

## Some Observation on Dray Building and Jumping Behavior of Indian Giant Squirrel *Ratufa Indica* (Erxleben, 1777)

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The ability of arboreal forms to leap from great heights without harm is valuable adaptation to life high above the ground surface (Koli *et al.*, 2011). Tree squirrel commonly occupy nests to avoid predators and rear young (Setoguchi, 1991) and prefer upper canopy level of forest as it arboreal nature. In Indian jungles *Ratufa indica* is a major arboreal mammal species and very few literatures available on its behavioral aspects. Datta (1999) reported day time use of dray and predation attempts on *Ratufa indica* by crested hawk-eagle. Indian giant squirrel have tendency to build dray in dense forest with closed canopies, sites were along the annual river or area where sufficient moisture in summer (Kanoje, 2008). In present study we reported observation on dray building behavior and jumping success of Indian giant squirrel.

Observation were conducted during study of All India Tiger Monitoring Project in Satpura Tiger

Reserve (22° 19' - 22° 30'N and 77° 56' - 78° 20'E) with an area of 1427.87 km<sup>2</sup> (Figure 1) in Hoshangabad district of Madhya Pradesh state in Central India (Kumbhar *et al.*, 2011). The terrain is hilly and highly undulating. Forest is mainly dominated by *Tactona grandis*, *Shorea robusta*, *Bauchania latifolia*, *Terminalia arjuna*, *Emblca officinalis*, *Madhuca indica*, *Rauwolfia surpentina*. The forest types consists of Southern moist mixed deciduous forest, Southern dry mixed deciduous forest, Dry peninsulas Sal forest (Champion and Seth, 1968). Field observations were opportunistically conducted while performing other field work project entitled "Monitoring Tigers, Co-predators, Prey and their Habitat" in the study area during intensive study period of October 2010 to February 2011. Dray building behaviour was observed in riparian habitat near Churnagundi Nala surrounded by moist deciduous forest and jumping behaviour was observed in whole tiger reserve on various occasions.

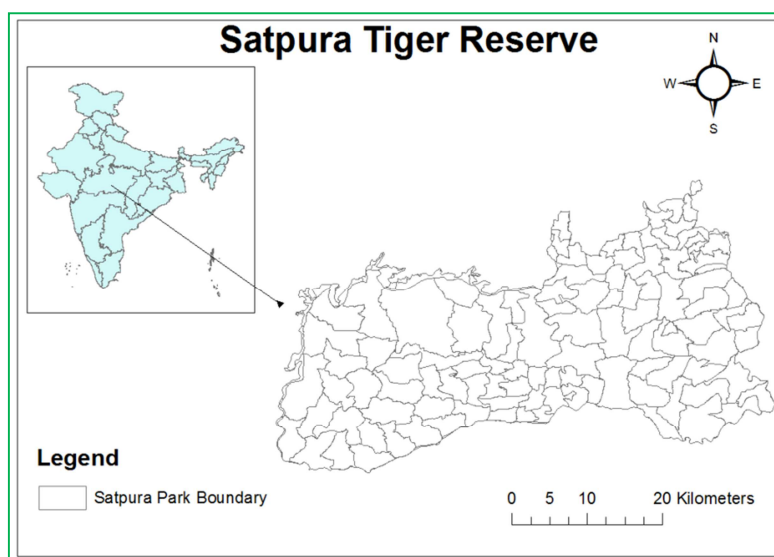


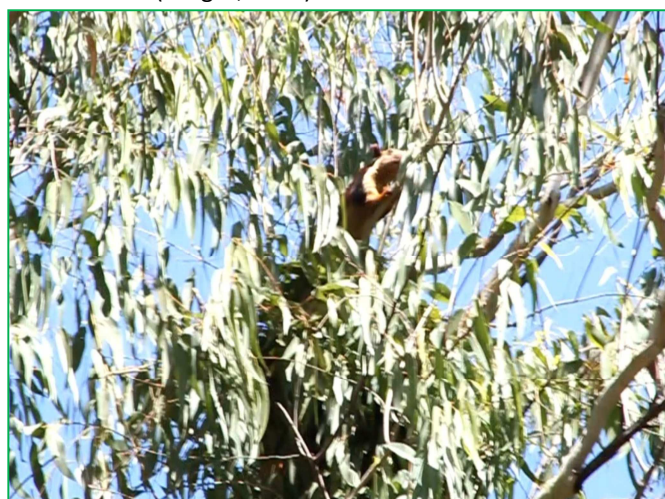
Figure 1: Map showing the location and study area of Satpura Tiger Reserve, Madhya Pradesh, India, Dray Building Behaviour

The behaviour was observed during study on two different occasions of 22<sup>th</sup> December 2010 and 4<sup>th</sup> January 2011 near Churnagundi Nala using from dawn to dusk focal animal sampling (Altmann, 1974). Focal animal were followed and observation were recorded in CANNON 500D digital SLR with cannon 75-300mm lens in video mode as well as in data sheet and also BUSHNELL 10X40 binocular used. First observation was recorded at 0845 hr. Dray building behaviour included gathering materials (cutting twigs, peeling bark), carrying material by mouth to the dray, and placing material in the dray. The first observation were made while sitting on forest floor close to dray site, tree selected by Indian giant squirrel male for dray building was on Nilgiri tree *Eucalyptus globulus*, on height of 16 meter from ground level, total tree height was 18 meter, distance measured by laser rangefinder (BUSHNELL, Overland Park, Kansas, USA).

Dray building material collected from plant species *Madhuca longifolia*, *Tactona grandis*, *Peltophorum pterocarpum* and largely *Eucalyptus globulus* available around the selected tree was used by squirrel. Dray tree were vertically broad spread where dray site was selected in corner at lower part of canopy and far from main trunk, Setoguchi, (1991) reported structural stability of tree might be contributing factor in dray placement. Dray wall made by 231 *E globulus* twigs of 15cm to 50cm and 23 *M longifolia* twigs of 20cm to 30cm in length, inner base floor portion made by 19 leafless *P pterocarpum* twigs of 15cm to 25cm in length, 8 fresh broad leaf of *T grandis* and 6 *E globulus* peeling bark of 5cm to 20cm each twig was around <2cm in diameter, length and diameter measured by scale from few fallen twigs during dray building. Each twig, after being gnawed from a branch, was carried in the mouth to the building site (Figure 2). At the building site the twigs were forced into the place with forward-thrusting movements of the snout and alternate tamping motion of the forefeet, total times spend for dray building was recorded 2.4hr. Dray was oval in shape and broad in size fully closed, entrance was around 10cm in diameter, east facing observed in all nest sighted inside study area might be for sunlight. Dray was monitored daily for activity included time of animal coming out from dray in morning and return time to dray in evening. We also compare new dray size with other 24 drays present in 200m radius; we found new dray was larger in size. Dray has not been used by animal on the day of completion; but from

next day onwards dray was used by animal as a resting site.

Second occasion of dray building observation was conducted on 4<sup>th</sup> January 2011 at 1000 hr by the same individual on *Tactona grandis* which was next tree of *Eucalyptus globulus* where previous dray was build. Dray was made on horizontal divided branch of tree on height of 12m, total height of tree 14m from ground level. Diameter of branch was around 5cm, 98 twigs of *E globulus*, 19 twigs of *M longifolia* were used to construct dray wall with 6 broad leaf of *T grandis* for floor but squirrel not completed that dray, because Indian giant squirrel is a solitary living species have inherent tendency to build several dray in its territory avoid predation risk or control nest infection (Borges, 1989).



**Figure 2:** Dray building behavior of Indian giant squirrel *Ratufa indica*.

### Jumping Success:

Jump from one tree to another (Figure 3) is a common behaviour exists in arboreal mammal for the basic needs such as in search of food, nesting tree and to avoid predation risk. We observed it by *Ratufa indica* opportunistically during October 2010 to February 2011, covering all the areas of the reserve. We recorded a total of 116 jumps, out of which 102 (87.9%) was successful and 14 (12.1%) attempts became as a failure during all observed occasions. Average distance covered by animals while jumping was 3.5 m  $\pm$  0.15 SE within canopy cover where animal failed to jump >5 meter distance in fragmented habitat. While jumping or gliding animal leave the support of flexible branch to jump another tree branch, this behaviour was observed to be a common adaptation in Indian giant squirrel on forest canopies for movement and for feeding and to avoid predation (Authors pers. Observation).



**Figure3:** Jumping behavior (Top and Bottom) of Indian giant squirrel *Ratufa indica* on two different occasions in Satpura Tiger reserve, India

We observed one successful predation attempts by crested serpent eagle *Spilornis cheela* on juvenile Indian giant squirrel on date of 13<sup>th</sup> January 2011 at 1030 hr near Churnagundi nahal. Where juvenile giant squirrel was feeding on twigs of *Madhuca longifolia*, crested serpent eagle were stalking squirrel from canopy of the same tree. Bird came down and caught giant squirrel in leg and fly on open ground and started eating flesh without killing animal. Squirrel died after 5minutes, eagle consumes 70% flesh within 40min and flies away. Canopy cover is a major part for arboreal mammals as it provides safety from predations. In our study also we observed that the sighting of the squirrel more in moist deciduous forest compare to dry deciduous forest. It addresses the importance of riparian habitat or similar microhabitat associated with streams for facilitating giant squirrel distribution (Baskaran *et al.* 2011) and abundance to ensure continues canopy cover for conservation of this endemic arboreal species in India.

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