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A Survey of Sri Lanka's Endangered and Endemic Western Purple-faced Langur (*Trachypithecus vetulus nestor*)

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Abstract: The western purple-faced langur is a Sri Lankan endemic listed by the World Conservation Union (IUCN) as one of the 25 most endangered primates in the world. The extremely endangered status of Sri Lanka's endemic langur, found nowhere else on earth, is due to the fact that it is primarily a tree-dwelling, leaf-eating monkey, the range of which includes the most densely populated areas of the country. In these areas of high human density, forests have been intensively exploited for several decades, and deforestation has adversely affected its preferred habitat and sources of food. During a recent survey, the western purple-faced langur was found most often in small and widely scattered groups, indicating that it is declining and has been extirpated in a number of areas within its range. This tendency, if left unchecked, would ultimately lead to extinction throughout its range. Although it faces a perilous future, certain facts uncovered during the survey indicate that it is still possible to prevent this monkey from disappearing forever. For instance, the largest forests where it can be found today are around two reservoirs that supply water to the 1.2 million inhabitants of Colombo, Sri Lanka's capital. Because of their importance to people and relatively large size, these forests represent the last strongholds for maintaining viable populations over the long term. Furthermore, the Forest Department, responsible for these forests, has indicated interest in replanting its pine plantations with native species exploited by these langurs, and thereby increasing its preferred habitat. Another encouraging fact is that most people living within its current range are Buddhists who have a strong aversion to killing animals. The cultural sentiments of people inhabiting the range of the western purple-faced langur provide an opportunity to create awareness of this monkey's highly endangered status, and help promote its conservation. Prospects and recommendations for conserving the western purple-faced langur are also discussed in this paper.

Key words: Purple-faced langur, Sri Lanka, endangered species, endemic species, effects of deforestation, prospects for conservation, recommendations

Introduction

The purple-faced langur, *Trachypithecus vetulus* (Erxleben, 1777) is a Sri Lankan endemic that consists of four subspecies (taxonomy following Groves 2001). All four are endangered, but the western subspecies, *T. vetulus nestor* (Bennett, 1833) is Critically Endangered (see Molur *et al.* 2003) and has been listed by the World Conservation Union (IUCN) as one of the 25 most endangered primates in the world (Dela and Rowe 2006, 2007). The highly endangered status of this subspecies troubled me because I had previously carried out a two-year study of the eastern (*T. v. philbricki*) and highland (*T. v. monticola*) subspecies (Rudran 1970, 1973a, 1973b), and had more than a passing interest in this species. I therefore organized a 10-day vehicle and foot survey within the historical range of *T. v. nestor* during a visit to Sri Lanka

in June–July 2007. The purpose of the survey was to gather information on its distribution, habitat and threats, to help ensure its long-term survival.

The survey involved nearly 1,500 km of travel by vehicle, mainly in an east-west direction through the middle one-third of *T. v. nestor*'s historical range. Other areas were surveyed less intensively due to lack of time, but I visited a total of 50 sites within about 50% of *T. v. nestor*'s historical range to locate and observe this monkey, and to interview local people. The interviews provided information about its occurrence, abundance, group size, frequency of sightings, food habits, and interactions with humans. Care was taken to ensure that interviewees did not confuse *T. v. nestor* with the toque monkey (*Macaca sinica*) that is also found in the same area. When interviews presented opportunities to locate groups, a local guide was hired to help approach the area on foot and count

the number of individuals. The survey also included an assessment of habitats around survey sites, as well as discussions with government officials and others responsible for habitats that appeared suitable for the conservation of this subspecies.

Results of the Survey

The most common habitat types within the survey area were residential areas with gardens (34%), or such sites with an adjoining patch of forest (9%), a commercial area (6%), or a coconut or rubber plantation (11%). Only 19% of the survey sites consisted of forests—usually small and isolated, and which sometimes occurred next to plantations (4%) or beside residential sites. Plantations (11%) and commercial areas (4%) or sites with both habitat types (2%) made up the rest of the areas surveyed. Thus deforested and human-dominated landscapes were the most common habitats (81%) found within the survey area. This situation is even more pronounced when the entire range is considered (Fig. 1). Due to several decades of deforestation, over 90% of the known range of the western purple-faced langur in the 1930s (Hill 1934) now consists of houses, gardens, townships, temples, schools, commercial operations and other areas of human activity. This is not surprising because its historical range includes the most densely populated areas of the country, including Colombo, Sri Lanka's capital. Deforestation of these areas has drastically depleted the preferred habitat and principal sources of food of this highly arboreal and folivorous primate.

Within the deforested, human-dominated survey area, *T. v. nestor* appears to be subsisting mainly on food from gardens. Of the fifteen food plants identified during the survey only four were native wild species, exploited for their fruits (*Dillenia retusa*, *Artocarpus nobilis*) or leaves (*Melia dubia*, *Albizia* sp.). Eight of the eleven cultivated species were exploited for their fruits (jak, *Artocarpus heterophyllus*; banana, *Musa* sp.; mango, *Mangifera* sp.; lovi, *Flacourtia inermis*; jumbu, *Syzygium jumbos*; rambutan, *Nephelium lappaceum*; betelnut, *Areca catechu*; coconut, *Cocos nucifera*), and the remainder were exploited for their leaves (manioc, *Manihot esculenta*; rubber, *Hevea brasiliensis*; durian, *Durio* sp.) or seeds (rubber). A diet consisting mainly of fruits was also documented in a 19-month study of two *T. v. nestor* groups conducted by Dela (2007). Both jak and banana were recorded as food plants at more than half of the 15 survey sites where I collected diet data, while each of the native wild species was exploited at no more than two sites. Furthermore, jak, banana and mango together constituted 50% of the diet records, while the four wild species comprised only 10% (N = 48). The western purple-faced langur's heavy use of cultivated plants is likely due to deforestation reducing wild plant diversity than to an actual preference for cultivated foods. Thus, in these human-dominated landscapes it probably exploits a less diverse diet than those living in natural habitats, such as forest patches. This is supported by the fact that the eastern (*T. v. philbricki*) and highland (*T. v. monticola*) subspecies, that occupy natural habitats less diverse

than those within the range of *nestor* (de Zoysa and Raheem 1990; Gunatilleke and Gunatilleke 1990; US Agency for International Development 1991; Green and Gunawardena 1993), exploited at least 32 and 33 plant species respectively within a single study site (Rudran 1970).

The nutritional consequences of feeding on a low diversity diet, especially of fruits, are not known, but likely to be detrimental over the long-term for *T. v. nestor*. This is because langurs are adapted to obtain much of their nutrients and energy from complex carbohydrates found in leaves, with the help of a highly specialized stomach and the action of symbiotic bacteria (Bauchop and Martucci 1968). However, when the diet becomes heavily dependent on cultivated fruits, loaded with simple sugars, instead of complex carbohydrates, the functioning of the gut fauna is undermined, and the ability to absorb nutrients is consequently compromised. Furthermore, fruits tend to occur seasonally, which means that *T. v. nestor* may not be able to fully satisfy its energy requirements outside the fruiting seasons of cultivated plants. When such detrimental effects have the potential to impact this langur through most of its range, its survival becomes an issue of serious concern.

Besides depleting *T. v. nestor*'s primary food source and preferred habitat, deforestation also causes other problems for this monkey's survival. For instance, when deforestation forces it to move on the ground, for which it is ill-adapted, people sometimes capture the young individuals to raise them as house pets. While on the ground it also runs the risk of being killed by village dogs or speeding vehicles. Death by electrocution is also a source of mortality when it climbs onto power lines and electricity cables. *Trachypithecus v. nestor* is occasionally shot and killed while feeding in home gardens in some parts of its range (Dela 2004). Thus deforestation indirectly leads to a wide range of human-induced fatalities.

Deforestation, and the mortality it causes, could explain the small group sizes recorded during the survey. The average size of the groups seen was 4.4 (range 1–10, N = 9), and the mean group size from 21 estimates recorded during interviews was 5.1 (range 1–15). These average group sizes were smaller than in the highland subspecies, *T. v. monticola* (mean = 8.9, range 3–14, N = 27) and the eastern subspecies, *T. v. philbricki* (mean = 8.4, range 3–15, N = 33) that I had studied earlier (Rudran 1970, 1973a). Nevertheless, group sizes at four survey sites were estimated to be more than 20 individuals. The existence of these relatively large groups could not be confirmed, but their occurrence was noted only in about 13% of the survey sites where *T. v. nestor* was seen or recorded as present (N = 30). At the other sites group size reduction appeared to have the potential to disrupt the social organization of the groups.

Deforestation may also be having an effect even more serious than group size reduction, disruption of social organization, loss of diet diversity and increased mortality. This effect can be illustrated by comparing its current status at the sites surveyed in relation to its historical range (Fig. 1, inset).

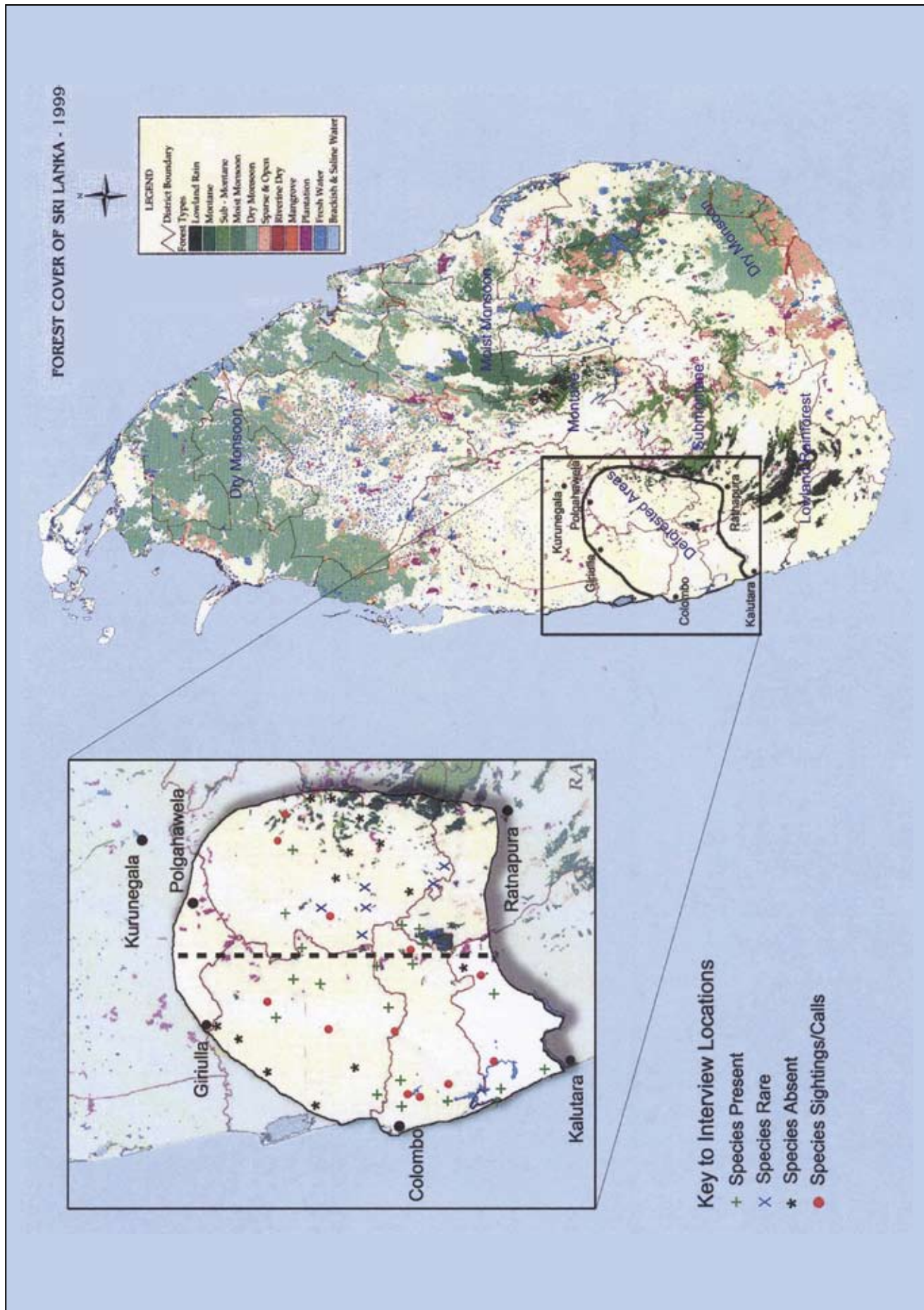


Figure 1. A recent forest cover map of Sri Lanka produced by the country's Forest Department showing the extent of deforestation within the historical range of the western purple-faced langur (as described by Hill 1934). Note that Hill (1934), Phillips (1935), and Hill and Burn (1941) suggest, but do not confirm, that the range may have extended further north-east up to Kurunegala. The inset indicates the results of the survey of the western purple-faced langur in the western and eastern half of its historical range.

The western purple-faced langur was seen or recorded as present only in 43% of the sites surveyed in the eastern half of its historical range ($N = 23$), and 78% of the survey sites in the western half ($N = 27$). At other sites in both halves, *T. v. nestor* was recorded as rare or absent. Thus range reduction seemed



Figure 2. A garden—the predominant habitat type within the current range of the western purple-faced langur, *Trachypithecus vetulus nestor*.



Figure 3. A juvenile western purple-faced langur, *Trachypithecus vetulus nestor*, resting in a coconut palm.

to be taking place more rapidly in the eastern than the western half, and these reductions suggest the occurrence of local extinctions. For instance, although Hill (1934) mentioned *T. v. nestor*'s presence several decades ago at localities such as Kitulgala and Ruwanwella, it was recorded as absent at these sites during the survey. Moreover, the sites in the eastern half where it was seen or recorded as present during interviews were interspersed between areas where it was absent or rare. Hence, the status of *T. v. nestor* at the sites surveyed (i.e., present, absent or rare) also suggests the occurrence of local extinctions. Local extinctions in the western half appeared to be mostly along the north-east boundary where it may have occurred in low numbers in the first place, but local extinctions in the eastern half appear to have progressed well inside its former haunts (Fig. 1, inset).

Prospects for the Conservation of the Western Purple-faced langur

Although facing a perilous future, certain facts revealed during the recent survey indicate that it is still possible to save this monkey from disappearing forever. For instance, the largest forests that it inhabits now are found around two reservoirs (Kalatuwawa and Labugama) that supply water to the 1.2 million inhabitants of Sri Lanka's capital, Colombo. Because of their importance to people and their relatively large size (about 21 km² in total), these forests represent the last and most secure strongholds for maintaining viable populations over the long-term. Furthermore, the Forest Department, which is responsible for these forests, has indicated interest in replanting the pine plantations found within them with native species exploited by *T. v. nestor*. Such an initiative would certainly increase *T. v. nestor*'s preferred habitat, but it would first require a study of this langur's little known dietary preferences in forested habitats.

Another important fact that surfaced during the survey was that the Forest Department has plans to promote forest conservation and generate income for communities living around its forests through environmental education and ecotourism programs. Such plans that benefit local communities also create opportunities to promote the conservation of the western purple-faced langur and its habitat. For instance, this langur could be used as a model in environmental education programs to disseminate information on the effects of habitat destruction on species survival. For such programs to be truly effective, experts in education, such as school teachers, must be trained to help school children and the rural public to clearly understand the significance of scientific concepts such as ecological niches, species-habitat interactions, minimum viable populations, and local extirpation and complete extinction. Training young people to become nature guides is also in line with the Forest Department's plans to develop ecotourism. Ecotourism has the potential to generate income, and therefore provides a powerful incentive to local people to protect their natural resources, including *T. v. nestor*. Numerous projects such as those based on fireflies in Malaysia (Othman

and Othman 1998) and gorillas in Uganda (Butynski 1998) are attempting to strengthen species protection through ecotourism's potential to generate income.

The training in nature guiding and public education must provide information on the local fauna and flora, particularly their benefits to humans, so that those who undergo the training could impart this knowledge to rural people and tourists. Information on the fauna and flora within *T. v. nestor*'s range is scarce, and collecting it creates opportunities for scientific research, which must also include other investigations such as the study of its little known diet in forested areas. Thus the Forest Department's plans to promote conservation and ecotourism provide ample opportunities to develop programs in scientific research, personnel training and public education.

Another promising aspect is that the survey showed that most people living within this langur's range are Buddhists, who have a strong aversion to killing animals. Thus shooting and trapping animals is uncommon, and besides the killing reported by Dela (2004) I was able to record only one other similar incident during the survey. It seems that about four years ago, six albino langurs were killed, presumably for their skin. In contrast to these events, interviews at two thirds of the survey sites (N = 21) indicated that people were either tolerant or protective of these animals. Two of the sites that protected langurs were Buddhist monasteries, where the incumbents strictly enforced the principles of their faith. At sites where *T. v. nestor* was neither tolerated nor protected, it was chased, with people throwing stones at them, or otherwise frightened off with fire crackers, when it raided home gardens. The Buddhist taboo against killing may explain why it has survived as long as it has in such a densely populated area, despite its reputation as an agricultural pest and a nuisance causing damage to roofing tiles of houses.

Recommendations for the Conservation of the Western Purple-faced Langur

Given the above-mentioned facts and findings of the survey, the following preliminary measures are recommended to help ensure the future survival of *T. v. nestor*.

1) The survey indicated that the best site available for *T. v. nestor*'s long-term survival is the forest around the Labugama and Kalatuwawa reservoirs. This forest is not only the largest remaining habitat for this langur but is also managed by the Forest Department, which is supportive of efforts to conserve these monkeys. Therefore, these efforts should be launched in collaboration with the Forest Department and initially focus on the forests around the two reservoirs.

2) In line with the Forest Department's plans to promote conservation and ecotourism, efforts to protect western purple-faced langur over the long-term should include programs in public education and personnel training. Since the Forest Department's own plans appear to be in the early stages, the public education and personnel training efforts to promote its conservation should be launched as soon as possible, to help get things moving.

3) The public education program related to the conservation of *T. v. nestor* should emphasize Buddhist concepts of compassion and kindness towards animals. It should also highlight the deeply-rooted cultural sentiments about protecting animals, such as those expressed in the first-ever Buddhist sermon delivered in Sri Lanka more than 2,500 years ago, and devoted solely to the protection of animals. The public education program should also help rural people to understand scientific concepts such as the evolution of species, biological diversity and conservation, which are very relevant to addressing sustainable development and issues related to human needs for this and future generations.

4) Training in public education and ecotourism should be enriched through scientific research, not only on the western purple-faced langur but other species as well. Such research should help reveal biologically important facts, and also the significance and economic, medicinal, agricultural, and social values of the fauna and flora within *T. v. nestor*'s habitats. This information could be provided to trainees through courses and workshops, and to the local public and tourists via posters, brochures, and community meetings. It could also be disseminated through signage along nature trails established within the forests around the two reservoirs.

5) In addition to the forests around the two reservoirs, other secure sites with healthy langur populations should be located to help ensure this species' long-term survival. Protecting *T. v. nestor* at several sites would prevent the possibility of a catastrophe at any one wiping out the entire subspecies. It would also provide opportunities to manage subpopulations as a metapopulation, where translocation could be used as a tool to overcome any deleterious effects of small population sizes (Valladares-Padua *et al.* 2002; Medici *et al.* 2003). Further surveys are needed to locate other viable sites for the conservation of populations of this subspecies. The indications are that the "sacred groves" around Buddhist monasteries could offer the best options for establishing satellite sites for conservation. Visits to these "sacred groves" are especially important during the next phase of the survey to evaluate the possibility of replicating the programs established in the forests around the reservoirs.

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