abun	NE
	Salicaceae					
79.	†*Salix tetrasperma* Roxb.	Tree	WD	Mar-Jun	Occa	NE
	CUCURBITALES					
	Cucurbitaceae					
80.	*Coccinia grandis* (L.) Voigt	Climber	WD	Mar-Oct	Abun	NE

81.	*Cucumis melo* L.	Climber	WD	Jul-Oct	Rare	NE
82.	†*Luffa cylindrica* (L.) M.Roem.	Climber	WD	Jul-Oct	Occa	NE
83.	*Mukia maderaspatana* (L.) M.Roem.	Climber	WD	Jul-Oct	Freq	NE
84.	*Trichosanthes cucumerina* L.	Climber	WD	Jul-Oct	Freq	NE
	FABALES					
	Fabaceae					
85.	*Abrus precatorius* L.	Climber	WD	Jul-Oct	Rare	NE
86.	*Aeschynomene indica* L.	Shrub	WD	Jul-Oct	Occa	LC
87.	*Alysicarpus vaginalis* (L.) DC.	Herb	GR	Jul-Oct	Rare	NE
88.	*Clitoria ternatea* L.	Climber	WD	Nov-Feb	Rare	NE
89.	*Crotalaria medicaginea* Lam.	Herb	WD	Jul-Oct	Freq	NE
90.	*Dalbergia sissoo* DC.	Tree	WD	Mar-Jun	Abun	NE
91.	†*Delonix regia* (Hook.) Raf.	Tree	WD	Mar-Oct	Rare	VU
92.	*Desmodium triflorum* (L.) DC.	Herb	WT, WD	Jul-Oct	Freq	LC
93.	†*Erythrina caffra* Thunb.	Tree	WD	Mar-Jun	Rare	NE
94.	**Indigofera linnaei* Ali	Herb	WD	Jul-Oct	Rare	NE
95.	*Lathyrus aphaca* L.	Herb	WD	Mar-Jun	Rare	NE
96.	*Melilotus indicus* (L.) All.	Herb	WT, GR	Nov-Jun	Freq	NE
97.	**Melilotus officinalis* subsp. *alba* (Medi k.) H.Ohashi & Tateishi	Herb	WT, GR	Nov-Jun	Freq	NE
98.	†*Pongamia pinnata* (L.) Pierre	Tree	WD	Mar-Jun	Abun	LC
99.	*Rhynchosia capitata* (Roth) DC.	Herb	WD	Jul-Oct	Rare	NE
100.	†*Tamarindus indica* L.	Tree	WD	Jul-Oct	Occa	NE
101.	*Tephrosia purpurea* (L.) Pers.	Herb	WD	Jul-Oct	Freq	NE
102.	*Teramnus labialis* (L.f.) Spreng.	Herb	WD	Jul-Oct	Rare	NE
103.	*Trifolium repens* L.	Herb	WT, GR	Nov-Feb	Abun	LC
104.	*Trifolium resupinatum* L.	Herb	WD	Nov-Feb	Freq	LC
105.	†*Bauhinia tomentosa* L.	Tree	WD	Jul-Oct	Freq	NE
106.	*Bauhinia variegata* L.	Tree	WD	Mar-Jun	Freq	LC
107.	**Senna obtusifolia* (L.) H.S.Irwin & Barneby	Herb	WD	Jul-Oct	Freq	NE
108.	**Senna occidentalis* (L.) Link	Herb	WD	Jul-Oct	Freq	NE
109.	†*Acacia auriculiformis* Benth.	Tree	WD	Jul-Oct	Occa	LC
110.	*Acacia nilotica* (L.) Delile	Tree	WD	Jul-Oct	Rare	NE
111.	†*Albizia lebbeck* (L.) Benth.	Tree	WD	Mar-Jun	Occa	NE
112.	†*Calliandra haematocephala* Hassk.	Tree	WD	Mar-Jun	Abun	NE
113.	**Lysiloma latisiliquum* (L.) Benth.	Shrub	WD	Jul-Oct	Occa	NE
114.	†*Pithecellobium dulce* (Roxb.) Benth.	Tree	WD	Mar-Oct	Abun	NE
115.	*Prosopis cineraria* (L.) Druce	Tree	WD	Mar-Oct	Abun	NE
116.	**Prosopis juliflora* (Sw.) DC.	Tree	WD	Mar-Oct	Abun	NE

	ROSALES					
	Cannabaceae					
117.	*Cannabis sativa* L.	Herb	WD	Nov-Feb	Abun	NE
	Moraceae					
118.	*Ficus religiosa* L.	Tree	WD	Mar-Jun	Occa	NE
119.	*Ficus virens* Aiton	Tree	WD	Jul-Oct	Abun	NE
120.	*Morus alba* L.	Tree	WD	Mar-Jun	Freq	NE
	Rhamnaceae					
121.	†*Ziziphus jujuba* Mill	Tree	WD	Nov-Feb	Occa	NE
	Urticaeae					
122.	*Gonostegia pentandra* (Roxb.) Miq.	Herb	WT	Jul-Oct	Rare	NE
	MYRTALES					
	Combretaceae					
123.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Tree	WD	Mar-Jun	Abun	NE
	Lytheraceae					
124.	*Ammannia baccifera* L.	Herb	WT	Jul-Feb	Rare	NE
125.	†*Lagerstroemia speciosa* (L.) Pers.	Shrub	WD	Jul-Oct	Occa	NE
126.	†*Lawsonia inermis* L.	Shrub	WD	Jul-Oct	Occa	NE
	Myrtaceae					
127.	†*Callistemon citrinus* (Curtis) Skeels	Tree	WD	Jul-Feb	Occa	NE
128.	†*Eucalyptus globulus* Labill.	Tree	WD	Jul-Oct	Freq	NE
129.	†*Psidium guajava* L.	Tree	WD	Jul-Oct	Occa	NE
130.	*Syzygium cumini* (L.) Skeels	Tree	WD	Jul-Oct	Abun	NE
	Onagraceae					
131.	**Ludwigia adscendens* (L.) H.Hara	Herb	WT	Jul-Oct	Abun	NE
132.	**Ludwigia perennis* L.	Herb	WT	Jul-Oct	Abun	LC
	BRASSICALES					
	Brassicaceae					
133.	*Brassica juncea* (L.) Czern.	Herb	WD	Nov-Feb	Rare	NE
134.	**Lepidium didymum* L.	Herb	WT	Nov-Feb	Abun	NE
	Capparaceae					
135.	*Capparis sepiaria* L.	Shrub	WD	Mar-Jun	Rare	NE
	Cleomaceae					
136.	**Cleome viscosa* L.	Herb	WD	Jul-Oct	Freq	NE
	MALVALES					
	Malvaceae					
137.	*Abutilon indicum* (L.) Sweet	Herb	WD	Mar-Oct	Abun	NE
138.	**Corchorus capsularis* L.	Herb	WD	Jul-Oct	Abun	NE
139.	**Corchorus trilocularis* L.	Herb	WD	Jul-Oct	Abun	NE
140.	*Malva parviflora* L.	Herb	WD	Mar-Jun	Rare	NE
141.	**Malvastrum coromandelianum* (L.) Garcke	Herb	WD	Throughout the year	Abun	NE

142.	**Melochia corchorifolia* L.	Herb	WD	Jul-Oct	Abun	NE
143.	**Sida acuta* Burm.f.	Herb	WD	Jul-Oct	Abun	NE
144.	*Sida cordata* (Burm.f.) Borss.Waalk.	Herb	WD	Jul-Oct	Abun	NE
145.	*Sida cordifolia* L.	Herb	WD	Jul-Oct	Abun	NE
146.	*Sida rhombifolia* L.	Herb	WD	Jul-Oct	Abun	NE
147.	**Triumfetta rhomboidea* Jacq.	Herb	WD	Jul-Oct	Abun	NE
148.	**Urena lobata* L	Herb	WD	Jul-Oct	Abun	NE
	SAPINDALES					
	Anacardiaceae					
149.	†*Mangifera indica* L.	Tree	WD	Mar-Jun	Occa	DD
	Meliaceae					
150.	†*Azadirachta indica* A.Juss.	Tree	WD	Mar-Jun	Occa	NE
151.	†*Chukrasia tabularis* A.Juss.	Shrub	WD	Mar-Oct	Occa	LC
152.	†*Melia azedarach* L.	Tree	WD	Mar-Oct	Occa	NE
153.	†*Toona ciliata* M.Roem.	Tree	WD	Mar-Oct	Occa	LC
	CARYOPHYLLALES					
	Aizoaceae					
154.	*Trianthema portulacastrum* L.	Herb	WD	Jul- Oct	Occa	NE
	Amaranthaceae					
155.	*Achyranthes aspera* L.	Herb	WD	Throughout the year	Abun	NE
156.	**Alternanthera philoxeroides* (Mart.) Griseb.	Herb	WT	Mar-Jun	Abun	NE
157.	**Alternanthera pungens* Kunt	Herb	WD	Jul- Oct	Rare	NE
158.	**Alternanthera sessilis* (L.) R.Br. ex DC.	Herb	WT, WD	Jul- Oct	Freq	LC
159.	**Amaranthus spinosus* L.	Herb	WD	Jul- Oct	Freq	NE
160.	*Amaranthus viridis* L.	Herb	WD	Jul- Oct	Freq	NE
161.	**Celosia argentea* L.	Herb	WD, GR	Jul- Oct	Occa	NE
162.	**Digera muricata* (L.) Mart.	Herb	WD	Jul- Oct	Abun	NE
163.	**Gomphrena serrata* L.	Herb	WD, GR	Throughout the year	Freq	NE
164.	*Pupalia lappacea* (L.) Juss.	Herb	WD	Jul- Oct	Occa	NE
165.	*Suaeda vermiculata* Forssk. ex J.F.Gmel.	Herb	GR	Nov-Feb	Abun	NE
166.	**Chenopodium album* L.	Herb	WT, WD, GR	Jul-Feb	Abun	NE
167.	*Chenopodium murale* L.	Herb	GR	Nov-Feb	Abun	NE
168.	*Dysphania ambrosioides* (L.) Mosyakin & Clemants	Herb	GR	Mar-Oct	Abun	NE
	Caryophyllaceae					
169.	*Polycarpaea corymbosa* (L.) Lam.	Herb	WD	Jul-Oct	Rare	NE
170.	*Spergula arvensis* L.	Herb	WD, GR	Nov-Feb	Occa	NE
171.	*Stellaria media* (L.) Vill.	Herb	WT	Nov-Feb	Freq	NE

	Nyctaginaceae					
172.	*Boerhavia diffusa* L.	Herb	WD	Throughout the year	Rare	NE
173.	†*Bougainvillea spectabilis* Willd.	Shrub	WD, GR	Nov-Feb	Freq	NE
	Polygonaceae					
174.	*Persicaria barbata* (L.) H.Hara	Herb	WT	Throughout the year	Abun	NE
175.	*Polygonum plebeium* R.Br.	Herb	WT	Throughout the year	Abun	LC
176.	*Rumex dentatus* L.	Herb	WT	Nov-Jun	Abun	NE
	ERICALES					
	Primulaceae					
177.	**Anagallis arvensis* L.	Herb	WT, GR	Nov-Jun	Abun	NE
	LAMIIDS GROUP					
	Boraginaceae					
178.	*Heliotropium europaeum* L.	Herb	WD	Mar-Jun	Freq	NE
	GENTIANALES					
	Apocynaceae					
179.	†*Alstonia scholaris* (L.) R. Br.	Tree	WD	Nov-Feb	Occa	LC
180.	†*Carissa carandas* L.	Shrub	WD	Jul-Feb	Occa	NE
181.	†*Cascabela thevetia* (L.) Lippold	Tree	WD	Jul-Feb	Abun	NE
182.	**Catharanthus pusillus* (Murray) G.Don	Herb	WD	Jul-Oct	Freq	NE
183.	†*Nerium oleander* L.	Tree	WD	Mar-Jun	Abun	NE
184.	†*Plumeria alba* L.	Tree	WD	Jul-Oct	Abun	NE
185.	†*Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.	Shrub	WD	Jul-Oct	Abun	NE
186.	**Calotropis procera* (Aiton) Dryand.	Herb	WD	Mar-Jun	Abun	NE
187.	*Oxystelma esculentum* (L. f.) Sm.	Climber	WD	Jul-Oct	Abun	LC
	Gentianaceae					
188.	*Centaurium pulchellum* (Sw.) Druce	Herb	WD	Mar-Jun	Rare	NE
	Rubiaceae					
189.	*Oldenlandia corymbosa* L.	Herb	WT, GR	Jul-Oct	Rare	LC
190.	*Spermacoce pusilla* Wall.	Herb	WT	Jul-Oct	Rare	NE
	LAMIALES					
	Acanthaceae					
191.	**Dicliptera paniculata* (Forssk.) I.Darbysh.	Herb	WD	Nov-Feb	Abun	NE
192.	*Hemigraphis hirta* (Vahl) T. Anders.	Herb	WD, GR	Mar-Jun	Freq	NE
193.	*Justicia japonica* Thunb.	Herb	WD	Throughout the year	Rare	NE
194.	*Rungia pectinata* (L.) Nees	Herb	WD	Nov-Feb	Rare	NE
	Bignoniaceae					
195.	†*Jacaranda mimosifolia* D.Don	Tree	WD	Mar-Jun	Occa	VU
196.	†*Kigelia africana* (Lam.) Benth	Tree	WD	Mar-Jun	Occa	NE

197.	†*Tecoma stans* (L.) Juss. ex Kunth	Shrub	WD	Jul-Feb	Freq	NE
	Lamiaceae					
198.	†*Volkameria inermis* L.	Herb	**GR**	Jul-Oct	Abun	NE
199.	*Anisomeles indica* (L.) Kuntze	Herb	WD	Jul-Oct	Abun	NE
200.	*Leucas cephalotes* (Roth) Spreng.	Herb	GR	Jul-Oct	Freq	NE
201.	*Ocimum americanum* L.	Herb	WD	Jul-Oct	Occa	NE
202.	*Salvia plebeia* R.Br.	Herb	WD	Nov-Feb	Rare	NE
	Lentibulariaceae					
203.	*Utricularia stellaris* L.f.	Herb	WT	Jul-Oct	Abun	NE
	Pedaliaceae					
204.	*Sesamum indicum* L.	Herb	GR	Jul-Oct	Rare	NE
	Phyrmaceae					
205.	*Mazus pumilus* (Burm.f.) Steenis	Herb	GR	Nov-Feb	Rare	NE
	Plantaginaceae					
206.	*Bacopa monnieri* (L.) Wettst.	Herb	WT, WD	Jul-Oct	Rare	LC
207.	*Veronica anagallis-aquatica* L.	Herb	WT	Nov-Jun	Abun	NE
	Scrophulariaceae					
208.	*Verbascum chinense* (L.) Santapau	Herb	WD	Mar-Oct	Occa	NE
	Verbenaceae					
209.	*Duranta erecta* L.	Herb	WD	Throughout the year	Rare	NE
210.	**Lantana camara* L.	Herb	WD	Jul-Oct	Occa	NE
211.	*Phyla nodiflora* (L.) Greene	Herb	WD	Mar-Oct	Freq	LC
212.	†*Verbena bipinnatifida* Nutt.	Herb	GR	Nov-Feb	Occa	NE
	SOLANALES					
	Convolvulaceae					
213.	*Convolvulus prostratus* Forssk.	Herb	WD, GR	Jul-Oct	Freq	NE
214.	*Evolvulus alsinoides* (L.) L.	Herb	WD, GR	Jul-Oct	Freq	NE
215.	**Evolvulus nummularius* (L.) L.	Herb	WD, GR	Jul-Oct	Freq	NE
216.	*Ipomoea alba* L.	Climber	WD	Jul-Oct	Abun	NE
217.	*Ipomoea aquatica* Forssk.	Climber	WT	Jul-Oct	Abun	NE
218.	**Ipomoea carnea* Jacq.	Climber	WT	Jul-Feb	Abun	NE
219.	*Ipomoea coptica* (L.) Roth ex Roem. & Schult.	Climber	GR	Jul-Oct	Freq	LC
220.	**Ipomoea eriocarpa* R. Br.	Climber	WD	Jul-Oct	Freq	NE
221.	*Ipomoea nil* (L.) Roth	Climber	WD	Jul-Oct	Freq	NE
222.	**Ipomoea pes-tigridis* L.	Climber	WT	Jul-Oct	Freq	NE
223.	*Ipomoea purpurea* (L.) Roth	Climber	WD	Nov-Feb	Freq	NE
224.	*Ipomoea violacea* L.	Climber	WD	Nov-Feb	Freq	NE
225.	*Merremia hederacea* (Burm. f.) Hallier f.	Climber	WT	Jul-Oct	Freq	NE

	Solanaceae					
226.	*Datura metel* L.	Herb	WD	Nov-Feb	Occa	NE
227.	*Lycopersicon esculentum* Mill.	Herb	WD	Nov-Feb	Rare	NE
228.	**Nicotiana plumbaginifolia* Viv.	Herb	WD	Mar-Jun	Occa	NE
229.	*Physalis angulata* L.	Herb	WD	Jul-Oct	Freq	NE
230.	**Physalis minima* L.	Herb	WD	Jul-Oct	Abun	NE
231.	**Solanum americanum* Mill.	Herb	WD, GR	Nov-Jun	Abun	NE
232.	*Solanum virginianum* L.	Herb	WD	Nov-Jun	Abun	NE
	ASTERALES					
	Asteraceae					
233.	*Acmella paniculata* (Wall. ex DC.) R.K.Jansen	Herb	WT	Jul-Oct	Abun	LC
234.	**Ageratum conyzoides* (L.) L.	Herb	WD	Nov-Jun	Abun	NE
235.	*Artemisia capillaris* Thunb.	Herb	WT	Jul-Oct	Rare	NE
236.	**Blumea lacera* (Burm.f.) DC.	Herb	WD	Mar-Jun	Abun	NE
237.	*Blumea membranacea* DC.	Herb	WD	Mar-Jun	Abun	NE
238.	**Cirsium arvense* (L.) Scop.	Herb	WD	Mar-Jun	Abun	NE
239.	*Cyanthillium cinereum* (L.) H.Rob.	Herb	WD	Jul-Feb	Abun	NE
240.	**Eclipta prostrata* (L.) L.	Herb	GR	Throughout the year	Abun	NE
241.	*Erigeron bonariensis* L.	Herb	WD, GR	Mar-Oct	Abun	NE
242.	**Gnaphalium polycaulon* Pers.	Herb	WD	Mar-Jun	Freq	NE
243.	**Grangea maderaspatana* (L.) Poir.	Herb	WD	Throughout the year	Occa	LC
244.	*Helichrysum luteoalbum* (L.) Rchb.	Herb	WD	Mar-Jun	Freq	NE
245.	*Launaea procumbens* (Roxb.) Ramayya & Rajagopal	Herb	WD, GR	Mar-Jun	Abun	NE
246.	**Parthenium hysterophorus* L.	Herb	WD	Throughout the year	Abun	NE
247.	**Soliva anthemifolia* (Juss.) Sweet	Herb	WT	Jul-Oct	Freq	NE
248.	**Sonchus asper* (L.) Hill	Herb	WD	Mar-Jun	Freq	NE
249.	**Sonchus oleraceus* (L.) L.	Herb	WD	Mar-Jun	Abun	NE
250.	†*Sphagneticola trilobata* (L.) Pruski	Herb	WD, GR	Throughout the year	Occa	NE
251.	**Tridax procumbens* (L.) L.	Herb	WD, GR	Nov-Jun	Abun	NE
252.	**Xanthium strumarium* L.	Herb	WD	Throughout the year	Abun	NE
	Menyanthaceae					
253.	*Nymphoides indica* (L.) Kuntze	Herb	WT	Jul-Oct	Freq	LC
	APIALES					
	Apiaceae					
254.	*Centella asiatica* (L.) Urb.	Herb	GR	Nov-Feb	Freq	LC

	EQUISETALES					
	Equisetaceae					
255.	*Equisetum ramosissimum Desf.*	Herb	WT, GR	Mar-Jun	Abun	NE
	SALVINIALES					
	Marsileaceae					
256.	*Marsilea quadrifolia* L.	Herb	WT	Jul-Feb	Abun	LC
	Salviniaceae					
257.	*Azolla pinnata* R. Br.	Herb	WT	Jul-Feb	Abun	LC

Footnote: Habitat: WT= Wetland, GR= Grassland, WD= Woodland; Flowering and Fruiting Season: March-June= summer, July-October=monsoon, November-February= winter; Abundance Status: Abun= Abundance, Freq= Frequent, Occa= Occasional; IUCN Status: VU= Vulnerable, LC= Least Concern, NE= Not Evaluated, DD= Data Deficient; *=Exotic/Invasive Species; †= Cultivated species.

ACKNOWLEDGMENTS
Authors are grateful to Dr. Asghar Nawab, WWF-India for their encouragement and providing facilities to carry out the work. We express our gratitude to Greater Noida Industrial Development Authority for the financial assistance. We are also thankful to Uttar Pradesh Forest Department for granting permission to carry out the study. The help rendered by our colleagues and the staff at the Dadri Forest Range and National Conservation Programme (WWF India) is highly appreciated. We thank the anonymous referee(s) for reviewing the manuscript.

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