
Habitat Use of Nilgiri Tahr *Nilgiritragus hylocrius* in Western Ghats, India

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Abstract

Nilgiri tahr is one of the endangered mammals in the world and also an endemic species of India. The utilization of habitats by Nilgiri tahr was evaluated by pellet analysis method. Four different microhabitats were identified in the Mukurthi National Park. The utilization of the habitat by the species was determined by transect method. Totally 112 transects comprising of 1028 quadrates were evaluated and counted. The pellet characteristics such as pellet groups including fresh pellets and old pellets were assessed. There were no significant variations between pellet groups and microhabitats ($P > 0.05$). But there was a close association between pellet groups, i.e. fresh and old pellets, among the microhabitats ($\chi^2 = 64.12$, $df = 3$, $P < 0.001$). The present study reveals that the species preferred the habitats which have their preferred/major food items among the availability of the habitats without minding the presence of predator or negative pressures.

Keywords

Habitat utilization · Nilgiri tahr · Pellet analysis · Habitat interactions

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12.1 Introduction

The Nilgiri tahr (*Nilgiritragus hylocrius*) is the only species of Caprine ungulate that is found south of the Himalayas in India. The animal was formerly named as *Hemitragus hylocrius*. The generic name was changed to *Nilgiri tragus* to be in tune with the latest phylogenetic research by Ropiquet and Hassanin (2005). The Nilgiri tahr is an endangered mountain ungulate listed in schedule I of the Indian Wildlife (Protection) Act 1972 and considered as endangered by the IUCN. This species is included in the Red Data Book (1994) as endangered under the criteria EN B1+2acd, C2a on 30.06.2000 (Assessors: CAMP Workshop, India). This species has been assessed as endangered in the Red List of 2008 (Assessors: Alembath, M. and Rice, C.G, Evaluators Harris, R. and Festa-Bianchet, M. (Caprinae Red List Authority). The biogeographical studies according to Daniels (2006) reveal that the geographical range, population size and distribution of the Nilgiri tahr to the mid and high elevation hills of southwestern Karnataka, western Tamil Nadu and Kerala. It has been estimated that there were 50,000–100,000 Nilgiri tahrs at the time that the British invaded the region.

Though there are many investigators, the ecology of ungulates and their critical issues associated with the species and their habitat utilization and their foraging status remain unexplored due to difficulty in carrying out the study in the steep terrains. Nevertheless available information states that the Nilgiri tahr population decreases every year due to intensive predatory pressures, influence of environmental stress and human disturbances. Hence, there is every possibility for the species to get designated and also to get into the category of extinction as suggested by Daniels et al. (2008). The patterns of pellet-group size have been used to assess the habitat use by large herbivores since 1940s (Neff 1968). Pellet-group counts have also been widely used as an indirect method for assessing the movement pattern of ungulates (Bennet et al. 1940; Batcheler 1975; Dzieciolowski 1976; Bailey and Putman 1981; Staines and Ratcliffe 1987; Aulak and Babin' ska-Werka 1990; Plumtre and Harris 1995; Latham et al. 1996; Marques et al. 2001). The present article deals with the movement pattern of Nilgiri tahr in different microhabitats in the Mukurthi National Park and application of faecal pellet count methods in the evaluation and understanding movement pattern.

12.2 Methods

12.2.1 Study Area

The study was carried out in the plateau west of Ootacamund hill station in Nilgiris District, Tamil Nadu state in the Western Ghats mountain range of South India. It is a part of Nilgiri Biosphere Reserve and the entire Mukurthi National Park is under consideration by the UNESCO World Heritage Committee for selection as a World Heritage Site. The Mukurthi National Park faces the west between 11°10' to 11°22' N and 76°26' to 76°34' E the central location being 11° 16' N and 76° 32' E

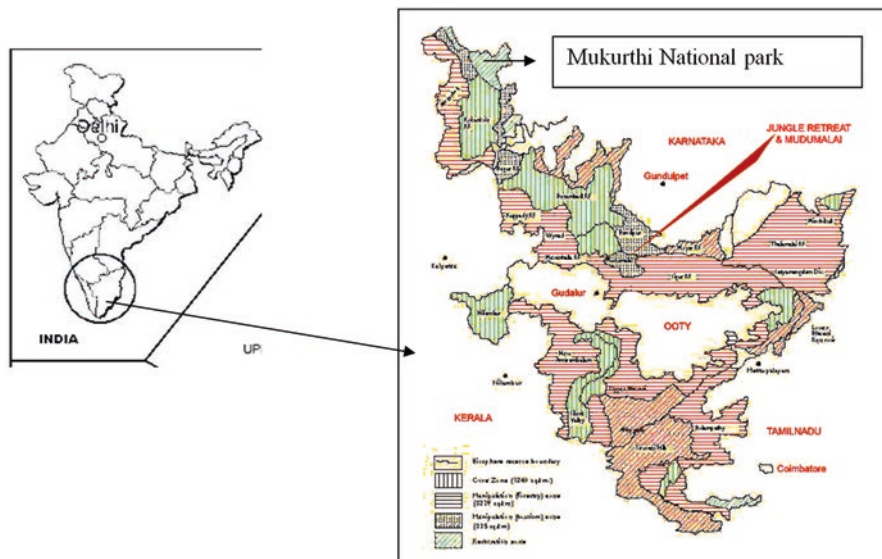


Fig. 12.1 Map showing the microhabitats of Nilgiri tahr at Mukurthi National Park

(Fig. 12.1). It is a grassland dominated by tall or short grasses. The dominant species of grassland include *Themeda tremula*, *Andropogon lividus* and *Eulalia trispicata* and other herbs. Bottom of the hills areas is covered by very long and dense grasses almost completely dominated by species of *Andropogon polytychus*. Flat areas near streams are not waterlogged and dominated by two species of grass, viz. *Chrysopogon zeylanicus* and *Helictotrichon virescens*. The animals present in the study area include Nilgiri langur, tiger, leopard, wild dog, elephants and Nilgiri tahr.

12.2.1.1 Evaluation of Pellets

The pellet evaluation was assessed by line transect method. Before laying transects, the intensive foraging sites of Nilgiri tahr in the study areas was identified by using preliminary survey method with the help of GPS. On the basis of the survey and assessment, four microhabitats were identified as effective foraging sites and selected for the study in the Mukurthi National Park, Tamil Nadu, Southern India. The length of each transect was 100 m long. In each 100 m transect, there were four sub-quadrates laid, and the size was 1.0 m length of the each transect. Totally 112 transect were laid to cover all the four microhabitats. The presence and the nature of the pellets were recorded as fresh or old and when the pellets were sighted. The newly deposited pellets on the grasslands, which dried within 2 days, were considered as fresh pellets (e.g. <2 days old), and more than 2-day-old pellets were considered as old pellets. The age (number of days) of pellet was determined on the basis of the percentage of moisture content. Repeated surveys were made to assess the usage of the different habitat of Tahr in the Mukurthi National Park. The presence of fresh pellets in the same habitats was used as the indicator to measure the

habitat, foraging behaviour and other activities. The length and width of the pellets were measured by using divider, vernier caliper and ruler. The width (breadth) was taken as the whole diameter of the entire pellet measured and the length measured from the anterior point to the posterior end of the Nilgiri tahr pellets.

12.2.2 Data Analysis

The analysis of variance (ANOVA) was performed to know the impact of microhabitats and pellet characteristics such as group, fresh, old, pellet length and widths. However, to understand the relationships between the pellet length and width Pearson's correlations were applied. The proximity and close affinity between the microhabitats and the pellet characteristics such as group, fresh, old, pellet length and widths were determined on the basis of chi-square analysis. All the statistical analyses were done by using SPSS 16.0 and Minitab 19.0.

12.3 Results

12.3.1 Pellet Groups

The present study was carried out in four different microhabitats of Mukurthi National Park. They include, viz. (1) western catchment III, (2) watchtower, (3) western catchment dam II and (4) western catchment rest house. These habitats were identified as the most preferred foraging areas for Nilgiri tahr. Totally 112 transects comprising of 1028 quadrates were monitored, and the pellets were counted as fresh and old pellets. The pellets were cylindrical in shape and they were classified into two regions, viz. anterior end was blunt and the posterior end was pointed. Colour of the pellet was black and greenish black.

Among the four microhabitats, the maximum number of pellets was recorded in the western catchment III ($1.4 \pm 1.12/m^2$) and minimum in the western catchment watchtower ($1.3 \pm 0.24/m^2$). The maximum number of fresh pellet was recorded in the western catchment dam II ($0.7 \pm 1.02/m^2$) and minimum in the western catchment III ($0.3 \pm 0.75/m^2$) (Table 12.1). Besides the range of the pellet size in each group was recorded 1–5 in the four different microhabitats (Fig. 12.2).

Table 12.1 Number of pellets was collected in different microhabitats of Mukurthi National Park during January to March 2010

Sl. No.	Microhabitat	Pellet/m ²		
		Groups (<i>N</i> = 1028)	Fresh (<i>N</i> = 1028)	Old (<i>N</i> = 1028)
1.	Western catchment III	1.4 ± 1.12	0.3 ± 0.75	1.0 ± 1.06
2.	Watchtower	1.3 ± 0.24	0.4 ± 0.89	0.9 ± 1.01
3.	Western catchment dam II	1.1 ± 1.25	0.7 ± 1.02	0.4 ± 0.85
4.	Western catchment rest house	1.2 ± 1.19	0.6 ± 0.85	0.5 ± 0.87

Values are Mean \pm 1SD

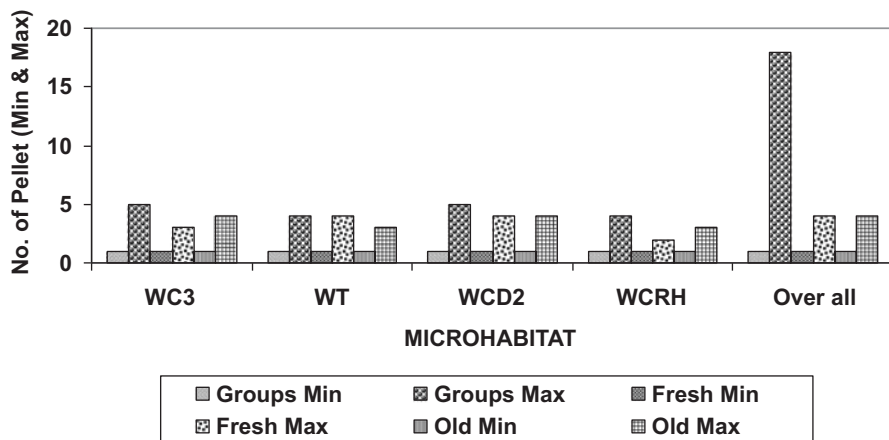


Fig. 12.2 The minimum and maximum pellet group, fresh and old pellets were recorded in the four different microhabitats of Mukurthi National Park. *WC3* western catchment III, *WT* watchtower, *WCD2* western catchment dam II, *WCRH* western catchment rest house

12.3.2 Pellet Size (Length and Width)

The pellet length and width of the Nilgiri tahr's from the four different microhabitats of the Mukurthi National Park were determined. The maximum pellet length was recorded in the western catchment III (9.2 ± 5.09 mm), and the minimum pellet length was in the western catchment II (7.3 ± 6.25 mm). But the width of pellet was maximum in western catchment watchtower (6.5 ± 3.66 mm), and minimum (5.2 ± 4.46 mm) was in the western catchment rest house (Figs. 12.3 and 12.4).

The analysis of the general linear model (GLM) showed that the length and width of Nilgiri tahr pellets showed significant variations among the microhabitats ($P < 0.05$). The chi-square analysis also showed that there were close associations between the pellet length and width among the microhabitats, i.e. length ($\chi^2 = 63.18$, $df = 3$, $P < 0.001$) and width ($\chi^2 = 57.31$, $df = 3$, $P < 0.001$) (Fig. 12.5).

12.4 Discussion

12.4.1 Pellet Groups

The presence of pellets (fresh or old) can be used as an indicator to monitor the visits, foraging and behaviour of the animals in any particular habitat. In the present investigation the population, activity and foraging behaviour were assessed on the basis of the study of the pellets of Nilgiri tahr. The pellet groups, fresh and old pellets, of Nilgiri tahr were collected and counted during January to March 2010. There were significant differences between the pellets groups and among the four

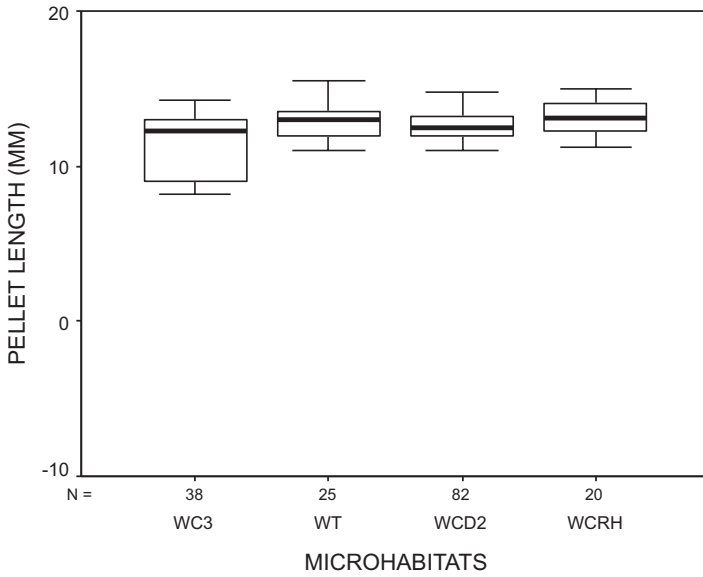


Fig. 12.3 Mean size of pellet length of Nilgiri tahr at Mukurthi National Park. *WC3* western catchment III, *WT* western catchment watchtower, *WCD2* western catchment dam II and *WCRH* western catchment rest house

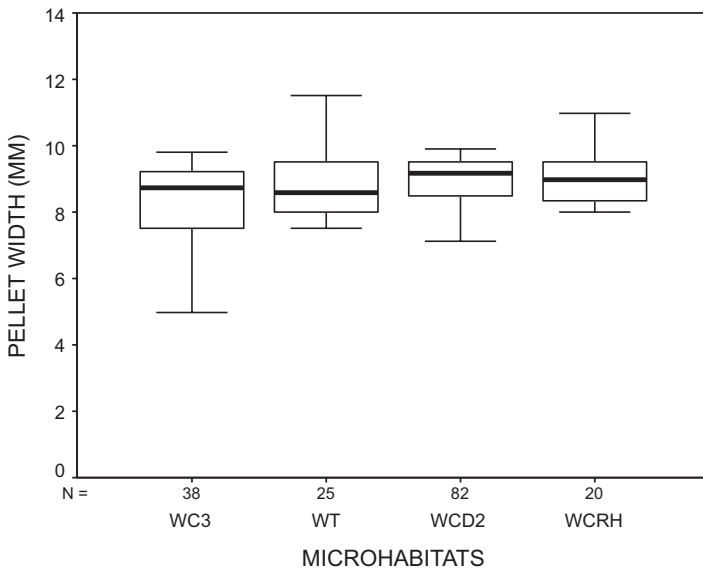


Fig. 12.4 Mean size of pellet width of Nilgiri tahr at Mukurthi National Park. *WC3* western catchment III, *WT* western catchment watchtower, *WCD2* western catchment dam II and *WCRH* western catchment rest house

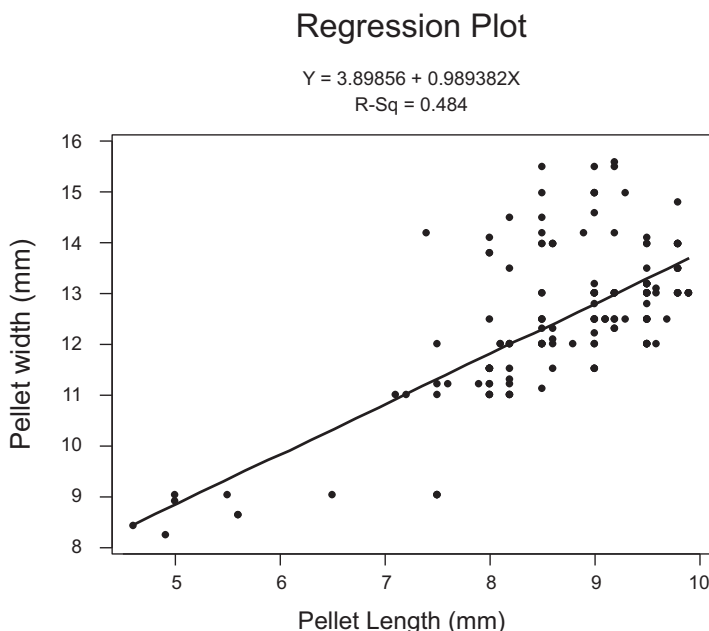


Fig. 12.5 Interpretation of Nilgiri tahr's pellet length and width recorded in the four microhabitats at Mukurthi National Park

microhabitats. The western catchment III was the most preferred foraging and feeding grounds when compared to other microhabitats for the Nilgiri tahr (Table 12.1, Fig. 12.2 and Appendix I).

It has been frequently reported that the pellet group varied, depending mainly on the sex and age of the animals, habitat type, season and the plants foraged (Sawyer et al. 1990). In general the pellet size purely depends on the availability of food, quality of food, nature of the animal and other edaphic factors. The animals will produce maximum number of pellets when they forage more quality food items. The determination of getting quality of food items depends on the availability of quality habitats and the availability of foraging plants. However, the eating of more food items by herbivores depends on not only availability of food items but also the presence of predatory pressures. In the present study, both disturbed and minimum disturbed areas among the four microhabitats have been determined merely basis of observation. The minimum disturbed area was the western catchment III, and the other three microhabitats showed maximum predatory pressures. Besides, 39 species of plants from the 4 microhabitats were recorded in the present study (Appendix I). But the western catchment III showed only 9 species out of 39 when compared to the other 3 microhabitats. But the western catchment watchtower showed 29 species of plants. All these plant species recorded in the 4 different microhabitats have been justifiably determined as the most preferred species for Nilgiri tahr.

Appendix I Most preferred food plant species of Nilgiri Tahr, Mukurthi National Park

S.No	Species name	Family	Habitat
1	<i>Anaphalis wightiana</i>	Asteraceae	Herb
2	<i>Bamboo spp</i>	Papilionaceae	Herb
3	<i>Cytisus scoparis</i>	Asteraceae	Shrub
4	<i>Erigeron mucronatum</i>	Asteraceae	Herb
5	<i>Eupatorium glandulosum</i>	Ericaceae	Herb
6	<i>Gaulthria fragrantissima</i>	Asteraceae	Herb
7	<i>Helichrysum buddleoides</i>	Asteraceae	Herb
8	<i>Hypochoeris glabra</i>	Acanthaceae	Herb
9	<i>Strobilanthus gossypinus</i>	Acanthaceae	Shrub
10	<i>Strobilanthus kunthianus</i>	Acanthaceae	Shrub
11	<i>Syzgium spp</i>	Gramineae	Shrub
12	<i>Andropogon lividus</i>	Gramineae	Grass
13	<i>Chrysopogon zeylanicus</i>	Gramineae	Grass
14	<i>Eualila trispicata</i>	Gramineae	Grass
15	<i>Isachna kunthiana</i>	Gramineae	Grass
16	<i>Themeda tremula</i>	Gramineae	Grass
17	<i>Tripogon ananthaswamianus</i>	Gramineae	Grass

Table 12.2 Pellet size was recorded in the different microhabitats of Mukurthi National Park during January to March 2010

Sl. no.	Microhabitats	Morphology	
		Length (mm)	Width (mm)
1	Western catchment III	9.2 ± 5.09	6.5 ± 3.66
2	Watchtower	8.8 ± 6.08	6.2 ± 4.28
3	Western catchment dam II	7.3 ± 6.25	5.2 ± 4.46
4	Western catchment rest house	8.2 ± 6.57	5.5 ± 4.42

Values are Mean ± 1SD

Generally animals prefer to forage in quality habitats which are without predatory pressures. The present results also reveal that more numbers of pellet groups were found in the undisturbed area, i.e. western catchment III, while only fresh pellets were found in the disturbed habitats (Table 12.2). It seems that the animals were using undisturbed habitats for both foraging and resting, whereas the disturbed areas were cautiously used by the animal for the purpose of foraging. Obviously the animals used the disturbed habitats because of the presence of their preferred food plants in spite of the predatory pressures such as the presence of dangerous predator like tiger, panther, wolves, etc., (author's unpublished data). The present study strongly suggests that the Nilgiri tahr visits the habitats for their preferred food plant species without minding the predatory pressures. It is because of the fact that the survival instinct compels them to forage even when there is predatory pressures.

12.4.2 Pellet Size (Length and Width)

The size of the pellets is generally directly based on the quality of the food plant species which in turn indirectly dependent on the quality of the habitat such as edaphic factors, including soil quality, moisture and fertility to sustain the plant species and other biological factors such as age and sex of the animal. There was a significant relationship between the length and width of the pellets of Nilgiri tahr ($P < 0.001$). Definitely the length and width is influenced by the availability of food items, nature of the animal and other environmental factors. The study areas are having abundant food items to meet out their day to day survival. The length and width of the pellets are directly proportional to the availability and quality of the food, the nature and body condition of the animal. The length and width differed significantly among the habitats, i.e. length ($\chi^2 = 63.18$, $df = 3$, $p < 0.001$) and width ($\chi^2 = 57.31$, $df = 3$, $p < 0.001$). The overall results showed that the pellet length and width were maximum in the western catchment III than the other micro-habitats studied (Figs. 12.3 and 12.4). It indicates that the Nilgiri Tahr preferred their habitat for foraging based on the availability of more number of preferred food plant species, less predatory pressures and favourable other environmental conditions.

Nevertheless the fragmentation of habitat leading to habitat loss and population segregation have been addressed in different studies. The evaluation of quality of habitats for their long-term suitability and sustainability has been recommended. Scientific means of improving the available forage (as against the total grass/shrub biomass) has to be seriously explored and adopted. The Tamil Nadu Forest Department is removing the exotic monocultures along the periphery of the Mukurthi National Park (Daniels 2006).

12.4.3 Management Implications

The results of the present study revealed that the endangered species of Nilgiri tahr use a selected habitat from among other available habitats. To ensure species population and sustain the same, we have to assess the carrying capacity of the wildlife habitats and increase the carrying capacity by way of increasing the population of foraging plant species so as to prevent the predatory pressures and to ensure the sustainability of the animal. Nilgiri tahr is one of such animal which is under Red List category to be given attention so as to prevent the animal to enter into the category of 'Extinct'.

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