

Status and Distribution of Nilgiri Salea (*Salea horsfieldii*) in the urban and sub urban areas of in and around Udhagamandalam, The Nilgiris, Tamil Nadu

S. Karthick and B. Ramakrishnan

<https://doi.org/10.56343/STET.116.013.003.004>

<http://stetjournals.com>

Article History

Received: 23.12.2019

Revised and Accepted : 09.01.2020

Published: 16.03.2020

Abstract

A short term intensive study was conducted on the distributional status of *Salea horsfieldii* in the selected sites outside protected areas of Udhagamandalam, southern India. Totally 136 individuals were recorded between September 2018 to February 2019 from the five selected locations. This present study clearly shows that the urbanism and land cultivation, fragmentation and pollution adversely affect the native species. Through this study we recommend that there is need for a detailed study on distributional pattern, conservation threats of this endemic *Salea horsfieldii* in the Nilgiris region.

Keywords : *Salea horsfieldii*, distribution, Udhagamandalam, microhabitat utilization.

INTRODUCTION

Salea horsfieldii, commonly known as Horsfield's spiny lizard or the Nilgiri salea, is a species of lizard in the family Agamidae. The species is endemic to the Nilgiri Hills of India. It is found mainly in the high altitude grassy hills. A related species, *Salea anamallayana*, is found in the grassy hills of the Anaimalai Hills, India. The Western Ghats, India, has two species of Salea, *Salea anamallayana* and *Salea horsfieldii* both are endemic (Bhupathy and Kannan, 1996). Large, unequal and strongly imbricate dorsal scales, strongly compressed body and dorsal crest extending upto tail in males are the distinguishing

features. The *Salea horsfieldii* is a higher altitude species of agama found in Southern part of India and endemic to Nilgiri hills. It differs from *Calotes versicolor* by the presence of large tympanic scales between the tympanium and the orbit, and is interrupted behind the ear and reappearing before the shoulder joint. This species inhabits moist montane forests, and is also known to be found on bushes, hedges and in gardens (Bhupathy and Kannan 1997; Daniel 2002; Sharma 2002). This species has narrow tolerance to habitat alterations as it has not been reported from disturbed habitats (S.R. Ganesh pers. comm. March, 2011). *Salea horsfieldii* is endemic to the high altitudes of the Western Ghats (Daniel 2002) including the Nilgiri and Palni Hills. Ramakrishna (2007) reported the Kudremukh hills, lying ca. 500 km further north, as one of its localities. But this must be considered dubious because his record was simply based on information from a website and field surveys in Kudremukh hill range did not yield any sightings of this species (Vasudevan *et al.* 2006, Ganesh *et al.* 2007). Likewise, an erroneous Sri Lankan locality "Nuwara Eliya" has also been reported for this Indian endemic species (Somaweera 2009). This species occurs at elevations between 1,600 and 2,500 msl. Although *Salea horsfieldii* has a very restricted distribution, it is listed as "Least Concern" as it is locally abundant, occurs in protected areas, and does not seem to be affected by habitat conversion to plantations. There is no detailed study on the distribution and density of this species in the Nilgiris region. Hence a short term intensive study was conducted on the distributional status of *Salea horsfieldii* in the selected sites outside protected areas of Udhagamandalam, southern India.

STUDY AREA

The study (Fig. 1), Udhagamandalam town is located in the Nilgiri District (11°24'N and 76°44'E) in the state of Tamil Nadu in the Southern end of India. The Nilgiri district forms the western extremity of Tamil Nadu. It is a hilly district made up of plateaus and



B. Ramakrishnan

email: bio.bramki@gmail.com

Mammology and Forest Ecology wing, Department of Zoology and Wildlife Biology, Government Arts College, Udhagamandalam, The Nilgiris - 643 002, Tamil Nadu, India.

landforms, with numerous perennial streams and an equitable climate. The district is the smallest and highest part of the state (average elevation 2000 mts) with an equitable climate. The district is divided into four taluks -Udhagamandalam, Gudalur, Coonoor and Kotagiri. Ooty town (Udhagamandalam town) is the headquarters town of the taluk and of the district. Ooty town is the largest hill station in South India and has the largest level surface. It is at an elevation of 2248 m and covers an area of 30.67 sq. kms.

Natural Vegetation

The warm climate with plentiful rainfall has resulted in abundant plant growth in the Nilgiris. Botanically, there are 4 zones, deciduous forests of the slopes, moist ever green forests higher up, and Sholas and grasslands. The last two are climax vegetation types. Sholas are wet temperate (montane) forests of tall rounded trees and several tiers of vegetation along with epiphytes and a dense undergrowth. They are found in the folds of converging slopes where moisture is higher. Sholas provide the perennial supply of water to the hill streams. The Dodabetta forests in the east and Snowdon in the north east have shola forests. In the rest of the valley slopes, degraded forests are found. Forest plantations of introduced plants like Australian Eucalyptus or blue gum and acacias are found in the upper slopes of Elkhill and other areas.

Land Use

Land is put to four major categories of use in Ooty town - forest area, agricultural area, built up area and uncultivated area. The lake watershed area forms the core of tourism activity in Ooty (Udhagamandalam).

METHODOLOGY

Visual Encounter Survey

Visual encounter survey (VES) was used to collect basic ecological data in the field by walking through the study sites for a prescribed time period,

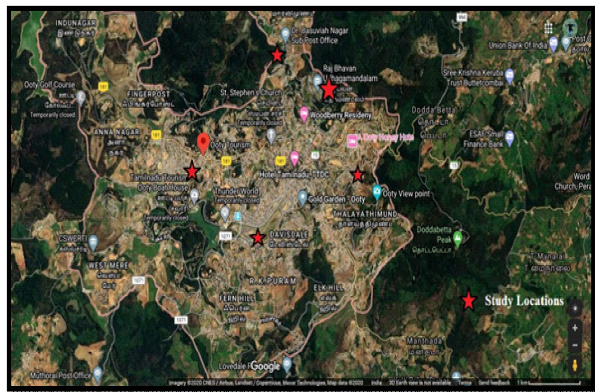


Fig.1. Urban and sub urban study locations, of Ooty , India

systematically searching for *Salea* in area or habitat (Campbell and Christman, 1982). The study was carried out from September 2018 to February 2019. Samplings were carried out in early morning (0900 - 1200h), mid day (1200-1400 h) and evening hours (1600 to 1900 h) of day. *Salea* was searched and checked in all possible microhabitats such as, under the small bushes, small stones, rocks, on the grass, on the tree and bare ground. This method was used study the (Size class distribution and abundance, micro and macro habitat use, seasonal abundance and activity and threat to *Salea horsfieldii* in the selected locations.

Transect Sampling

Transect Sampling is ideal for studying elevation gradients from low lands to uplands depending on the land use of the study location. Totally 3 transect were laid with a length of 2 kms in each study location during the study period.

RESULTS AND DISCUSSION

Totally 136 individuals were recorded between September 2018 to February 2019 from the five selected locations. Among the study locations, Poomandu showed the highest number of individuals (n=49, 36.03%) followed by Forest gate (n=31, 22.79%) Rajbhavan (n=29, 21.32%) and Stone house area (n=18, 13.24%). The lowest number of individuals were recorded in the Race course area (n=9, 6.62%) (Table 1 & Fig.2).

Among the 136 individuals of *Salea horsfieldii* recorded, females were dominant (n=46) followed by males (n=44) young ones (n=28) and sub adult category (n=18) (Table 2.). Poomandu recorded highest number of females (n=18) followed by males (n=13) young ones (n=10) and sub adults (n=8). Similarly Rajbhavan recorded more number of females (n=11) than males (n=9).s On the contrary Forest gate location recorded highest number of male individuals than female followed by young ones (n=7) and sub adults (n=4).

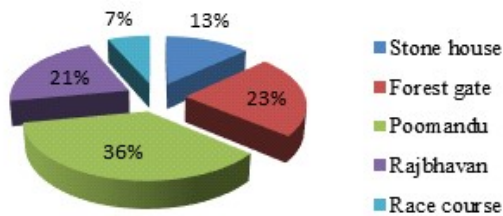
Season wise density of *Salea horsfieldii* showed that during winter season (December-February) had the highest percentage (n=80; 58.82%) of individuals were recorded (Table 3 and Fig.3).

The occurrence of *S. horsefieldii* was highest during December and least during September of the present study period (Table 4).

The *Salea horsfieldii* was mostly more active during morning hours than the evening. They were noticed through the study period mostly while basking. Out of 136 sightings most of the individuals were sighted on the shrub species in particularly in *Cestrum aurantiacum* (n=34, 25%) followed by *Ulex europaeus* (n=20, 14.7%), *Elaeagnus kologa* (n=16, 11.8%) and *Lantana camara*

Table 1. Number of individuals recorded in the selected study locations

S.No	Name of the locations	Number of individuals recorded	Relative percentage
1	Stone house	18	13.24
2	Forest gate	31	22.79
3	Poomandu	49	36.03
4	Rajbhavan	29	21.32
5	Race course	9	6.62
	Total	n=136	100

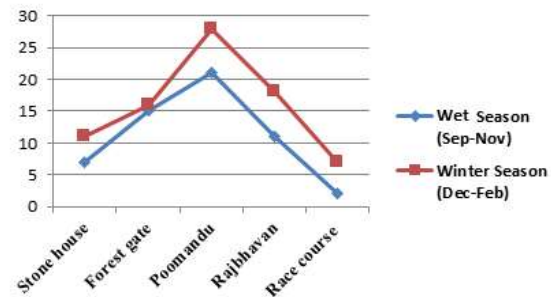
**Fig. 2.** Relative percentage of individuals recorded in the selected study locations.

(n=13, 9.6%). Twenty nine (21.3%) sightings were (2.9 %) recorded on the rock while basking. Interestingly, four (2.9 %) dead specimens were recorded as road kills (Table 5 and Fig. 3).

Morphometric measurements of *S. horsfieldii* are given in Table 8. The total length of male individual ranged from 7.8-28.0 with a mean and SD of 18.6 ± 7.17 . Females TL varied from 10.0-24.7 (18.2 ± 5.5). Head length of male individual varied from 1.0-2.5 (1.8 ± 0.6) and females ranged from 1.0-2.5 (1.5 ± 0.46). The head width of male *Salea horsfieldii* ranged from 0.5-1.2 (0.86 ± 0.2) and for females it varied from 0.5-1.5 (0.9 ± 0.34). Similarly the Tail length of male ranged from 4.2-16.5 with mean and SD of 10.9 ± 4.8 and females varied from 6.4-17.0 (11.2 ± 4.3) (Table 8).

Table 3. Seasonal distribution pattern of *Salea horsfieldii* in the study locations

S.No.	Name of the locations	Wet season (Sep-Nov)	R%	Winter Season (Dec-Feb)	R%
1	Stone house	7	12.5	11	13.75
2	Forest gate	15	26.79	16	20
3	Poomandu	21	37.5	28	35
4	Rajbhavan	11	19.64	18	22.5
5	Race course	2	3.57	7	8.75
	Total	n=56	100	n=80	100

**Fig. 3.** Season wise population of *Salea horsfieldii***Table 4.** Month wise record of *Salea horsfieldii* in the study locations.

S.No.	Month	Number of individuals recorded	R%
1	September	15	11.03
2	October	19	13.97
3	November	21	15.44
4	December	29	21.32
5	January	24	17.65
6	February	28	20.59
	Total	136	100

Table 2. Sex wise distribution of *Salea horsfieldii* in the selected study locations

S. No.	Name of the locations	Male	R%	Female	R%	Sub adult	R%	Young ones	R%	Total
		(n)		(n)		(n)		(n)		
1	Stone house	7	15.91	5	10.87	2	11.11	4	14.29	18
2	Forest gate	11	25	9	19.57	4	22.22	7	25	31
3	Poomandu	13	29.55	18	39.13	8	44.44	10	35.71	49
4	Rajbhavan	9	20.45	11	23.91	3	16.67	6	21.43	29
5	Race course	4	9.09	3	6.52	1	5.56	1	3.57	9
	Total	44	100	46	100	18	100	28	100	136

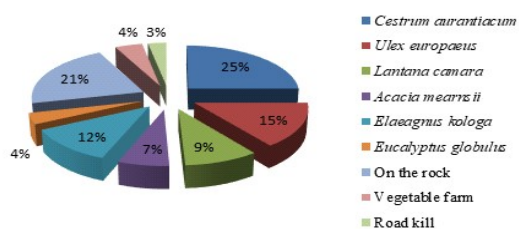


Fig. 4. Micro habitat usage of *Salea horsfieldii*

Table 5 Microhabitat utilization of *Salea horsfieldii* in the study locations

S.No.	Micro habitat	Number of individuals recorded	R%
1	<i>Cestrum aurantiacum</i>	34	25
2	<i>Ulex europaeus</i>	20	14.7
3	<i>Lantana camara</i>	13	9.6
4	<i>Accacia mearnsii</i>	9	6.6
5	<i>Elaeagnus kologa</i>	16	11.8
6	<i>Eucalyptus globulus</i>	5	3.7
7	On the rock	29	21.3
8	Vegetable farm	6	4.4
9	Road kill	4	2.9
	Total	136	100

Table 6. Size composition of *Salea horsfieldii*

Measurements	Male	Female
	Mean±SE	Mean±SE
Total length (TL)	18.6±7.17 (7.8-28.0)	18.2±5.5 (10.0-24.7)
Head Length (HL)	1.8±0.6 (1.0-2.5)	1.5±0.46 (1.0-2.5)
Head Width (HW)	0.86±0.2 (0.5-1.2)	0.9±0.34 (0.5-1.5)
Tail Length (TL)	10.9±4.8 (4.2-16.5)	11.2±4.3 (6.4-17.0)

DISCUSSION

The agamids are a large and diverse family of old world lizards exhibiting parallelisms in adaptive types to many of the new world iguanids. They are ecologically diversified into burrowing, surface dwelling, arboreal and species inhabiting open areas as well. The present study targeted five different urban

and semi urban study locations. In the present study totally 136 individuals were recorded. Interestingly 80% of the individuals were recorded from sub urban areas like Poomandu, Forest gate and Rajbhavan. According to Rajkumar *et al.*, (2003) the population of agamids play a major role in the control of pests. Similarly they state that the male occupies the hill tops and dominant over the females. Daniel *et al.*, (2002) stated that sexual harassment by male lizard affects the population size and dynamics. The female harassment may theoretically even bring about the population extension. The populations of adults are characterized by female biased sex ratio. The male are larger than the female and gorgeous with nuptial colour during breeding season. While the females are molted and different to distinguish from Indian rock lizard (Rajkumar and Radder, 2006). The present study revealed that the total length of male individual ranged from 7.8-28.0 with a mean and SD of 18.6±7.17. Females TL varied from 10.0-24.7 (18.2±5.5). Head length of male individual varied from 1.0-2.5 (1.8±0.6) and females ranged from 1.0-2.5 (1.5±0.46). The head width of male *Salea horsfieldii* ranged from 0.5-1.2 (0.86±0.2) and for females diverse from 0.5-1.5 (0.9±0.34). Similarly the Tail length of male ranged from 4.2-16.5 with mean and SD of 10.9±4.8 and the females with 95mm body length to 250 mm as tail length making as 345 mm total body length. Interestingly during breeding season males are clearly diversified with dark brown colour while the females turn into green. This species occurs at elevations between 1,600 and 2,500 msl. Although *Salea horsfieldii* has a very restricted distribution, it is listed as Least Concern as it is locally abundant, it occurs in protected areas, and does not seem to be affected by habitat conversion to plantations. As it is a common species there is no much work done in its distributional and conservation related studies. This present study clearly shows that the urbanism and land cultivation, fragmentation and pollution adversely affect the native species. Through this study we recommend that there is need for a detailed study on distributional pattern, conservation threats of this endemic *Salea horsfieldii* in the Nilgiris region.

REFERENCES

- Bhupathy, S. and Kannan, P. 1997. Status of Agamid lizards in the Western Ghats. Technical Report No. 5. Salim Ali Centre for Ornithology and Natural History, Coimbatore.
- Daniel, J.C. 2002. *The Book of Indian Reptiles and Amphibians*. Oxford University Press / Bombay Natural History Society, Oxford.
- Ganesh, S.R., Chandramouli, S.R. and Edward, S.L. 2007. A study on herpetofaunal assemblages in the rainforests of Western Ghats, Karnataka, India. *Journal of Scientific*

- Transactions in Environment and Technovation* 1(2): 95-103.
<https://doi.org/10.20894/STET.116.001.002.009>
- IUCN. 2013. IUCN Red List of Threatened Species (ver. 2013.1). Available at: <http://www.iucnredlist.org>. (Accessed: 12 June 2013).
- Ramakrishna, G. (ed.). 2007. Fauna of Kudremukh National Park, Karnataka. *Conservation Area Series*, Zoological Survey of India.
- Rajkumar, Radder, Bhagashri and shambhag. (2003). Interrelationship among reproductive traits of female lizard. *Sitana ponticeriana*, Current science. Vol.85. No.189-291
- Rajkumar,S. and Radder (2006). An overview of geographic variation in the life history traits of the tropical agamid lizards *Calotes versicolor*. Current science. Vol.91. No.5.
- Sharma, R.C. 2002. *Fauna of India and adjacent countries. Reptilia Volume II (Sauria)*. Zoological Survey of India, Kolkata.
- Smith, M.A. 1935. *The Fauna of British India, including Ceylon and Burma. Reptiles and Amphibia, Vol. II. Sauria*. Taylor and Francis, London.
- Somaweera, R. and Somaweera, N. 2009. *Lizards of Sri Lanka: A Colour Guide with Field Keys*. Edition Chiamria, Frankfurt am Main, Germany.
- Vasudevan, K., Singh, M., Singh, V.R., Chaitra, M.S., Naniwadekar, R.S., Deepak, V. and Swapna, N. 2006. Survey of biological diversity in Kudremukh Forest Complex. Karnataka Forest Department Report.