

# Study on the Seasonally Waterlogged Grasslands of Mudumalai Tiger Reserve

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**Abstract-**Seasonally waterlogged grasslands are colloquially called *vayals*. These *vayals* in addition to providing various ecological services are valuable habitat and food source for many insects, amphibians , reptiles , aves and herbivore mammals. Due to high soil fertility this habitat is much sought after for agriculture . Most of the natural *vayals* have been converted into farmland resulting in loss of not only the valuable ecological services but also the invaluable biodiversity. What little of this habitat is left undisturbed is only in the wildlife protected areas. The status of the *vayals* inside Mudumalai Tiger reserve was evaluated by mapping the *vayal* area, documenting the area occupied by invasive and tracing the hydrological path. The study revealed that invasion of exotic species like *Lantana camara* and *Chromolaena odorata* into these *vayals* are a threat to the very existence of this ecosystem. Without proper conservation and management these wetlands would be lost for ever. A closer look at the complexity of these *vayals* may help us put proper management tools in place to ensure the conservation of these fragile ecosystems, before it is too late.

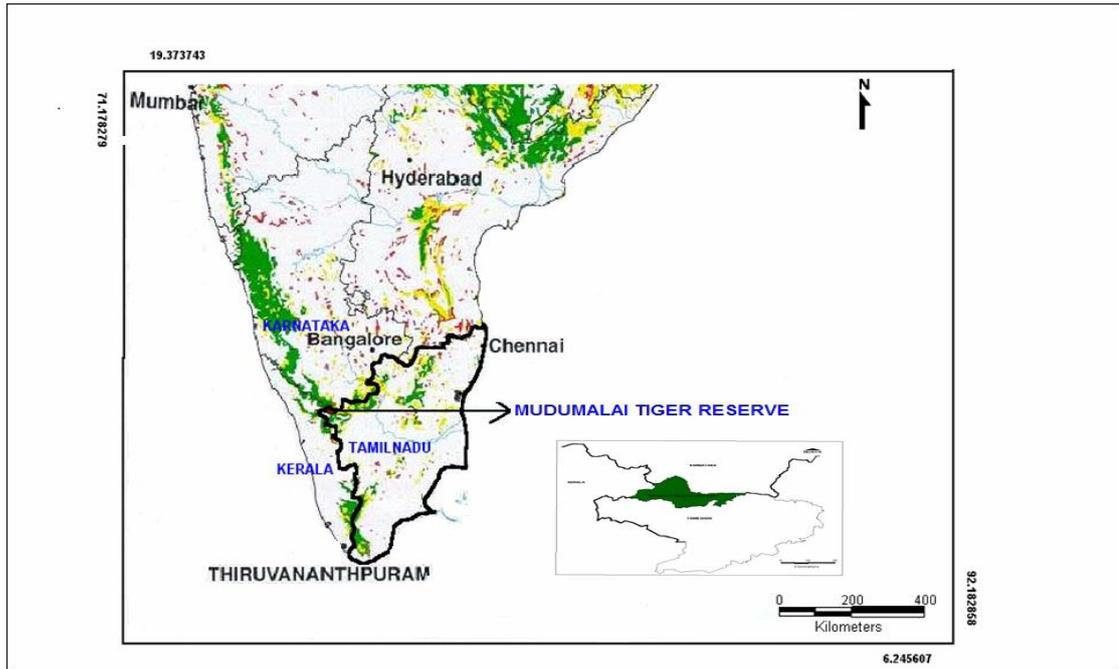
**Index terms-** *Vayals*, Mudumalai Tiger Reserve, wetlands, biodiversity.

## I. INTRODUCTION

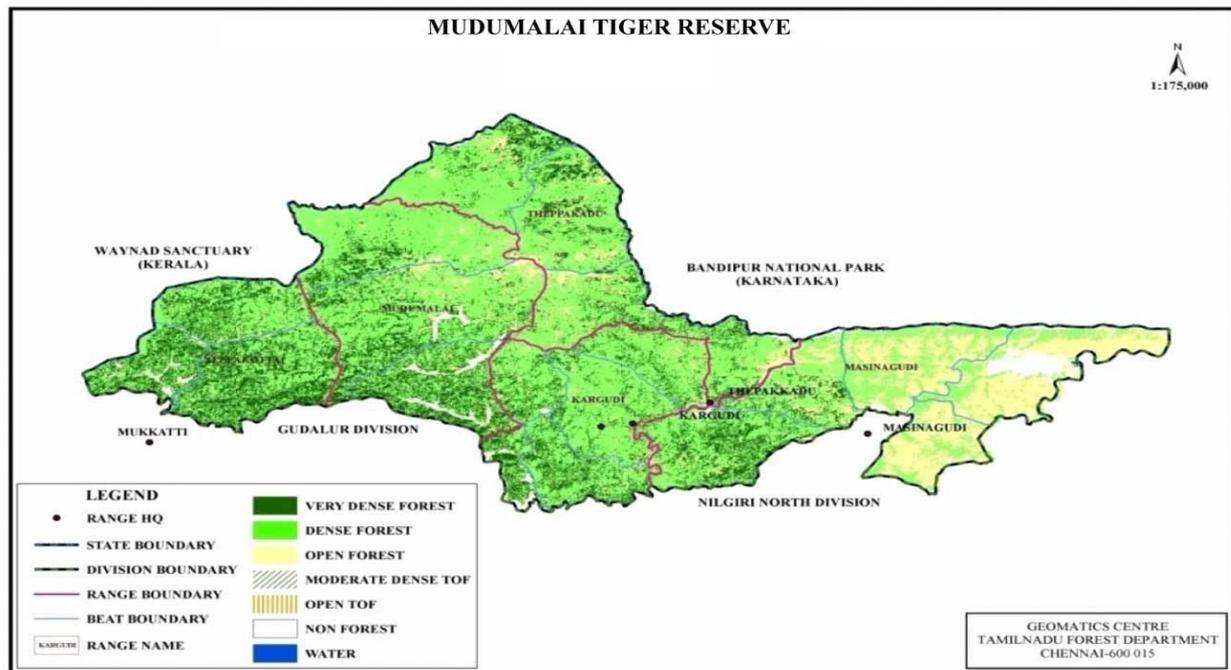
*Vayal* is a colloquial word in Tamil and Malayalam for seasonally waterlogged meadows or wet meadows. These meadows or grasslands are classifiable as “wetlands” under article 1.1 of the Ramsar convention which states that “wetlands are areas of marsh , fen, peat land or water , whether natural or artificial , permanent or temporary with water that is static or flowing , fresh , brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters”. This ecosystem falls under the category “Ts” i.e seasonal/intermittent freshwater marshes/pools on inorganic soils of Ramsar’s Classification System for Wetland Type. *Vayals* for us is the never ending lush green paddy fields which is our food source . All the natural swampy meadows which are valuable habitats for wetland plant, numerous invertebrate, amphibians , reptiles , aves and small mammals have been converted into farmlands. In spite of providing important ecological services and covering all the strata of a food web this ecosystem has not received the deserved attention. This study was carried out to evaluate the extend of existence of this ecosystem and to assess their status inside protected boundaries of Mudumalai Tiger Reserve.

## II. STUDY AREA

Mudumalai Tiger Reserve is located in the state of Tamilnadu and is a part of the Nilgiri Biosphere Reserve . It lies between 110 32’ & 110 43’ N and 76 0 22’ & 76 0 45’ E at the tri-junction of Kerala, Karnataka and Tamilnadu. Mudumalai Tiger Reserve is contiguous with Wayanad wildlife Sanctuary on the west, Bandipur Tiger Reserve on the north, Singara Reserved Forests in the south and Sigur Reserved Forests in the east. Spread over an area of 321 Km<sup>2</sup> with an altitude of 1000 m and a rainfall gradient of 50 to 200 cm per annum from east to west has resulted in different forest types. These forest types have in turn contributed to Mudumalai’s rich diversity of vegetation. Champion and Seth (1968) classified the vegetation type in Mudumalai as Southern Tropical dry thorn forest (6A/C) ,Southern Tropical dry deciduous forest (5A/C1B and /C3), Southern Tropical moist deciduous forest (3B/C1C and C2) ,Southern Tropical semi evergreen (2A/C2 , Moist Bamboo brakes (2E3) , Moist Bamboo brakes (2E3), Riparian forest (4E/RS1).



Mudumalai plays an important role in biodiversity conservation of especially large mammals, by offering habitat contiguity of about 3300 km<sup>2</sup> with three other protected areas in the region, namely Nagarahole and Bandipur National Park and Wynaad Wildlife Sanctuary through forest corridors between the Western Ghats and Eastern Ghats. Mudumalai has a part of the single largest tiger population in India and acting as source population for the Northern and Eastern parts of the Western Ghat landscape complex and has the highest potential for long-term tiger conservation (Jhala et al., 2008).



Mudumalai's high tiger density can be attributed to its healthy prey-base. Tiger's preferred preys – Chital, Sambar and the Indian gaur need enough forage to maintain their population especially during the dry season especially in a deciduous forest where the *vayals* have a critical role to play.

### III. METHODOLOGY

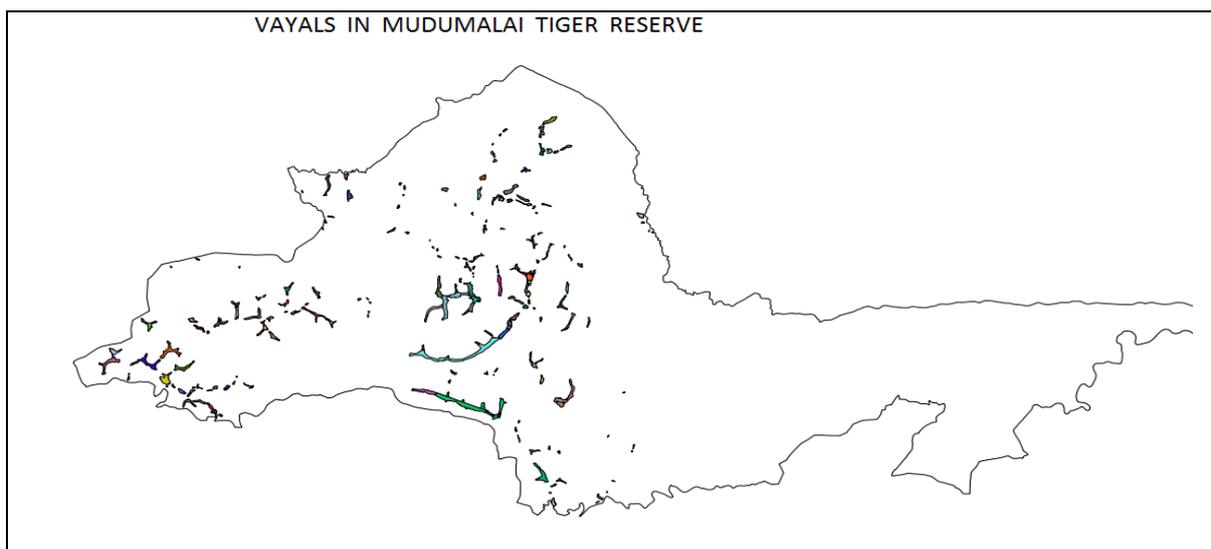
The data of the *vayal* area which comes under administrative boundary of Gudalur taluk of Nilgiri District of Tamilnadu State was collected from the Revenue department to arrive at the total area classified as *vayal*. The records categorize the *vayals* as patta and assigned waste (assigned as waste land). The ground truth was studied by perambulating every individual *vayal* within the reserve on foot with a GPS and the data stored was downloaded and mapped using QGIS software. The extend of area invaded by woody and shrubby invasive in the *vayal* was calculated by demarcating the invaded area using a GPS and downloading and mapping the data using QGIS software. While mapping, the invaded *vayal* area were coloured differently to categorise the area occupied by woody species, dense *Lantana*, sparse *Lantana* and *Chromolaena spp.* The woody species were marked as a way point using GPS. The total area of the *vayals* under cultivation was also arrived at by mapping the cultivated area using a GPS & QGIS software. In the cultivated *vayals* inside the reserve, in addition to the agricultural crop, the forest dwellers have planted a number of trees, shrubs and herbs for their economical and medicinal needs. These cultivated plants grown in the *vayals* were listed with their ethno botanical uses.

The water source to these *vayals* was identified by tracing the hydrological path throughout the Tiger Reserve with a GPS and downloading & mapping the data using QGIS software.

### IV. RESULTS

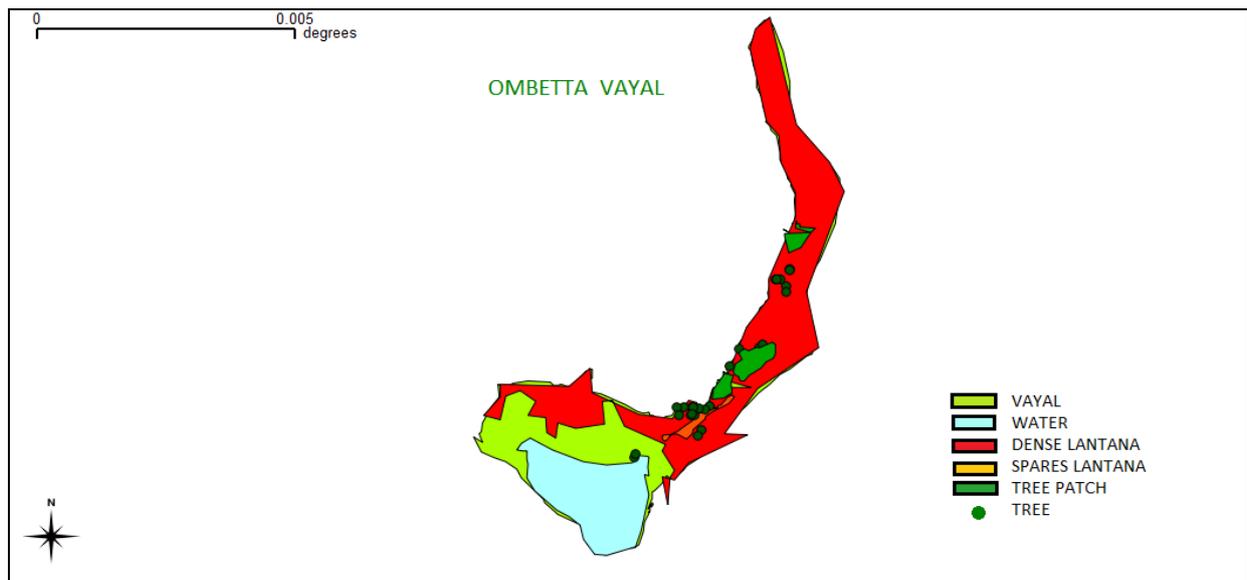
Analysis of data collected from the Gudalur taluk Revenue office revealed that 4.72% of the total land area in Gudalur taluk is classifiable as *vayals* and 24% of these *vayals* lie within the boundaries of Mudumalai Tiger Reserve. Only 66% of the *vayals* in Mudumalai Tiger Reserve are undisturbed. Thus in the whole of Gudalur taluk of Nilgiris district less than 0.81% of *vayal* is in its natural state without any kind of anthropogenic pressure which seems to be proportionately low.

The study concluded that Mudumalai Tiger Reserve has *vayals* spreading over an area of 571.14 ha. The *vayals* in Mudumalai are now much fragmented due to invasion of exotic invasive.

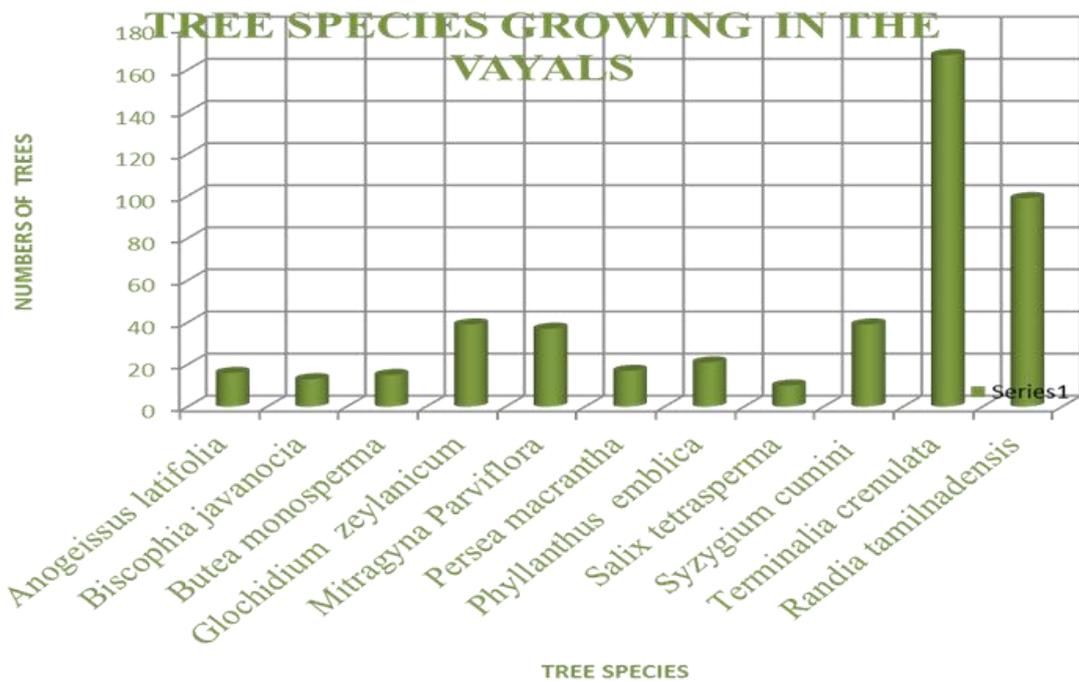


The total area of "islands of invasive" accounts for less than 3% of the natural *vayals*. As the invasion progresses radially more area will be invaded in a short time. The exotic invasive that have colonised the *vayal* are suppressing the growth and existence of its native biodiversity. The area invaded by *Lantana camara* dominated followed by

*Chromolaena odorata*. Other invasive like *Mimosa pudica*, *Ageratum conizoides*, etc., have naturalised and is not a threat to the vayal ecosystem.

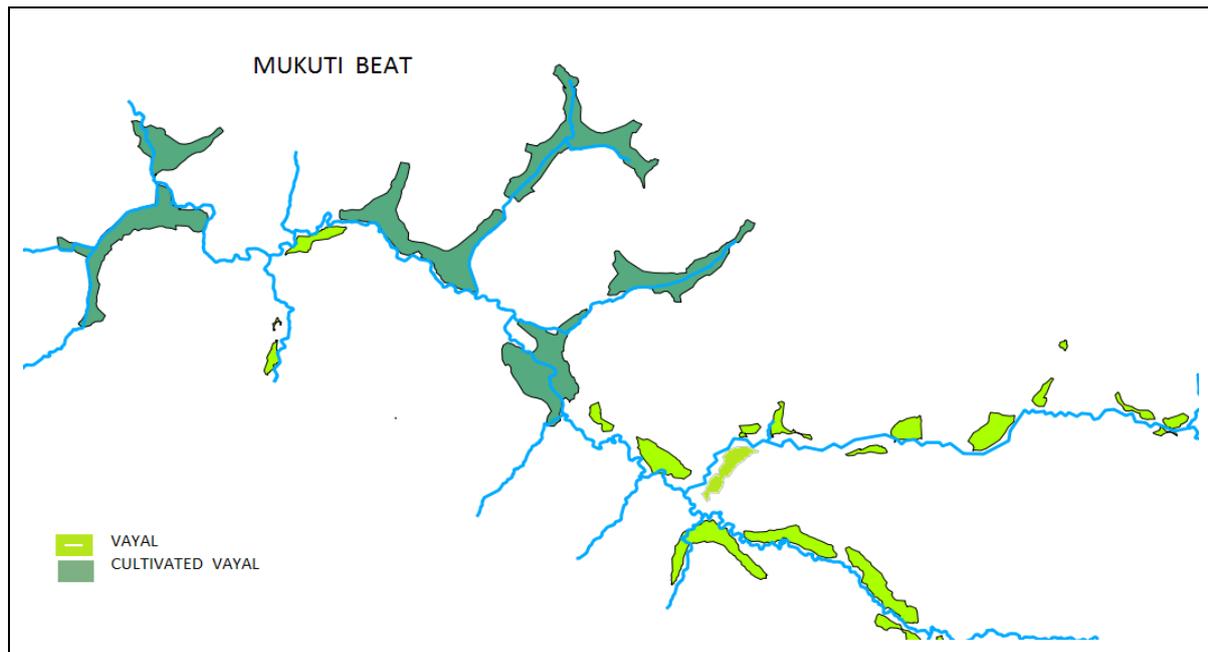


11 species of trees have been seen to commonly invade the vayals. *Anogeissus latifolia* which generally avoids swampy and badly drained soil are seen in reasonable numbers. *Bischofia javanica* grows where the water table are high and in swamps. *Butea monosperma* can tolerate water-logged situations and swampy badly drained soils. *Salix tetrasperma*, *Syzygium cumini* and *Glochidion zeylanicum* are found growing in wet swampy places and along the rivers and stream. *Terminalia crenulata* and *Mitragyna parviflora* favours stiff, clayey soil, where it often becomes gregarious in depressions and round the edges of swamps. *Phyllanthus emblica*, *Persea macrantha* and *Randia tamilnadensis* thrives best in a damp climate and requires deep moist soil. Thus except for *Anogeissus latifolia* which are found only in the vayals of dry deciduous forest, all other woody invasive have only found a suitable habitat in the vayals due to the lack of optimal waterlogging to deter the germination of these woody species.



The cultivated *vayals* account for 33% of the vayal area. *Oryza sativa* and *Zingiber zerumbet* is chiefly cultivated in these *vayals*. The study of the floristic composition of the cultivated area revealed that 141 species belonging to 124 genera and 52 families are present in these cultivated *vayals*. All the species are either of economic, medicinal or of ornamental value and exotic to the *vayal* ecosystem. Many of these escapes like *Ocimum tenuiflorum*, *Plectranthes amboinicus*, *Curcuma aromatica*, *Zingiber officinale*, *Canna indica* have colonized the neighbouring *vayals*.

Hydrology of the entire tiger reserve was traced to derive the water source to these *vayals*. The study revealed that all the *vayals* lie on the bank of seasonal or permanent streams. Some of the *vayals* are sources of alluvial ground water discharge and remain wet throughout the year. During periods of high rainfall, these *vayals* collect runoff, reducing the likelihood of seasonal flooding to downstream low-lying areas thus acting as flood-plains.



## V. CONCLUSION

Left with very little area, the *vayal* ecosystem is reeling under acute pressure due to invasion of exotic species. The *vayals* are presently fragmented badly. Continued inaction would further degrade their status and gradual loss of entire *vayal* ecosystem is eminent unless proper conservation measures are put in place in time. The *vayals* like the prairies of South America will have to be reconstructed after man realises his blunders long after these wetlands are lost.

As a timely move can save this ecosystem, the following prescriptions have been put forward for rehabilitation of these *vayals*:

- Uprooting the exotic invasive from the *vayals* on a war footing. Removal of invasive plants should be followed by active restoration of native vegetation in the removal sites, as weedy species often take advantage of disturbed soil and become more easily re-established in the absence of competition.
- A critical feature of any restoration or rehabilitation effort must involve restoring the hydrologic processes that allow the existence and persistence of a shallow water table throughout the growing season. Bunds will prove effective in raising the water table and discouraging re-establishment of non-*vayal* vegetation. During the monsoon when the in-flow is high a bund at the mouth of the *vayal* would ensure that rainwater does not run-off and is evenly distributed giving enough time for water to percolate.

- A bund constructed at the out-flow end will ensure that only excess water leaves the *vayal*.
- Monitoring by removing invasive shrubs and regular maintenance of bunds and check-dams is essential for long term results.

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#### REFERENCES

- [1] Gamble ,J.S & C.E.C Fischer (1915-1936). *Flora of the Presidency of Madras* , 3 Vols. Adlard & Son Ltd.,London.
- [2] Jahala,Y.V, Gopal ,R And Qureshi,Q.2008. *Status of Tigers co-predators and prey in India*, National Tiger Conservation Authority , Govt. of India, New Delhi and Wildlife Institute of India , Dehra Dun.
- [3] Mathew ,K.M.1995. *An excursion flora of central Tamilnadu*, India Oxford & IBH Pub. Co., New Delhi.
- [4] Sharma ,B.D, B.V Shetty, K. Vivekanathan & N.C. Radhakrishnan 1977. *Flora of Mudumalai Wildlife Sanctuary*, Tamilnadu. *J. Bombay .Nat. Hist. Soc.*75(1):13-42.
- [5] Suresh, H.S , H.S Dattaraja & R. Sukumar.1996 . *Tree flora of Mudumalai Sanctuary* , Southern India . *Indian Forester* 122:507-519.
- [6] Suresh, H.S.,Harish R Bhat , H.S Dattaraja & R. Sukumar.2006. *Revised Flora of Mudumalai Wildlife Sanctuary*, Tamilnadu, India. *J. Econ.Txon.Bot.*Vol.30 No.1(2006).
- [7] Sekar ,T, Conservator of forests, Coimbatore Circle. *Forest history of the Nilgiris*. Tamilnadu Forest Department
- [8] Stephen , D. ,BSI (1994) *Studies on the Flora of Mudumalai Wildlife Santuary* , Nilgiris ,Tamil Nadu, Bharathiar University, Coimbatore.
- [9] Sankara Rao, K, *Flowering Plants of Indian Institute of Science: A Field Guide* , 2 Vols., Indian Institute of Science, Bangalore.
- [10] Sabu,M, 2006 , *Zingiberaceae and Costaceae OF South India*, IAAT
- [11] Sachin A Punekar & P Lakshminarasimhan,2011, *Flora of Anshi National Park* , Biospheres Publications.
- [12] Ramesh, T, 2010, *Prey selection and food habits of large carnivores: tiger (panthera tigris), leopard (panthera pardus) and dhole (cuon alpinus) in Mudumalai Tiger Reserve, Tamilnadu*, Thesis submitted to Saurashtra University, Rajkot, Gujarat.

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