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**Effects of Foraging Resources, Anthropogenic Risks, and Mating Opportunities on Grouping Behaviour of Male Elephants in Wasgamuwa, Sri Lanka**

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**Abstract**

Male elephants maintain larger home ranges than female family groups, and as a result, they come into contact with humans, resulting in a high level of casualty to them. Therefore, understanding the ecology of male elephants, including their grouping strategies, is an essential aspect of the conservation of male elephants. Grouping strategies of male elephants, defined by group size and age categories, depends on the availability of forage, anthropogenic risks, mating opportunities, and musth state. We present the findings of male grouping behaviour in relation to those governing factors using three years of data. We monitored male elephants and their grouping behaviours for three years from 2017 to 2019. We monitored elephants in Wasgamuwa National Park and human-dominated areas outside the park. We recorded 1,665 independent sightings. The most noticeable grouping behaviour of mature adult males was staying solitary irrespective of the anthropogenic risk and foraging opportunities. Yet, the occurrence of male-only groups was significantly high outside the protected area. Mature adults formed larger male-only groups during the ripening stages of the paddy in both Yala and Maha cropping seasons when crop guarding intensity was high. This behavioural pattern suggests that mature adult male elephants were willing to take risks for better foraging opportunities by adopting a high-risk high gain strategy and pairing with similar peers was the adaptive strategy when taking high risks. The associations of young males and sub-adult males with mature adult groups during the crop ripening months were weak, indicating social learning, especially regarding crop raiding, was not a behavioural adaptation in Asian elephants in Wasgamuwa, unlike in some African elephant populations. Adult male elephants joined the mixed-sex groups temporarily to check the availability of females in estrous and mating opportunities. Their association with the mixed-sex group was random. Sub-adult males associate more frequently with the mixed-sex group, indicating social learning from the group members. Mature adult males in musth predominantly associated with mixed-sex groups to seek mating opportunities. Musth male's interaction with young males and sub-adult males in mix-sex groups when no females in estrous were not threatening and escalating. Musth males were not part of male-only adult groups that were frequent outside the protected areas, indicating the motivational state for the associations of musth males was purely reproductive, not foraging. Our finding highlights the different aspects and complexity of grouping strategies of male elephants; therefore, conserving male elephants should be based on accurate scientific information.

**Keywords:** Asian elephants, Male elephants, Sociality, Anthropogenic risks, Foraging opportunities, Musth, Sri Lanka