

## SURVEY OF ISOLATED POPULATIONS OF THE NILGIRI TAHR *NILGIRITRAGUS HYLOCRIUS* (OGILBY) IN KERALA, INDIA

SHARON VERGIS<sup>1,3</sup>, JEAN-PHILIPPE PUYRAVAUD<sup>2</sup>, PRATHEESH C. MAMMEN<sup>1,4</sup> AND PRIYA DAVIDAR<sup>1,5</sup>

<sup>1</sup>Department of Ecology and Environmental Sciences, Pondicherry University, R. Venkataraman Nagar, Kalapet, Puducherry 605 014, India.

<sup>2</sup>ECOS, 9A, Frederic Ozanam Street, Colas Nagar, Puducherry 605 001, India. Email: jp.puyravaud@gmail.com

<sup>3</sup>Email: forestranger@rediffmail.com

<sup>4</sup>Email: pratheeshmammen@gmail.com

<sup>5</sup>Email: pdavidar@gmail.com

We conducted a survey in Kerala from December 2009 to March 2010 to document Nilgiri Tahr *Nilgiritragus hylocrius* (Ogilby) populations in fourteen sites that ranged from Neyyar Wildlife Sanctuary in the southern Western Ghats to Silent Valley, north of the Palghat Gap. The total sightings of the Nilgiri Tahr over the course of the survey were 235 animals, of which yearlings and kids constituted 12%. Information from local sources indicated an estimate of about 500 in the area covered. The largest population of 76 animals was recorded in Neyyar Wildlife Sanctuary, besides small numbers in 8 sites. There were no sightings in Parambikulam Tiger Reserve and Siruvani hills. Habitat loss, due to colonization of grasslands by forests and plantation trees, was the major threat that affected all the sites to differing degrees. Human disturbance, accessibility, tourism, and poaching were other threats. Habitat management and stringent protection is critical for the long term viability of the Nilgiri Tahr.

**Key words:** Endangered species, India, Kerala, *Nilgiritragus hylocrius*, Nilgiri Tahr, small populations, Western Ghats

### INTRODUCTION

The Nilgiri Tahr *Nilgiritragus hylocrius* (Ogilby) is an endangered mountain ungulate endemic to the Western Ghats with a distributional range of about 400 sq. km, in the southern Indian states of Kerala and Tamil Nadu. From the first systematic census in the Nilgiris, where 292 animals were sighted (Davidar 1963), it was already clear that poaching, human presence, and plantations were a threat to this animal. The first map of the Nilgiri Tahr range was outlined by Schaller (1970) who visually recorded 640 animals in several areas he visited and estimated their total number to be less than 1,500. Between 1975 and 1978, Davidar (1978) surveyed most of the species' range and estimated the total number at 2,230, in 17 areas. Later, Rice (1984) noted that of the 17 sites in which the Nilgiri Tahr has been recorded, only two supported populations of over 100 animals. The largest population is found in Eravikulam National Park (NP), in Kerala. The number of Tahr in this place remained relatively stable: 500 according to Schaller (1970), 700 according to Davidar (1978) and 696 according to Abraham *et al.* (2006). The second largest population in the Nilgiris was originally estimated to be about 300 in 1969 (Schaller 1970) and around 450 between 1975 and 1978 (Davidar 1978), and since appears to have declined in the 1990s (Sumitran 1997). Other population assessments have been by Mishra and Johnsingh (1998), who estimated about 1,400 animals in Kerala, including Eravikulam NP. Alembath (2002) in his study in Periyar Tiger Reserve (TR) recorded 16 animals in the

Mangaladevi region, and Abraham *et al.* (2006) in their most recent survey in 2001 stated that the tahr population in Kerala was highly fragmented, and estimated a population of 998 animals. Our present objective was to survey the areas with smaller populations in Kerala, as they are at a greater risk of extinction.

### METHODS

The survey was carried out from December 2009 to March 2010. Fourteen sites were visited (Table 1). The sites ranged from Neyyar Wildlife Sanctuary (WLS) in southern Western Ghats at 08° 33' N to Silent Valley at 11° 12' N. The sites ranged in altitudes from 820 m above msl in Ponnudi to 2,420 m above msl in Munnar in the high ranges (Fig. 1).

Direct sightings, pellets, hoof marks, urine stains, presence of fire were recorded during the study. An effort was made to identify the herd structure and classify them by age and sex with the help of binoculars. This information was corroborated with supporting information from local sources and naturalists. The geographic coordinates of the site, altitude, level of access by roads, indications of human disturbances and poaching were noted.

The herd size and composition were noted when possible using guidelines by Rice (1984): (i) Young: age 0-1 years, grey brown or light brown coat; (ii) Yearling: age 1-2 years, grey brown coat. Intermediate in size between young and adult females; (iii) Adults: since the males and females could not be differentiated because of lack of powerful

binoculars, we classified them generally as adults; (iv) Saddle back (male): age 6+ years. Dark brown coat, with an area of light brown white or silvery hair covering the lower back rump and or flanks. Carpal patches white.

The level of disturbance caused by humans, poaching, impact of tourism and habitat losses were considered to be potential threats and ranked as 0 (nil), 1 (low), 2 (medium), 3 (high) and 4 (very high). No actual measurement was made on these variables. However, disturbance reflected distance to the nearest road/habitation, poaching assessment was based on witness accounts, impact of tourism was ranked according to the presence or sign of presence of visitors, and habitat loss was estimated from age of plantations and informal questions to villagers. We used Spearman's Rank correlation to look at the association between levels of disturbance with tourism, poaching, road access and habitat quality. The analysis was conducted using Systat (SPSS 2000).

### RESULTS

The total sightings of the Nilgiri Tahr over the course of the survey were 235 animals, of which the largest category was not classified to age or sex (Table 2). On the whole young animals, which are easier to classify, constituted 12% of the population, which indicates a healthy replacement level. Information from local sources suggests that there could be

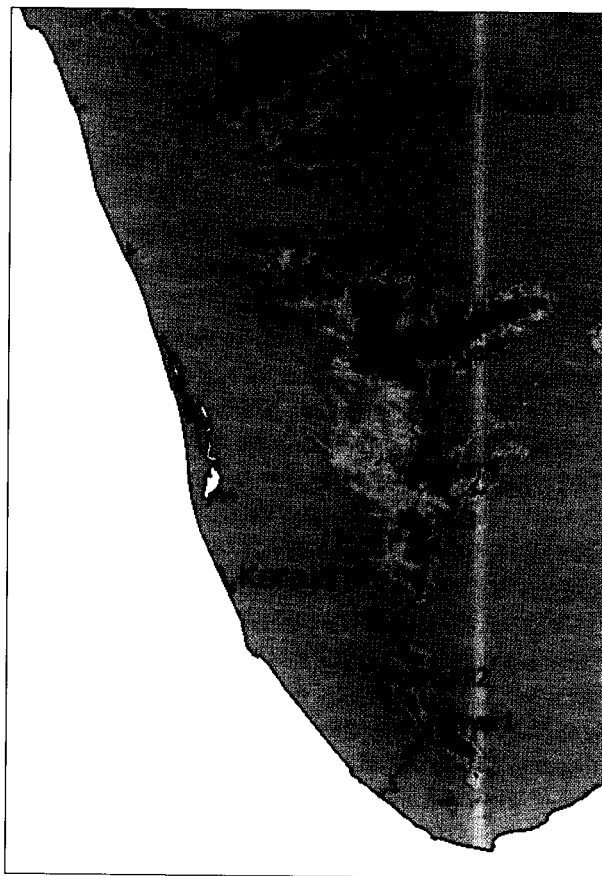


Fig. 1: Sites surveyed during the study

Table 1: Details of the sites surveyed

| Site Ref. | Site                  | Range                                 | Location                                   | Lat. (N) | Long. (E) | Elevation (m) |
|-----------|-----------------------|---------------------------------------|--|----------|-----------|---------------|
| Neyyar1   | Neyyar WLS            |                                       | Varayattumudi                              | 08° 33'  | 77° 17'   | 1,420         |
| Ponmudi2  | Ponmudi RF            | Palode range Trivandrum Division      | Varayadumottai                             | 08° 44'  | 77° 06'   | 820           |
| Kochu3    | Kochu Pamba RF        | Goodrical Range Ranni Division        | Varayadukokkai                             | 09° 23'  | 77° 09'   | 1,180         |
| Periyar4  | Periyar TR            |                                       | Mangaladevi                                | 09° 36'  | 77° 13'   | 1,330         |
| Munnar5   | Munnar Hills RF       | Devikulam range Munnar Division       | Kolukkumalai                               | 10° 05'  | 77° 12'   | 2,420         |
|           |                       |                                       | Meesapuli Malai -<br>Silent Valley Plateau |          |           |               |
| Param6    | Parambikulam TR       |                                       | Pandaravarai                               | 10° 30'  | 76° 49'   | 1,209         |
| Param7    | Parambikulam TR       |                                       | Vengoli Malai                              | 10° 25'  | 76° 48'   | 1,000         |
| Param8    | Parambikulam TR       |                                       | Karimala                                   |          |           |               |
|           |                       |                                       | Gopuram                                    | 10° 22'  | 76° 44'   | 1,430         |
| Nelli9    | Nelliampathy Hills RF | Nelliampathy range Nenmara Division 1 | Kurisumalai Hilltop                        | 10° 31'  | 76° 44'   | 1,260         |
| Nelli10   | Nelliampathy Hills RF | Nelliampathy range Nenmara Division 1 | Mampara                                    | 10° 33'  | 76° 45'   | 1,336         |
|           |                       |                                       | Minnampara                                 |          |           |               |
| Shiru11   | Siruvani Hills RF     | Agali range Mannarkkad Division       |  |          |           |               |
|           |                       |                                       | Kunjara Malai                              | 10° 57'  | 76° 39'   | 1,400         |
| Shiru12   | Siruvani Hills RF     | Agali range Mannarkkad Division       |  |          |           |               |
|           |                       |                                       | Elival Malai                               | 10° 56'  | 76° 38'   | 1,480         |
| Silent13  | Silent Valley NP      |                                       | Neelikkal                                  |          |           |               |
|           |                       |                                       | Vannampara                                 | 11° 04'  | 76° 24'   | 1,087         |
| Silent14  | Silent Valley NP      |                                       | Ankinda Malai                              |          |           |               |
|           |                       |                                       | New Amarambalam                            | 11°12'   | 76° 26'   | 2,040         |

Note: Geographic coordinates indicate approximate places of observation

about 500 animals in the area surveyed.

The largest population of Nilgiri Tahr was recorded in Neyyar WLS (Table 2). Other sites with populations over 40 animals were in Munnar and Kurisumalai-hill top in Nelliampathy. Small herds were sighted in Mangaladevi in Periyar TR, Mampara and Minnampara in Nelliampathy, and Neelikal and Vannampara in the Silent Valley NP. No tahrs were sighted in Parambikulam TR and Siruvani hills (Table 2).

Habitat loss was the major threat overall, both in occurrence and intensity. Habitat loss affected all the sites to differing degrees (Table 3). It was a major threat in Parambikulam TR and Silent Valley NP and to a lesser threat in Neyyar WLS, Kochu Pamba, Periyar, and Elival Malai in the Siruvani hills, and Ankinda Malai in Silent Valley NP (Table 3). Habitat loss is caused by loss of grasslands due to expansion of forests or monoculture plantations.

Levels of human disturbance were highest in Ponmudi RF and in Mampara and Minnampara in Nelliampathy. The Neyyar WLS, Kochu Pamba RF, and Ankinda Malai in the Silent Valley NP were fairly undisturbed (Table 3). An indicator of human disturbance was the presence of motorable roads <1 km from the tahr habitat. Sites in Neyyar WLS, Parambikulam TR and Silent Valley NP had low levels of human disturbance. Tourism and poaching were other major threats and were highly correlated with human disturbance (Table 3). Human disturbance levels were positively correlated with increasing levels of poaching ( $r_s=0.50, n=15, p<0.05$ ), tourism ( $r_s=0.68, n=15, p<0.05$ ), and negatively

**Table 2:** Number of Nilgiri Tahr sighted in the different sites

| Site Ref. | SB | Adult | YLNG | K | UI  | Total |
|-----------|----|-------|------|---|-----|-------|
| Neyyar1   | 6  |       | 8    | 2 | 60  | 76    |
| Ponmudi2  |    |       |      |   | 11  | 11    |
| Kochu3    |    | 2     | 3    | 2 | 15  | 22    |
| Periyar4  |    |       | 2    |   | 4   | 6     |
| Munnar5   | 2  | 4     | 3    |   | 37  | 46    |
| Param6    |    |       |      |   |     | 0     |
| Param7    |    |       |      |   |     | 0     |
| Param8    |    |       |      |   |     | 0     |
| Nelli9    |    | 3     | 4    | 3 | 40  | 50    |
| Nelli10   |    |       |      |   | 7   | 7     |
| Siru11    |    |       |      |   |     | 0     |
| Siru12    |    |       |      |   |     | 0     |
| Silent13  | 3  |       |      |   |     | 3     |
| Silent14  |    | 2     |      | 2 | 10  | 14    |
| Total     | 11 | 11    | 20   | 9 | 184 | 235   |

SB: Saddle back, Adult: male and female, YLNG: yearling, K: kid, UI: unidentified

**Table 3:** Estimates of threat levels due to different causes

| Site Ref.       | Human disturbance | Poaching | Tourism | Habitat loss | Total |
|-----------------|-------------------|----------|---------|--------------|-------|
| Neyyar1         | 0                 | 1        | 0       | 1            | 2     |
| Ponmudi2        | 4                 | 2        | 2       | 2            | 10    |
| Kochu3          | 1                 | 0        | 1       | 1            | 3     |
| Periyar4        | 2                 | 1        | 1       | 1            | 5     |
| Munnar5         | 2                 | 1        | 1       | 2            | 6     |
| Param6          | 0                 | 0        | 1       | 4            | 5     |
| Param7          | 1                 | 2        | 1       | 4            | 8     |
| Param8          | 0                 | 1        | 1       | 2            | 4     |
| Nelli9          | 2                 | 2        | 2       | 2            | 8     |
| Nelli10         | 3                 | 2        | 2       | 2            | 9     |
| Siru11          | 1                 | 1        | 0       | 2            | 4     |
| Siru12          | 1                 | 2        | 0       | 1            | 4     |
| Silent13        | 2                 | 2        | 0       | 4            | 8     |
| Silent14        | 0                 | 0        | 0       | 1            | 1     |
| Total           | 19                | 17       | 12      | 29           |       |
| Number of sites | 10                | 11       | 9       | 14           |       |

correlated to distance from the nearest town ( $r_s=0.52, n=15, p<0.05$ ). Accessibility by roads (km) was positively correlated with tourism threat ( $r_s=0.48, n=15, p<0.05$ ).

Poaching was detected in all sites except Kochu Pamba RF, Pandavarai in Parambikulam TR and Ankinda Malai in the Silent Valley NP (Table 3). Unregulated tourism was a threat in most of the sites except Neyyar WLS, Siruvani hills and Silent Valley NP. Motorable roads increased access to the sites and increased levels of human disturbance, tourism and poaching.

### DISCUSSION

This survey indicates that most of the small populations of the Nilgiri Tahr in Kerala are under threat. We recorded 235 Nilgiri Tahr in 14 locations in Kerala. These were areas that had been surveyed earlier (Davidar 1978; Abraham *et al.* 2006). Of the 14, only three sites, Neyyar WLS, Munnar hills and Kurisumalai-hill top in Nelliampathy, held over 40 tahr. Most of the records were of one small herd. In some places, we did not see any animals. Parambikulam TR and Siruvani hills are sites where tahr had been recorded earlier, but none were sighted during this survey (Davidar 1978; Abraham *et al.* 2006).

Upon evaluating the levels of threat in each site, we found that the highest threat level was due to habitat loss. Habitat loss is due to the decrease of grasslands because of natural expansion of forests, or due to the installation of

monoculture plantations in the grasslands. One of the reasons for the forest expansion could be because of lack of fire in the grasslands. However, this has to be tested with experimental fires at the earliest so that the loss of tahr habitat could be reversed.

In some sites, we did not record any tahr; for example, Davidar (1978) and Abraham *et al.* (2006) recorded 22 tahr and 4 tahr (2 adults and 2 yearlings), respectively in Pandavarai in Parambikulam TR. In Karimala Gopuram, which lies inside Parambikulam TR, Davidar (1978) reported 120 animals in the 1970s, Abraham *et al.* (2006) recorded nine animals: five adult females and four subadults in 2001. We did not see any animals, but few signs of tahr such as pellets were sighted. Davidar (1978) estimated a population of 20-25 animals in Vengoli, and Abraham *et al.* (2006) recorded one saddleback. The status of the Vengoli population is unclear. This population moves between Kerala and Valparai in Tamil Nadu. There were no recent sightings of tahr in this area according to local sources and prior surveys (Mammen pers. comm.). Senior tribal forest guards informed us that the forests had overgrown the tahr habitats due to lack of fire, which could have negatively affected the tahr populations, since they become more susceptible to ambush by predators such as tigers and leopards. Tribal sources also informed us that the grasslands were more extensive decades ago in Parambikulam-Thunakadavu area and due to forest incursion, much of the tahr habitat had been lost. Levels of human disturbance were highest in Ponmudi RF, and in Mampara and Minnampara in the Nelliampathy. Private estates and unresolved claims over land ownership pose severe

threat to the existence of tahr in Mampara and Minnampara.

In the Siruvani hills, we did not record any tahr, but fresh and old pellets were noted. Earlier surveys by Abraham *et al.* (2006) had recorded 11 animals in Elival malai, and signs of a larger population in Kunjara malai.

The population in Nelliampathy seems more stable and we recorded about 50 animals in Kurisimala-hill top, whereas Abraham *et al.* (2006) had recorded 37. However, levels of human disturbance remain high, and in the past (Abraham *et al.* 2006) livestock grazing and poaching appear to be major threats.

Overall the young tahr constituted 12% of the population, which indicates that there is a healthy replacement of population. However, it is important to note that habitat loss is a major threat, and roads which facilitate easy access to tourists, and pilgrimage centres within Nilgiri Tahr habitats will increase the pressure on the habitat and will ultimately lead to the decline and eventual extinction of small vulnerable populations of this highly endangered mountain ungulate.

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