

Field Report on

VISIT TO SINGALILA NP AND STUDY OF DIURNAL BEHAVIOUR OF HIMALAYAN GRIFFON VULTURE

Submitted for the partial fulfillment of Semester V examination in
Zoology Honours.

21 to 23 November 2023

Submitted By: *Pronghita Mazumdar.*

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CERTIFICATE

THIS IS TO CERTIFY THAT **PRONGHITA MAZUMDAR** OF 5TH SEMESTER PARTICIPATED IN THE FIELD STUDY OF THE DEPARTMENT OF ZOOLOGY TO SINGALILA NATIONAL PARK, DARJEELING, WEST BENGAL HELD FROM 21.11.2023 TO 23.11.2023.

SHE UNDERTOOK THE BEHAVIOUR STUDY OF HIMALAYAN GRIFFON VULTURE [GYPS HIMALAYENSIS] TITLED "STUDY OF DIURNAL BEHAVIOURS OF HIMALAYAN GRIFFON VULTURE [GYPS HIMALAYENSIS] AT TUMLING, W.B., INDIA DURING THE FIELD STUDY.

SHE HAS COMPILED THE FIELD SURVEY AND BEHAVIOUR STUDY REPORT FOR PARTIAL FULFILMENT OF SEMESTER V EXAMINATION IN ZOOLOGY HONOURS DURING THE YEAR 2023.

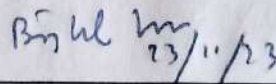
 22.11.23

BENOY KRAI

Mentor

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1. INTRODUCTION

The Department of Zoology, Kurseong College organised a Field Study Tour to Singalila National Park, Sandakphu as part of the Curriculum for DSEP3-Animal Behaviour & Chronobiology Lab (5th Semester) for partial fulfilment of the course entitled "Visit to forest/Wild Life Sanctuary/ Biodiversity Park/ Zoological Park to study behavioural activities of animals and prepare a short report.

The site was chosen for its rich Biodiversity and Natural beauty to help students get an experiential learning of the organisms and their interactions in the nature.

The study tour was undertaken by 10 students of 5th Semester Zoology honours accompanied by two mentors from the Department between 21.11.2023 to 23.11.2023.

2. ACKNOWLEDGEMENT

I extend my heartfelt gratitude to all those who contributed to the successful completion of this field survey report. Our sincerest appreciation goes to Dr. Samir Bal, Principal, Kurseong College whose support and guidance were invaluable.

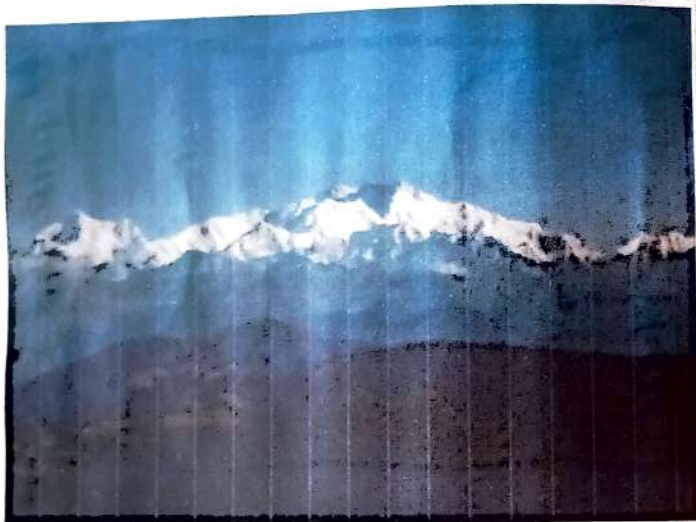
I would like to express my profound thanks to the participants of the survey for their cooperation and willingness to share their insights, without which this report would not have been possible.

Special thanks are also due to my mentors Mr. Benoy Kishore Rai and Mr. Biplab Das for their guidance in data collection, analysis, and review.

Finally, I extend my gratitude to my family and friends for their understanding, encouragement, and unwavering support during this endeavor.

Thank you all for your dedication and contributions.

3. ROUTE MAP



4. PARTICIPANTS

The students of Zoology Honours comprised the team of participants. We were guided through the study tour by two of our teachers from the Department of Zoology.

The following students and teachers participated in the study tour:

1. Arman Newar
2. Anshu Thapa
3. Debika Chettri
4. Pukar Rai
5. Pronghita Mazumdar
6. Pooja Rai
7. Sneha Routh
8. Suja Thapa Mangar
9. Sanjukta Paul
10. Ronal Lama
11. Mr. Biplab Das [Teacher]
12. Mr. Benoy Kishore Rai [Teacher]
13. Diya Bhujel

DEPARTMENT OF ZOOLOGY
5TH SEMESTER (2023)
FIELD TRIP TO SINGALILA NATIONAL PARK [SANDAKPHU]



(From left to right) Pukar Rai, Ronal Lama, Debika Basnet, Anshu Thapa, Sneha Routh, Diya Thapa, Arman Newar, Biplab Das, Sanjukta Paul, Pronghita Mazumdar, Pooja Rai, Suja Thapa Mangar, Benoy Kishore Rai

5. TOUR DIARY

21.11.2023

Travelled from Kurseong college to Mancybhanjyang and from Mancybhanjyang and arrived in Tumling at 1.30pm.

Checked into our rooms, had lunch and conducted behaviour study with vultures.

22.11.2023

Continued behaviour study with vultures after breakfast at Tumling. Started for Sandakphu at 1pm via Singalila National Park.

Reached Sandakphu. Had tea and Compiled the Data collected at Tumling for preparation of Report.

23.11.2023

Enjoyed the Sunrise from Sandakphu and returned to College.



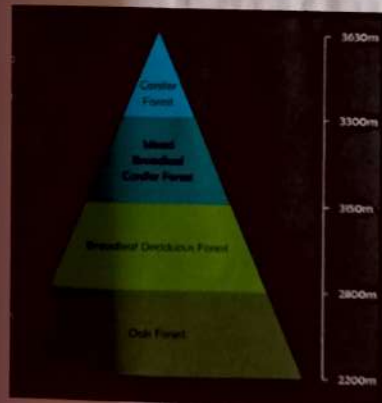
6. SINGALILA NATIONAL PARK

The Singalila National Park, located in Darjeeling district of West Bengal covers an area of 78 km² and has an altitudinal range of 2,400-3,650 metres. The National Park shares a natural boundary with Nepal on the west and with Sikkim on the north. The international border between India and Nepal is identified by a 52 km road running from Phalut (3,650 m) down to Manchehanyang (1,920 m). The National Park is an Important Bird Area and an IUCN Category II Protected Area. Singalila National Park is under the administrative control of the Wildlife Division-I, Department of Forest, Government of West Bengal.

The Singalila area in Darjeeling was purchased by the British Government from Subban Durbar in 1882, and notified a Reserve Forest under the Indian Forest Act 1878. It was notified as a National Park in 1992 and was also officially opened up for tourism.

6.1 FOREST

The Singalila Landscape encompasses the Eastern Himalaya Broadleaf Temperate and Subalpine Conifer Forests between 2,200 - 3,636 meters. The temperate zone comprises of Oaks, Beech (*Catanopsis* spp.) interspersed predominantly with Magnolia, Michellia, Maple (*Acer* spp.), Sorbus and Rhododendrons with an understorey of bamboo. The Subalpine zone comprises of conifers such as Silver Fir (*Abies densa*), Hemlocks interspersed with Birch with an understorey of bamboo.



6.2 FLORA AND FAUNA

Darjeeling Himalaya is very rich in plant life and is estimated to have about 2,900 species of angiosperms. Singalila National Park has a large number of flowering ground flora of which the Primulas, Aconites, Asters, Arisaema, Meconopsis, Cotonasters, Geraniums are predominant.

The National Park has a record of 350 species of birds. Some of the prominent birds are Pheasants and Partridges like the Satyr Tragopan, Blood Pheasant, Kaleej Pheasant, Hill Partridge, and Rufous-throated Partridge. Others include Beautiful Nuthatch, Firetail Myzornis, Himalayan Griffon Vulture, Fire-tailed Sunbird, Crimson Sunbird, Brown Parrot Bill.

Singalila National Park with its diverse habitats supports a rich community of birds ranging from small sized birds like warblers, sunbirds and flowerpeckers to the relatively larger sized species like Raptors, Magpies, Jays and Thrushes.

Red Panda is an Endangered mammal. Red Panda subsists on an extremely specialized herbivorous diet of bamboo leaves, while still retaining its morphological features of a carnivore. Red Panda is distributed across Eastern Himalayas in Nepal, India (Sibbim, Darjeeling and Arunachal Pradesh), Bhutan, extending into Myanmar and China. Red Panda numbers may be as low as 10,000 in its entire distribution range with rapid declines reported. Red Panda is threatened due to loss and fragmentation of its habitat and direct harvest, and trade. Singalila National Park is an important Red Panda habitat.



7. STUDY OF DIURNAL BEHAVIOURS OF HIMALAYAN GRIFFON VULTURE [*Gyps himalayensis*] AT TUMLING, W.B., INDIA



7.1 The behaviors were recorded at three intervals

08:00hrs to 09:00hrs

12:00hrs to 13:00hrs and

16:00 hrs to 17:00hrs.

7.2 Diurnal Behaviors:

Altogether 6 activities were recorded.

1. Feeding, 2. resting, 3. Sun bathing, 4. preening, 5. fighting and 6. locomotion [walking/ flying/ soaring].

7.3 Observations:

Resting behavior was most frequent (44.45%) followed by

Soaring (42.86%),

Feeding (2.87%),

Preening (3.21%),

Sun bathing (5.25%),

Disturbance (1.16%)

Interaction with other species (0.20%)

It spends maximum time in resting. Resting comprised 44.45% of the day activities. It generally rest alone perched over the trees, or on the ground. Maximum resting was observed during morning. The vulture also rests in the evening between 16:00 hours to 17:00 hours.



It spends 22.86% of time in flight [soaring] Maximum flight was observed in morning hours. The vulture hovers above rocks to absorb heat and flex its flight muscles in the cold mornings.

Feeding comprises 2.87% of the total day activities. Feeding activity was only observed between 08:00hrs to 09:00hrs and 16:00 hrs to 17:00hrs. In the absence of natural carcass in the region the vultures resides close to human habitation [homestays] and relies on the poultry, fish and occasional mutton, pig and beef [butcher's waste] that is disposed.

Sunbathing comprises 5.25% of the total day activities. It continues for 1-2 minutes. During the activity the vultures spreads its wings and keep its back towards sun. Sunbathing probably is done to seek body drying, plumage maintenance, and heat exchange, to remove ectoparasites (such as mallophaga, hippobosid flies, and ticks), viruses and bacteria. Vultures start sun bathing just after sunrise but it could occur during any time of the day.

Preening is done by beak and legs [scratching] probably to remove the pests and maintain its flight feathers. It comprised 3.21% of the activities.

The vultures were seen to get disturbed by dog bark, sound of vehicles and human approaching to its proximity. Disturbance comprises of 0.16% of the total day activities. It reacts to disturbance by flying away from the site.

Social interactions include taking small flights and playing with birds mostly crows and occasionally eagles etc.

7.4 Results & Discussion

Vultures spend most of their time in self-maintenance. This maintenance includes preening, sun bathing, basking. Sun bathing was usually seen in early morning. Most of the Vultures used rocks or stones for sun bathing. The main outcome of sunbathing seems to be the cleaning of the body and plumage maintenance, removal of ectoparasites and maintaining the elasticity of the feathers. We also found that vultures spend most of their time resting which



as a large, soaring scavenger is a good evolutionary trait to conserve energy when relying on sparse and unpredictable food source (carrion).

The most characteristic behavior of vultures is their soaring behavior. As the sun warms the Earth, it also warms the air. This causes the air to rise in upward currents called "thermals." Vultures take advantage of these thermals by flying into the rising air, spreading their wings and soaring to great heights without beating their wings. Once in the air, they can spot carrion with their very good eye-sight, although some species use a well-developed sense of smell ("olfaction").

8. CONCLUSION

The three day Field tour was a great learning experience for all the students. The concepts of ecology, animal behaviour and interactions between organisms were presented in nature and beautifully explained by our accompanying mentors.

The study of behaviour of Himalayan Griffon vulture was enjoyed by all the students.

This study tour has greatly helped us to observe things around us with a scientific approach and search for explanations to animal behaviour and interactions.

ETHOGRAM OBSERVATION

ANIMAL: Gyps himalayensis RESEARCHER'S NAME: Arman Newar

DATE: 22nd Nov. 2023 TIME: 12:00 pm to 12:05 pm

LOCATION: Jumling

BEHAVIOUR CODES:

Feeding [F] Resting [R] Sun bathing [SB]

Preening [P] Locomotion [walking [W] / flying [F] / soaring [S]]. Socializing [SO]

TIME [secs]	BEHAVIOURS							
	F	R	SB	P	W	F	S	SO
0-10		✓						
11-20		✓						
21-30		✓						
31-40		✓						
41-50		✓						
51-60					✓			
61-70	✓			✓				
71-80	✓							
81-90	✓							
91-100						✓		
101-110						✓		✓
111-120							✓	
121-130							✓	
131-140							✓	
141-150							✓	
151-160							✓	
161-170							✓	✓
171-180							✓	✓
181-190						✓		✓
191-200						✓		✓
201-210			✓					
211-220			✓					
221-230			✓					
231-240		✓						
241-250		✓						
251-260		✓						
261-270		✓						
271-280		✓						
281-290		✓						
291-300		✓						

ETHOGRAM OBSERVATION

ANIMAL: *Gyps himalayensis* RESEARCHER'S NAME: Anshu Thapa

DATE: 22nd Nov, 2023 TIME: 12:05 pm to 12:10 pm

LOCATION: Jumling

BEHAVIOUR CODES:

Feeding [F] Resting [R] Sun bathing [SB]

Preening [P] Locomotion [walking [W]/ flying [F] / soaring [S]]. Socializing [SO]

TIME [secs]	BEHAVIOURS							
	F	R	SB	P	W	F	S	SO
0-10		✓						
11-20		✓						
21-30		✓						
31-40						✓		
41-50						✓		
51-60						✓		
61-70						✓		
71-80						✓		
81-90							✓	
91-100							✓	
101-110							✓	
111-120							✓	
121-130						✓		
131-140						✓		
141-150					✓			
151-160	✓				✓			
161-170					✓			
171-180				✓				
181-190			✓					
191-200			✓					
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281-290				✓				
291-300		✓						

CERTIFICATE

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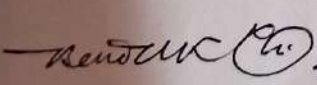
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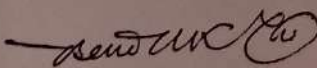
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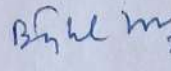
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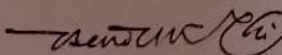
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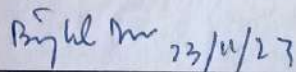
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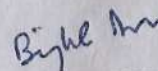
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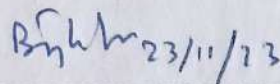
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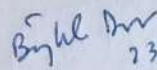
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SHE HAS COMPILED THE FIELD SURVEY AND BEHAVIOUR STUDY REPORT FOR PARTIAL FULFILMENT OF SEMESTER V EXAMINATION IN ZOOLOGY HONOURS DURING THE YEAR 2023.

 23-11-23

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Sericulture Project



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**UNIVERSITY OF
NORTH BENGAL**

**PROJECT
ON
SERICULTURE**



Roll No. - 234024332236

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Semester - 4th

Year - 2023

REPORT ON FIELD TO SERICULTURE SILK PRODUCTION BY SILKWORM

Dept - ZOOLOGY
Academic Year - 2023



Acknowledgement

We would like to express our special thanks of gratitude to Benoy Kishore . Head of the Department of "Zoology" for arranging this study tour. Furthermore we like to acknowledge to Mrs. Ranjana Pradhan. who successfully headed study tour.

At the last but not least we would like to thank all who are involve in this study tour which was one of the amazing experience for all of us.



AIM : To visit Silkworm seed production centre.

Event title: Sericulture visit

Event Date : 4th November 2023

Event Conduction Duration: 2-3 hour

Event Venue: Silkworm seed Production Centre.

Time of departure 9:30 AM

Time of Arrival : 2:30 PM



Out line : Department of Zoology has organized field visit to demonstrate "SERICULTURE" - tion of silkworms to produce silk. The event was on 4th November 2023 within

Project officer from Sericulture department & association with farmers were there



department in .

The event was organized after theoretical lecture on respective topic faculties of Zoology Department.

Outcome :-

This field visit was of great use for students after theoretical knowledge they obtained in lectures, students were exposed to the hierarchical and financial aspects to establish their own sericulture and silk production units. Furthermore students collected life cycle stages (eggs, caterpillars, cocoon and adults) of *Bombyx mori*.

- 1) Hierarchical exposition of agriculture of this field of mulberry to obtain its leaves, on which silkworm & caterpillars feed.
- 2) Observe the life cycle of *Bombyx mori*. hundreds of eggs were laid on leaves, caterpillars feeding on leaves of mulberry, cocoon collected to extract silk.
- 3) Illustrations of equipments used in rearing silkworms.
- 4) Cost effective methods and material required to establish sericulture.
- 5) Application and Economic importance of silk culture.
- 6) Funding and Compensation provided to farmers/owners.

by government to establish sericulture farm.

MULBERRY PRODUCTION

Mulberry leaves product under fertilisation are known to be nutritious for silkworm. Nitrogen fertilization significantly increases mulberry leaf and shoot yields.

Harvesting of tender and succulent leaves are done in cool weather so as to maintain the nutritive quality and presence of the leaves.

Growth are affected mulberry and quality of the leaves are affected by various environmental factors such as temperature, humidity, moisture and rainfall.



No.

Egg Production:-

Egg cocoons should be preserved at an optimum temperature of $25^{\circ}\text{C} - 23^{\circ}\text{C}$ and optimum humidity of 75 - 80%.

Coupling pairs are to be kept in semi-dark condition and preferably at a temp of $24^{\circ}\text{C} - 25^{\circ}\text{C}$.

The moths usually lay maximum eggs from the afternoon onwards and reach the peak of oviposition for 18-12 hrs. loose eggs are washed with a salt solution of 1.06 - 1.10 specific gravity to separate out the unfertilized and dead eggs which float on the surface of saline solution.

The hydrochloric acid used for egg treatment must be absolutely pure and should have a sp. gravity of 1.064 to 45.1°C when the acid treatment is completed for 4-6 min.



SILKWORM REARING

The egg cards with the new emerged silkworm larvae are placed in the trays or bare and tender mulberry leaves cut with small bits of size 0.5 cm^2 are sprinkled over the egg cards.

Thus making silkworms to crawl to feed on the tender leaves. The egg cards are removed and only worms still left on the cards are removed and only worms still left on the cards are tapped gently on the creasing beat and brushing is done.

Feeding silkworms with the top tender leaves of mulberry leaves was found nutritionally richer to the chawki worms and mature leaves to the late age worms was most important from the view point of good health and vigour of the leaves and reeling quality of the cocoons.

A temperature of $25-26^\circ\text{C}$ was to be maintained during the incubation and till hatching of the eggs. Humidity of the room atmosphere was to be maintained at $75-80\%$.

It is concluded that optimum temp for rearing silkworm of different instar are -



I \rightarrow 26-28°C ; II \rightarrow 26-28°C ; III \rightarrow 24-25°C ; IV \rightarrow 24-25°C
V \rightarrow 23-24°C

STAGES OF PRODUCTION

1. The silk moth lays 300-500 eggs.
2. The silk moth eggs hatch to form larvae or caterpillars - are known as silkworms.
3. The larvae feed on mulberry leaves.
4. Having grown and moulted several times, the silkworm extrudes a silk fibre and forms a net to hold itself.
5. It swings literally from side to side in a figure '8' distribution the saliva that will form silk.
6. The silk solidifies when it contacts the air.
7. The silkworm spins approximately one mile of filament and completely encloses itself in a cocoon in about two - three days.
8. The intact cocoons are boiled, killing the silkworm pupae.
9. The silk is obtained by bursting the undamped cocoon to find the outside end of the filament.
10. The silk filaments are then wound on a reel. One cocoon contains approximately 1,000 yards of silk filaments. The silk at this stage is known as raw silk.



MERITS OF SERICULTURE

- High employment potential
- Low glutation, high retention.
- Provides vibrancy to village economy.
- Women friendly occupation.
- Ideal program for weaker section of the society.
- Eco friendly activity.
- Satisfy equity concerns.

USES OF SILK

- Mainly in textile industry for manufacturing garments.
- Used in telephone cable insulation, dyng and screen printing.
- Silk threads is used as a non-absorbable surgery sutures.
- It is also occasionally used to made to casing of bicycle tires. Cotton and nylon are also used for this purpose.
- It is also used in bluing garments because of its ability to keep body cool.



Expt. No.

Conclusion

Sericulture biologically means that the cultivation of silkworm. Mulberry plants are typically used as cultivation of plants. *Bombyx mori* is the most important silkworm. Sericulture is the production of raw silk by raising silkworms. The productivity and profitability of sericulture depends on the yield of mulberry crop.

Indian silk are exported to more than 50 countries and gains about 800 crores of rupees each year from it. We have a unique position among the silk producing countries. Because India is the only country in the world producing all the four commercially important varieties of natural silk - mulberry, Tassar, Eri and Muga silk.



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