**TD-0000010**

**Vinod, U. J. (2007). Status and eclogy of the Nilgiri Pipit in the Western Ghats. Sálim Ali Centre for Ornithology and Natural History. Coimbatore, Bharathiar University, Coimbatore.**

Summary

* Distribution and status of the Nilgiri Pipit were assessed by surveying select areas of the Western Ghats. The intensive study on the ecology of the Nilgiri Pipit was conducted in the Upper Bhavani area of the Nilgiris.
* The main habitats in the area comprise rolling hills with grass carpets, shola forests and plantations of pine, eucalypts and wattle.
* The Nilgiri Plateau receives both the south-west and north-east monsoons which varied during study period; 18033 mm in 2002 to 1680 mm in 2003 and 2642mm in 2004.
* There was a drastic decline in the rainfall from 3832 mm to 1222 mm in 10 years (1992 to 2002).
* The average monthly humidity was about 90 % at 0700h during the south-west monsoon while it was slightly less during summer.
* Monthly average temperature varied from 19.3˚C (November 2004) to 26.3˚ C (May 2003).
* Minimum temperature recorded was -8˚C on 30th December 2003.
* Velocity of wind was quite high at Upper Bhavani during January to April 2003, and February to March and December 2004.
* Frost occurs generally in the grass valleys with marsh patches between November and April in the Upper Bhavani area.
* The major vegetation types found in the area are; 1. Southern montane wet temperate forests, 2. Montane grasslands, and 3. Plantations.
* 24 species of birds were recorded in a 10ha area of grassland in Upper Bhavani and the diversity index was 1.03.
* 44 species of birds were recorded from the edges where the grassland is bordered by shrub, plantations of wattle, pine or tea.
* Major characteristics of the family Motacillidae and the study species, the Nilgiri Pipit, were described.
* The characteristic differences between Nilgiri Pipit and Paddyfield Pipit were tabulated in-distinguish the two species in the field.

3.5 SUMMARY

* All the localities where the Nilgiri Pipit was sighted and, collected for museum studies were gathered and compiled.
* Field survey was conducted covering Goa, Karnataka, Tamil Nadu and Kerala focusing on likely areas of occurrence of the Nilgiri Pipit.
* Habitat preference of the species for various activities was studied.
* The Nilgiri Pipit is confined to higher altitudes above 2000 m, mainly in the Nilgiri hills and Southern Western Ghats.
* There were no sightings at the localities surveyed in Goa and Karnataka.
* The mean encounter rate was 0.04 / ha in the 3273.5 ha surveyed. It was comparatively higher in the Nilgiris (Tamil Nadu) followed by Anamalai (Kerala).
* The Nilgiri Pipit is more abundant in Protected Areas (National Parks/ Sanctuaries) than in unprotected areas.
* It was not found inside the plantations, but occasionally at the edges of the plantations bordering grasslands.
* The typical habitat of the species is montane grasslands interspersed with shola forests.
* Day length and rainfall appear to affect the abundance of the species.
* The nesting site is close to the feeding area where the food is abundant.
* Microhabitat for nesting and roosting is comparatively taller grasses interspersed with bunch of sedges in the marshy valleys near streams.
* Nesting area almost invariably has a grass, namely *Andropogon polypticus*.
* Loss of the essential habitats, namely the grasslands, especially the marshy valleys due to plantations and other anthropogenic activities affect the population of the species.
* Grazing and frequent fire in the grassland compound the threat to its population.
* The Nilgiri Pipit is rare in all its ranges and hence, it is recommended to be included in the list of Globally Threatened species (as Vulnerable).

4.5 SUMMARY

* Feeding behavior of the Nilgiri Pipit was studied for 600 hours during 2002-2004.
* Observations amounting to 12,988 for feeding, 1744 for feeding height, 932 for foraging substrate and 7176 for foraging maneuver were made.
* Invertebrates formed the major diet (86%) during breeding and seeds (68%) during non-breeding.
* Small beetles followed by grasshoppers and flies formed the major invertebrate diet.
* Seeds in the food comprised those of grasses *Isachnae kunthiana*, *Eragrostris nigra*, *Isachaemum ciliare*) and a species of herb (*Cyanotis wightii*).
* The Nilgiri Pipit has specific feeding habitat; grassland with short creeping grasses around marshy area.
* Feeding substrate was mainly grass and herb foliage with definite feeding technique, “glean”.
* They fed mainly less than 15 cm height.
* Nilgiri Pipit was selective in feeding locations.
* The Nilgiri Pipit is a specialist in different foraging dimensions, namely substrate, maneuver, height and food.
* It had a bimodal pattern of feeding in certain seasons with a major peak in the morning and a minor one in the afternoon / evening. The peak hours of feeding varied in different seasons and locations.
* The feeding rate varied from 174 /h to 615 /h.
* Seasonal variation occurred in feeding rate; comparatively less during south-west monsoon and more during north-east.
* The rate of feeding varied with different factors such as insect and seed abundance, temperature, humidity, wind speed and day length.
* Ambient temperature has a negative correlation with the feeding activity.
* Feeding activity is positively correlated with ground temperature and light intensity.

5.5 SUMMARY

* Breeding biology of the Nilgiri Pipit was studied from February 2002 to June 2004 in a 14 ha grassland in the Upper Bhavani area in the Upper Nilgiris.
* The Nilgiri Pipit has a very short breeding period; from February to June with a peak in April.
* Average nesting density is one nest / ha in the nesting area. While it varies from 0.3 to 0.6 nests / ha in the study area of 14 ha during different years.
* The breeding season has positive correlation with maximum and minimum temperatures and negative correlation with rainfall, relative humidity and seed abundance.
* Abundance of Coleoptera, Orthoptera are important factors influencing the breeding season.
* The Nilgiri Pipit prefers marshes on grassy slopes for nesting.
* Major nest-site characteristics are nearness to water (river / stream), higher density of grass and herb cover and grass height.
* The Nilgiri Pipit shows site fidelity.
* It is highly territorial; the average territory size is 0.154 ha.
* Male defends the nest most.
* Nest is a cup, fully concealed in a depression, mostly at the base of tussocks of grasses.
* Nest is placed at a mean height of around 5 cm.
* Nest construction takes 5-6 days.
* Nest construction is mostly by the female, as much as 90%.
* Clutch size is mostly two, rarely three or one.
* Incubation period is 14 15 days; incubation is exclusively by the female.
* The male and female are involved in feeding the nestlings; first three days only by the male as the female broods and latter mainly by the female.
* Major diet of the nestlings and fledglings comprised, Lepidoptera, Orthoptera, Diptera and Coleoptera in varying proportions.
* Abundance of the above groups of insects and the pattern of rainfall influenced the breeding seasons.
* Average reproductive success for three years is 38.64%; nesting success being the highest (66.66%) in 2003.
* Early nesting pairs are more successful.
* Predation pressure is higher at the nestling period.
* Grassland fire and cattle grazing affect the breeding habitat of the Nilgiri Pipit.

6.5 SUMMARY

* The activities of the Nilgiri Pipit was classified into six major categories, namely breeding, feeding, maintenance, spatial, agonistic, and vocalization.
* Major activity was feeding followed by breeding, maintenance, vocalization, spatial movement and agonistic behavior.
* Time spent for activities varied seasonally; feeding being the major activity in all the seasons. Feeding and maintenance were more during non-breeding season.
* Breeding was confined mainly to summer.
* Feeding was the highest in winter (62%) followed by south-west monsoon (53%), north-east monsoon (49%) and summer (44%).
* Activity pattern varied significantly in various seasons.
* Nilgiri Pipit roost inside the marsh, mostly before sunset and wake up before sunrise.
* Forty calls/songs of the Nilgiri Pipit could be recognized, out of which purpose could be ‘guessed’ for more frequently heard calls/songs associated with major activities.

**Chapter VII**

**Summary and conclusion**

The Nilgiri Pipit Anthus nilghiriensis, an endemic Near Threatened species of the Western Ghats, facing various anthropogenic threats has been studied to: a) determine the status and distribution, b) unravel the ecology and, c) identify the key factors affecting their survival.

Distribution and status of the Nilgiri Pipit were studied in select areas covering around 3273.5 ha in the Western Ghats in Kerala, Tamil Nadu, Karnataka and Goa. All the sightings were from grass-slopes and marshes in high altitude, which constitute 2103 ha of the total area covered. Based on the literature available on the sightings and localities of collection of specimens of the Nilgiri Pipit, a tentative map of its distribution has been prepared. Among the states surveyed, the encounter rate of the Nilgiri Pipit was high in Tamil Nadu (0.13 / ha). It was more in the Protected Areas than in the unprotected areas. The Nilgiri Pipit does not occur in the low altitudes (<1000 m), but found in low densities in the medium altitude of 1000-2000 m and more (0.045 / ha) and, slightly higher densities in high altitude areas (>2000 m). They are more abundant above 2300 m in the Nilgiris and Anamalais.

Intensive studies were conducted in the Upper Bhavani area of the Upper Nilgiris, mostly within the Mukurthi National Park. Weather in the Upper Bhavani are remains wet much of the year. Dry season lasts from January to April. The ground temperatures vary from -8 to 45˚C in the grasslands during the dry season. High velocity of wind has been experienced in the Upper Nilgiris and especially in Upper Bhavani. Frost occurs generally in the grass valleys in Upper Bhavani from November to April.

The major vegetation types found in the area are: a) southern montane wet temperate forests, b) montane grasslands, and c) plantations. Seed and invertebrate abundance were quantified in the area. There was marked seasonal variation in seed abundance which had a peak in winter (39%) and then gradually declined to a minimum during south-west monsoon (11%). The F4 block had the maximum and abundance among the five feeding blocks.

Invertebrates were sampled by following standard methodologies such as sweep, line transect and ground quadrates. The invertebrates in the order of abundance were Diptera (51%), Lepidoptera (11%), Coleoptera (8%), Hymenoptera (8%), Arachnida (7%), Odonata (6%), Phasmida (3%), Hemiptera (2%), Isoptera (1%) and Annelida (1%). Insects up to 0.5 mm size (49.31%) were more in the study area. In the case of birds, 332 individuals belonging to 24 species were counted during the survey in a 10 ha area and the diversity index was 1.03.

The maximum encounter rate of the Nilgiri Pipit at Upper Bhavani was 1.0 / ha in April 2003 and minimum 0.1/ ha in October 2002 and the number fluctuated frequently without any definite pattern, but it had a significant negative correlation with monthly rainfall. Pipits were more during summer with minimum rainy days. Also the number of pipits was correlated significantly with the abundance of seeds in the non-breeding season and with the abundance of invertebrates in different size classes. The Nilgiri Pipit has specific microhabitat requirements for feeding and breeding activities. The edge of the marsh had high heterogeneity where both marsh and grass species of the plants were present. The Nilgiri pipits fed mostly from creeping grass in the valleys, nested in marshy grasslands with slightly taller grasses and sedges and roosted in the stream banks inside the marshy grasslands with thick grasses and herbs.

Nilgiri pipit walked on the ground and picked seeds, insects and other invertebrates off the soil or grasses and herbs. They fed mainly (92%) from creeping grass. The most preferred feeding height (82%) recorded in 1744 observations was <15cm. However, there was significant seasonal variation in the height preferences. Five categories of feeding substrates were recognized: air, fern foliage, grass and herb foliage, ground, and logs. The main substrate from which the Nilgiri pipit picked their food was grass and herb foliage (96%). Foraging maneuvers were recorded, on the whole, 7176 times. Of these, 92% attempts were gleaning, 5% reach up, 2% leaping, and 1% lunge. Seasonal variation was observed in the foraging maneuvers.

From 12,988 feeding observations, food items could be detected only in 6626 attempts. In total, 63% attempts were for seeds and 37% for invertebrates. The pipits took 86% invertebrates and 14% seeds during breeding season, whereas it was 32% and 68% respectively in the non-breeding season. The Nilgiri Pipit took seeds mainly of three species of grasses (*Eragrostris nigra, Isachnae kunthiana, Isachaemum ciliare*) and a species of herb (Cyanotis wightii). The invertebrates in the diet belong to the orders Coleoptera (42%), Diptera (16%), Orthoptera (18%), Arachnida (13%), and Lepidopter (8%) including their larvae. The faecal samples analyzed also showed that Coleoptera (61%) was the maximum followed by Diptera (25%) and Hymenoptera (7%). The Nilgiri Pipit is a specialist in different foraging dimensions, niche breadth being very narrow on foraging substrate (J’ = 0.009), foraging maneuver (J’ = 0.008), food (0.07), and foraging height (J = 0.02).

The average feeding rate during the study period, 2002-2004 was 465.94 / h which varied according to the season. The feeding rate had significant negative correlation with mean maximum temperature, light intensity and wind speed, but showed a positive correlation with mean relative humidity.

Most of the time, the Nilgiri Pipit fed in pair. It was seen feeding with other species on 340 occasions. The association was more with Pied Bushchat (25.59%) followed by Paddyfield Pipit (19.7%), Tickell’s Leaf Warbler (15.29%) and Prinia (12.35%).

Breeding biology of the Nilgiri Pipit was studied from Febraury 2002 to June 2004 on the grasslandsof the Upper Nilgiris. Breeding season of the Nilgiri Pipit was late Febraury to May. The breeding season had positive correlation with minimum and maximum temperature. The Nilgiri Pipit preferred short grassland habitat with marshy grasses restricted to valleys with streams for nesting. The most used species of nesting plant of the Nilgiri Pipit was Andropogon polypticus. The territory size varied from 0.06 to 0.25 ha with a mean of 0.154 ha. Site fidelity was observed in the Nilgiri Pipit. The intensive study area at Upper Bhavani had the highest density of nesting, 0.6 pair / ha in 2003. Thirty one nests were found in the Upper Nilgiris, 18 in the intensive study area and the rest from outside. The nest is a cup, in most cases fully concealed, and located at the base of tussocks of grass (*Andropogon polypticus, Mariscus cyperinus* roots, *Eriocholon Spp.*). The mean length, width and the height of the nests were 11.15, 6.5 and 5.16 cm respectively. The mean concealment was 92%. All the nests were oriented towards the water source. The nests were placed at a mean height of 4.76 cm, inside the intensive study area and 5.86 cm outside. The nest-site characteristics showed three parameters as important in deciding the site, namely nearness to water or stream, higher densities of grasses and herbs and height of grass. The period required for nest building was 5-6 days.

The eggs were greyish cream with coffee brown speckles on the broader side and spots in the narrow end. The mean clutch size was 2.13 and incubation period 14 to 15 days. Incubation had almost a bimodal pattern with peaks in the morning and evening. The number of visits with food for nestlings per hour in a day also showed a bimodal pattern. The food of nestlings identified by direct observation was mainly of lepidopter (33%), orthoptera (25%), dipterans (20%) and coleopterans (17%). Faecal samples of the nestlings showed coleopteran (33%), orthopteran (16%) and lepidopteran larvae (23%) as dominant items. The main food of the fledglings was coleopterans (34%) and, orthopteran (34%). Abundance of these major groups of insects and pattern of rainfall influenced breeding success. Nesting success was 16.66%, 66.66% and 25% in 2002, 2003 and 2004 respectively. Among the 18 nests in the intensive study area, 7 were 100% successful while one was 50% successful and 10 were unsuccessful.

The activity of the Nilgiri Pipit was classified into six major categories for analysis, namely breeding, feeding, maintenance, spatial, agonistic, and communication. Major activity was feeding followed by breeding, maintenance, vocalization, spatial movement and agonistic behavior. Time spent for activities varied seasonally, feeding being the major activity in all seasons. Breeding was confined mainly to summer. Feeding was the highest in winter (62%) followed by south-west monsoon (53%), north-east monsoon (49%) and summer (44%). Activity pattern varied significantly in various seasons. Nilgiri Pipit roosted inside the marsh, mostly before sunset and woke up before sunrise. Forty calls/songs of the Nilgiri Pipit could be recognized, out of which purpose could be ‘guessed’ for more frequent calls.

The present study recommends the status of the Nilgiri Pipit as Threatened (Vulnerable) because of their a) restricted distribution in specific habitat, montane grasslands interspersed with montane wet temperate (shola) forests mainly above 2000m, b) low abundance and c) reduction in the range of distribution with almost extinction in some localities. Their basic biology shows that the crucial habitat for their survival is creeping grass slopes with marshy valleys with minimum disturbance, especially during summer, as they nest only in this habitat. This habitat forms an essential part of the larger shola-grassland ecosystem which nees to be conserved for the long-term survival of the Nilgiri Pipit and many other endemics. Hence, it is recommended that more of the montane grasslands should be given full protection and restored with community participation.

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