Moth Fauna of the Kheoni Wildlife Sanctuary, District Dewas, Madhya Pradesh

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Kheoni Wild Life Sanctuary (KWLS) is situated in Kannod tehsil of Dewas district. It was first notified in the year 1955 vide Madhya Bharat, Gwalior notification No. 5898-10-F-55 dated 05.12.1955. This area was previously the hunting reserve of rulers of Holkar state. The area was rich in forest and wildlife. Earlier, the forests of Dewas Forest Division were included in the wildlife sanctuary. Subsequently, in the year 1982, some areas of Sehore Forest Division were also included and a fresh notification was issued by Government of Madhya Pradesh No. 15-4-X-(2)-82 dated 04.12.1982, with a total area of 132.77 km². It includes 28.12 km² Reserved Forest, 104.66 km² Protected Forest. Keoni Wildlife Sanctuary lies between N latitude of 22°12' and 22°23' and E longitudes of 75°3' and 75°38'. This WLS is 115 Km from Bhopal, 35 Km from Ashta and 65 Km from Dewas. This sanctuary is connected to the Ratapani Wildlife Sanctuary.

There is an acute shortage of water in the sanctuary, particularly during the summer. The water sources which exist in the WLS are seasonal and dry up after February. There are 4 tanks and 17 jhirias, but many of these dry up in the summer. Some hand pumps have been dug up to augment the water supply.

Flora

The forests of the sanctuary belong to Dry Deciduous type with teak (*Tectona grandis*) as a predominant species. Other species associating with teak are saj (*Terminalia alata*), dhaora (*Anogeissus latifolia*), salai (*Boswellia serrata*), moyan (*Garuga pinnata*), anola (*Emblica officinalis*), dhaman (*Grewia tiliefolia*), haldu (*Adina cordifolia*), Kalam (*Mytragyna parvifolia*) khair (*Acacia catechu*), kullu (*Sterculia urens*), mahua (*Madhuca latifolia*), bija (*Pterocarpus marsupium*) and palas (*Butea monosperma*). On hill tops, salai (*Boswellia serrata*) and gurjan (*Lannea coromandelica*), form almost pure crop. Khair (*Acacia catechu*) tends to become pure on shallow and rocky soils. Bamboo (*Dendrocalamus strictus*) also occurs in better areas particularly in valleys.

Fauna

Kheoni WLS has a sizeable species of wild animals. Among the fauna of this sanctuary carnivores like tiger and panther are most important wild animals of this sanctuary. Other carnivore species found in the sanctuary include hyena, wild dog, jackals and wolf. Among herbivores, important species include spotted deer, sambar, nilgai, chausingha and barking deer. Rhesus macaque and common langur are common primates. Smaller mammals include field mouse, squirrel, porcupine, etc. Fauna like sambar, wild boar, barking deer, four-horned antelope, and palm civet are also observed but rarely sighted.

Avifauna of the WLS has not been studied properly. Common birds of this sanctuary incluare common crow, night jar, sand grouse, myna, peafowl, Indian roller, babbler, vultures, bulbul, lapwing, peacock, cuckoo, tailor bird, wood pecker, kingfisher, tree pie, wagtail, parakeet, crow pheasant, dove, etc. Among reptilia, garden lizard, chameleon, skink, Bengal monitor, snakes, etc. are generally seen. Among snakes, cobra, common krait, Russel's viper and python are commonly found in this sanctuary. Besides, no study has been reported on the moth fauna of Kheoni WLS.

Hence, attempt has been made to record the moth fauna of this sanctuary, during Geometridae survey of Madhya Pradesh, under the in-house research programme of Zoological Survey of India, Central Zone Regional Centre, Jabalpur, during the year 2012-14. The study yielded to record 39 species of moths belonging to 39 genera in six superfamilies. The superfamily Noctuoidea outnumbers the other superfamilies. All moth species recorded for the first time from this sanctuary. There would be more moth species available from this sanctuary. Hence, further intensive survey could add more number of species which would be highly significant for the better management of insect biodiversity of the sanctuary, especially moths.

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Table 1. Moth Fauna of Kheoni Wildlife Sanctuary, District Dewas, Madhya Pradesh.

	Species	Family	Subfamily
	Superfamily: **Zygaenoidea** Latreille, 1809		
1	*Altha subnotata* Walker, 1865	Limacodidae	-
2	*Miresa albipuncta* Herr.-Schaffer, 1854	Limacodidae	Limacodinae
3	*Parasa hilaris* (Westwood, 1848)	Limacodidae	-
4	*Phacoderma velutina* Kollar, 1844	Limacodidae	-
	Superfamily: **Thyridoidea** Herrich-Schaffer, 1867		
5	*Dixoa albatalis* Swinhoe, 1889	Thyrididae	-
6	*Rhodoneura* sp.	Thyrididae	Siculodinae
	Superfamily: **Pyraloidea** Latreille, 1809		
7	*Omiodes diemenalis* Guenée, 1854	Crambiade	Spilomelinae
8	*Parotis marginata* Hampson, 1893	Crambidae	Spilomelinae
9	*Pygospila tyres* Cramer, 1780	Crambidae	Spilomelinae
10	*Tyspanodes linealis* Moore, 1867	Crambidae	Spilomelinae
	Superfamily: **Bombycoidea** Latreille, 1802		
11	*Eupterote* sp.	Eupterotidae	Eupterotinae
12	*Actias selene* Hubner, 1806	Saturniidae	Saturniinae
13	*Agnosia orneus* Westwood, 1847	Sphingidae	Smerinthinae
14	*Marumba indicus* Walker, 1856	Sphingidae	Smerinthinae
15	*Agrius convolvuli* Linnaeus, 1758	Sphingidae	Smerinthinae
16	*Psilogramma menephron* Cramer, 1780	Sphingidae	Sphinginae
	Superfamily: **Geometroidea** Leach, 1815		
17	*Amraica recursaria* Walker, 1860	Geometridae	Ennominae
18	*Biston suppressaria* Guenée, 1857	Geometridae	Geometrinae
19	*Chiasmia fidoniata* Guenee, (1858)	Geometridae	Ennominae
20	*Traminda mundissima* Walker, 1861	Geometridae	Sterrhinae
	Superfamily: **Noctuoidea** Latreille, 1809		
21	*Allata argentifera* Walker, 1862	Notodontidae	Pygaerinae
22	*Antheua servula* Drury, 1773	Notodontidae	Phalerinae
23	*Neocerura liturata* Walker, 1855	Notodontidae	Cerurinae
24	*Phalera grotei* Moore, 1859	Notodontidae	Phalerinae
25	*Euproctis lunata* Walker, 1855	Erebidae	Lymantriinae
26	*Olepa ricini* Fabricius, 1775	Erebidae	Arctiinae
27	*Tatargina (Hindergina) sipahi* (Moore, 1872)	Erebidae	Arctiinae
28	*Asota ficus* Fabricius, 1775	Erebidae	Aganainae
29	*Achaea janata* (Linnaeus, 1758)	Erebidae	Erebinae
30	*Ariena dotata* Fabricius, 1794	Erebidae	Erebinae
31	*Bastilla torrida* Guenee, 1852	Erebidae	Erebinae
32	*Grammodes stolida* Fabricius, 1775	Erebidae	Erebinae
33	*Ophiusa tirhaca* Cramer, 1777	Erebidae	Erebinae
34	*Aegocera binacula* Walker, 1854	Noctuidae	Agaristinae
35	*Chrysodeixis eriosoma* Doubleday 1843	Noctuidae	Plusiinae
36	*Xanthodes intersepta* Guenee, 1852	Noctuidae	Bagisarinae
37	*Acantholipes trajectus* (Walker, 1865)	Noctuidae	-
38	*Callyna costiplaga* Moore, 1872	Noctuidae	Noctuinae
39	*Callyna jugaria* Walker, 1858	Noctuidae	Noctuinae

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'14 of world's 15 worst polluted cities in India'

Kanpur Tops the List in terms of PM 2.5

Delhi is not the most polluted city in the world. But that is hardly any reason to cheer. The WHO global air pollution database released in Geneva reveals that India has 14 out of 15 most polluted cities in the world, in terms of PM 2.5 concentration, with the worst being Kanpur.

Despite public outcry over severe air pollution, and both Centre and Delhi govenrments taking up the issue, WHO's database of more than 4,000 cities in 100 countries shows that Delhi's pollution levels improved only marginally between 2010 and 2014, but started deteriorating again in 2015.

In 2016, the latest WHO's database, Delhi recorded the highest pollution levels in six years. The city's PM 2.5 annual average was 143 micrograms per cubic metre, more than three times the national safe standards, while the PM 10 average was 292 micrograms per cubic metre, more than 4.5 times the national standard.

The Central Pollution Control Board (CPCB) had recently claimed that air pollution levels improved in 2017 as compared to 2016. The board, however, hasn't released the annual average PM 2.5 concentration for 2017 yet.

A number of policies came into effect towards the end of 2016—the graded response action plan (GRAP) in October, doubling of the environment compensation charge (ECC) on trucks in December 2015 and better coordination among NCR states on pollution control.

The WHO report however doesn't reflect this because it considers annual PM 10 and PM 2.5 averages between 2010 and 2016 for this database. Data sources for Delhi is mainly from CPCB (about 10 stations), although for the years 2015 and 2016, WHO has also considered data from Ministry of Earth Sciences (MoES) and US Environment Protection Agency's (EPA) Air Now. This may have also influenced the air pollution concentrations for 2015 and 2016, experts said.

Kanpur tops the list with a PM 2.5 concentration of 173 micrograms per cubic metre, followed by Faridabad, Varanasi and Gaya. "With improved air quality monitoring, we are beginning to understand the depth and spread of the air pollution problem in India. While Delhi is at the crossroads and is expected to bend the curve post 2016, other pollution hot spots are proliferating across the country" said Anumita Roy Chowdhury, executive director, Centre for Science and Environment (CSE).

Some of the well known reasons for the pollution in Indian cities are—vehicular exhaust emissions from the diesel and petrol vehicles; dust and debris dispersal due to contruction activities; road traffic particularly lorries; and burning of farming residues (called *parali*).

The population explosion and subsequent migrations from rural to urban areas escalate the pollution levels, in air, water, soil and noise. Plastic pollution is another scourge of cities.