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NETAJI NAGAR COLLEGE FOR WOMEN

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The following students of Zoology (Honours) Semester, V completed **their EDUCATIONAL FIELD VISIT TO BAKKHALI, WEST BENGAL WEST BENGAL** from 2nd November – 5th of November 2022 in Session 2022-2023

Total No. of students: 17 (Seventeen)

NAME OF THE STUDENTS	PAPER	UNIVERSITY ROLL NO.	UNIVERSITY REGISTRATION NO.
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Principal
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ESTD. 1st APRIL 1986

HEAD
DEPARTMENT OF ZOOLOGY
NETAJI NAGAR COLLEGE FOR WOMEN

(Dr. Subhalakshmi Ganguly)
Head, Department of Zoology

Title - Report on a visit to Ecology and Biodiversity assessment at Bakkhali and adjoining areas.

University Roll Number	**:**	**203056-11-0027**
Registration Number	**:**	**056-1211-0127-20**

CERTIFICATE OF PARTICIPATION

This is to certify that,
Roll No. : 203056-11-0027
Registration No. : 056-1211-0127-20

Student of the department of Zoology, Netaji Nagar College for Women, has prepared this project after participating in an extensive field work performed at Bakkhali and Henry's Island, Coastal regions of Indian state of West Bengal during the period of an educational excursion in the month of November (2022) under the guidance of teaching faculties of Netaji Nagar College for Woman, Kolkata.

Date :

Signature

ACKNOWLEDGEMENT

The following field report has been accomplished in Bakkhali and Henry's Island, West Bengal. I would like to express my gratitude to all those who have encouraged and contributed me throughout this field visit. It would not have been possible to proceed without the guidance of our respected teachers. I would like to thank Principal of my College [Netaji Nagar College for Women] -Dr. Tapan Kumar Ghosh and our respected teachers - Dr. Subhalakshmi Ganguly, Head of the Department of Zoology and Dr. Moumit Roy Goswami, Head of the Department of Environmental Science for being with us during the trip and for guiding us throughout.

Further, I would also like to thank Dr. Subhalakshmi Ganguly, for helping us analyze our collected data and prepare the excursion project report.

At last, I would like to thank my family and friends for their constant inspiration during the progress of the study.

INDEX

1. DETAILS OF FIELD VISIT

- **AIM OF EXCURSION:** The aim of excursion is mainly to provide us the first-hand experience by emerging us with real situation.

To develop our acknowledgement about field work through which we can relate the theoretical things with the practical's and can apply our thoughts in theme.

- **REASON BEHIND SELECTION OF BAKKHALIAND HENCRY'S ISLAND:** The Bakkhali beach constitutes the interface between the sea and cluster stretchers show line and the cost as this sea beach is situated in a rural village area. It is full of species richness. We got here various type of anima diversity then the other popular sea beaches. Not only that during the train journey and walking on beach sides we notice many birds and animals and the beauty of that village. We have seen many majority birds' which breeds above the free line in the Himalayas and at the coastal plants of the Bay of Bengal.

The mangroves are full of crab diversity and much animal diversity like mud Skippers etc.

The 1.2 km stretch of Bakkhali beach from its east to west provides an example dynamic morphological domain, which is presently under threat of severe erosion.

The important morphocytes of the beaches are coastal dunes, sand flats, runnels and insects and mangroves patches, wave parameter micro and macro tidal cycle. Long spare currents are recorded in the beach area of Bakkhali.

- **OUR TEAM:**

Zoology department:

i) PIYASHA NASKAR
ii) BAIJAYANTI MONDAL
iii) BARNA SIL
iv) SREELEKHA CHOWDHURY
v) PURABI GHOSH
vi) ANKITA DEBNATH
vii) DEBOSMITA SAHA
viii) SUSMITA PAUL
ix) TRISHA BASU
x) SUMANA MONDAL
xi) SULTANA MONDAL

xii) RIYA DAS

xiii) BIDISHA PATRA

xvi) DEYTTA BASU

xvii) AHANA BISWAS

xviii) NAJRIN SULTANA

xix) RISHITA CHAKRABORTY

E.N.V.S. Department:

i) ANNESHA ROY

ii) SUNITA RANI PAL

iii) ADRITA DAS

iv) SWETY NANDI

Fig1. The Whole Group (Teacher Staff + Zoology Department + Environmental Science).

Fig2. Zoology Department with Teacher

TOUR ITENARY

DAY	DATE	TIME	ACTIVITY
1	2.11.22	11:50am	Journey began from Sealdah Station by Sealdah - Namkhana local train
		3:30pm	Reached Namkhana Station and boarded toto
		4:30pm	Finally, we reached Hotel Samudraneel at Bakkhali
		6:30pm	We had done all the steps of the procedure for setting up pitfall trap experiment
		7:00pm	We went to Bakkhali Beach adjacent to our hotel
2	3.11.22	8:30am	Went for Henry's Island by toto.
		8:50am	Reached our destination where we studied the area, crab - holes, identified various specimens, performed three quadrats and line transects .
		10:00am	Went for Benfish harbour by toto.
		10:10am	Reached the place, learnt about the fish diversity, took report from local fishermen
		10:25am	Went for Kargil Beach by toto
		10:40am	Reached Kargil Beach where we studied the area, crab- holes, identified various specimens and performed three quadrats and line transects.
		11:50am	Went for Frasergunj.
		12:00pm	Reached the place, observed fish drying in the area, dry fish stalls and wind-mills
		12:15pm	We set out to return back to our hotel
		12:20pm	Came back to our hotel
		6:30pm	We did the experiment of light-trap of insects
3	4.11.22	1:30pm	We boarded toto for going to Namkhana Station
		2:35pm	We reached the station
		3:00pm	Our journey began from Namkhana Station by Namkhana - Sealdah local train
		7:30pm	Reached Sealdah Station and our journey ended

2. SOME FACTS ABOUT THE STUDY AREA:

- **INTRODUCTION:** The bakkhali beach is located on the east of the Hooghly River and the length 350 km. This sea beach represents a wide range of diversity in terms of coastal process and geomorphology. They can many channels creeks and mangroves.
    - **Geographical Location**: Bakkhali is located on one of the many details Islands spread across southern Bengal.

It is a village within the jurisdiction of the Namkhana police station of the Namkhana ED Block in The Kakdwip Subdivision of the South 24 pgs.

- **Henry's Island**: Henry's Island is on island near Bakkhali. It is around 130km from Kolkata. It's named after a British severe who survived the area about a century ago.

This island is one of the numerous islands that from the Ganga-Brahmaputra-Detta etc. the largest in the world. This island is crisscrossed by numerous rivers and rivulets.

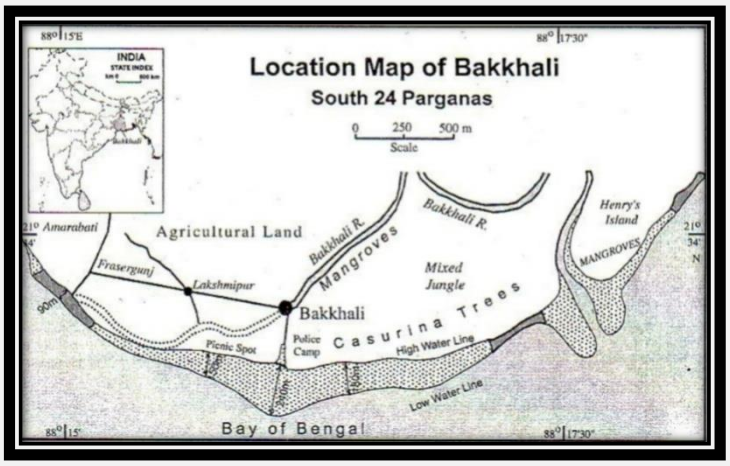

Fig3. Geographical map of Bakkhali

- **PROFILE OF THE STUDY AREA:**
    - **Kargil beach:**
        - **Climate:** The climate was sunny and fresh with the clear sky on the day of study.
        - Nature: this Kargil beach is the sunset point of Bakkhali, its view of sunset is like a jewel on top of it. The beach is visible on a steep ramp put across to stop the sea from taking a way land.

The local people said that the water has been rising recently and especially during the Cyclone Amphan, the beach had diver stating effects.

- Temperature was between 250c-270c. The water of the beach was quite away inside and without waves.

Fig4. Kargil Beach

- **Beach:**

Climate: The climate was sunny and fresh with the clear sky on the day of study

Nature: The henry's island is a huge fishing community area. This island is well stabilized and well-maintained full of mangroves and the muddy areas hosting red crabs, muds creepers etc.

Temperature and wave action: Temperature very from was between 250c-270c.

The beach doesn't have waves however the mild breeze and the vast views were available.

Fig5. Henry's Island Beach

3. ECOLOGICAL AND BIODIVERSITY STUDY OF COASTAL AREAS OF BAKKHALI HENRY'S ISLANDAND FRASERGUNJ:

A) Study of crab burrow diversity: TRANSECT: A transect is a path along which one counts 2 records occurrences of the species of study. It requires an observer to move along a fixed path/distance and to count occurrences of the species along the path at a given time. Using this count, one can estimate density and other diversity indices of species in a certain area.

Percentage Frequency = [(No. Of sampling units in which a particular species has occurred)/ Total no. Of sampling units] ×100

Density= [(Total no. Of individuals of a particular species in all the sampling units)/ Total no. Of sampling units]

Abundance= [(Total no. Of individuals of a particular species in all sampling units)/ Total no. Of sampling units in which species occurred]

MATERIALS REQUIRED:

- Nails
- Hammer
- Thread
- Measuring tape

METHOD:

- A measuring tape was run across 10m the beach under study.
- Crab burrows touching the tape in alternate segments of convenient length were noted down.
- A number of transects were laid down at random across the field at different sites.
- Three sizes of crab burrows (small, medium and large) were noted down in each transect.
- Percent frequency, density and abundance of each type of crab burrow were calculated from the data obtained.

Fig6. Performing line transect on Kargil Beach

- Place- Kargil beach
- Date- 03.11.22, Time:

BURROW STAGE BASED ON DIAMETER

SMALL- 0.2-1 cm

MEDIUM- 1-1.5 cm

LARGE- 2 cm and above

Crab hole sizes	Spot 1	Spot 2	Spot 3	Average	Percent Frequency (%)	Density	Abundance
SMALL	70	63	67	66.6	100	66.6	66.6
MEDIUM	15	17	17	16.6	100	16.6	16.6
LARGE	5	3	8	5.3	100	5.3	5.3

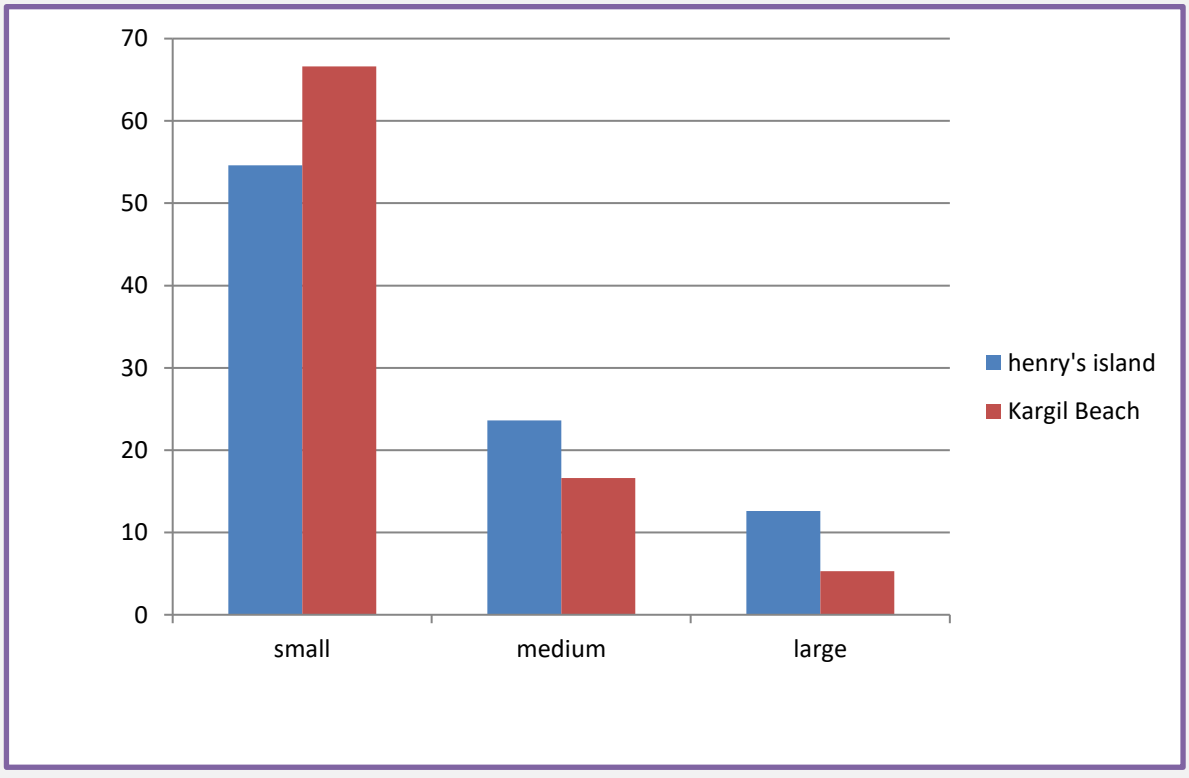

Fig7. Prepare comparative graphs for crab holes.

- Place- Henry's Island
- Date- 03.11.22, Time:

Fig8. A Small hole

Crab hole sizes	Spot 1	Spot 2	Spot 3	Average	Percent Frequency	Density	Abundance
SMALL	55	57	52	54.6	100	54.6	54.6
MEDIUM	20	23	28	23.6	100	23.6	23.6
LARGE	14	11	13	12.6	100	12.6	12.6

B) Study of burrowing habits of crab:

HTL- High Tide Line, LTL – Low Tide Line

No of Crab Holes (LTL to HTL)

METHOD:

- A measuring tape was run across 10m the beach under study.
- Crab burrows touching the tape in alternate segments of convenient length were noted down.
- A number of transects were laid down at random across the field at different sites.
- Three sizes of crab burrows (small, medium and large) were noted down in each transect.
- Percent frequency, density and abundance of each type of crab burrow were calculated from the

data obtained

LT Zones Meters	Henry's Island	Kargil Beach
5	15	13
10	20	27
15	15	30
20	20	30
Total	70	100
HT Zones Above 20	10	40

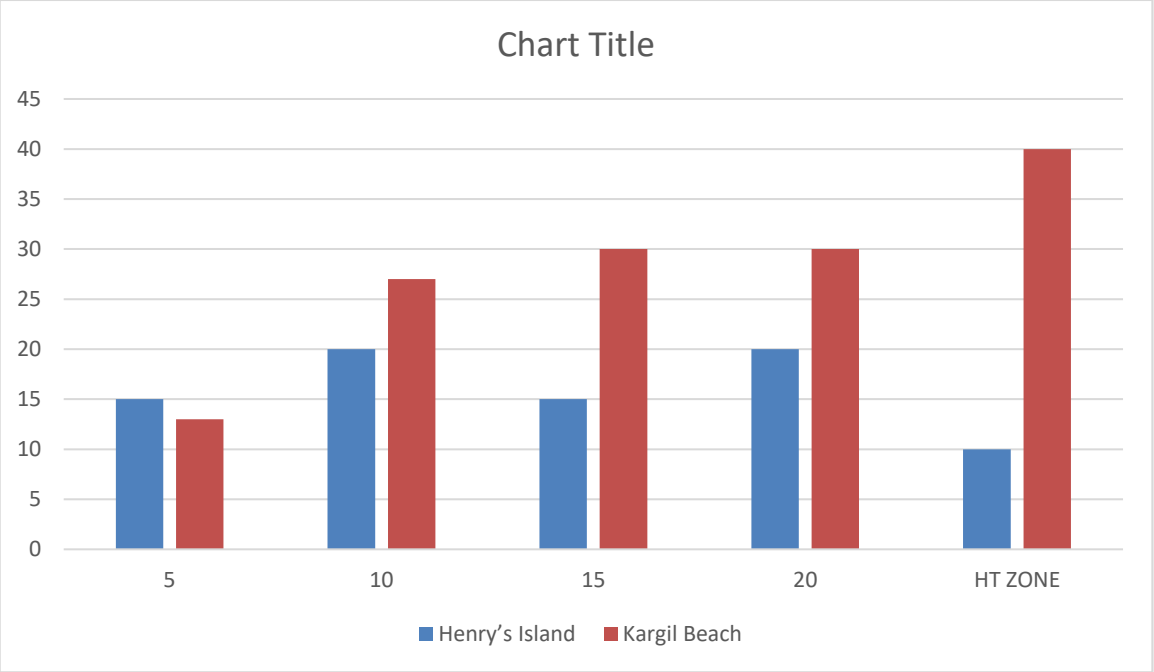

Fig9. Prepare comparative graphs for burrowing habits

Interpretation: From this data it can be conclude that more crab holes in LT zones And HT Zone are there in Kargil Beach compere to Henry's Island. It is further noted that no of crab holes in Kargil Beach (HT Zone) is significantly higher than HT Zone in Henry's Island. The observation through seen light on the burrowing habit of the crabs that inhibit this beach.

C) Study of Faunal Diversity

PRINCIPLE :

- Faunal diversity of a particular habitat refers to the different animal species living in that habitat. When in need to know how many organisms there are in a particular habitat, it is not feasible to count them all. Instead a smaller representation of the community is considered, called a sample.
- A quadrat is a basic sampling unit (an area of definite size) that can be a rectangle or a square. The size of the quadrat is very important as too small or too large a size may not be representative of the community. The size of quadrat in which maximum diversity of species can be recorded is called the minimum size of quadrat for that area. The minimum size of a quadrat suitable for a particular community is determined by the species- area curve method.
- Random sampling over the area under studydeletes the chance of biasness regarding species and hence a uniform collection of specimen can be made from theplace.

Thusthe total species diversity of a community can be studied alongwith frequency, density, abundance, relative density of each species which help us to study the community pattern of an area at any specific time of year.

Percentage Frequency =[(No. of sampling units in which a particular species has occurred)/ Total no. of sampling units]×100

Density= [(Total no. of individuals of a particular species in all the sampling units)/ Total no. of sampling units]

Abundance= [(Total no. of individuals of a particular species in all sampling units)/ Total no. of sampling units in which species occurred]

Relative density =[(Total no. of individuals of a particular species)/Total no. of individuals of all species]× 100

- MATERIALS REQUIRED
  - Nails
  - Thread
  - Measuring tape
  - Notebook
  - Pen

Fig10. Performing quadrat sampling on Henry's Island Beach

- **<u>METHOD</u>**
  - The sites for sampling were selected randomly so as to prevent biasness regarding species.
  - Three quadrat plots each of 2m × 2m were laid in Henry Island Beach.
  - The various species of animals were identified in the sampling plots.
  - The presence or absence of each species was determined in each plot.
  - The number of individuals of each species was counted and the data was

noted down.

- With the help of the data, the percentage frequency, density, abundance, relative density was calculated.
- On the basis of the percentage frequency values, various species were then distributed into five frequency classes (Raunkiaer, 1934).

The same steps were repeated for quadrat sampling on Kargil Beach.

Notes:

QUADRAT

STUDY OF FAUNAL DIVERSITY

- Place- Kargil beach
- Date- 03.11.22, Time: 10:50 am

Shan on index:

Sl no.	Observed specimen	Spot 1	Spot 2	Spot 3	No of Sp.	Pi=n/N	ln(Pi)	Piln(Pi)	% fre.	Density	Abandance	Relative density	Fre. class
1	Jelly Blobs/ Salps	2	0	1	3	0.013	-2.16	-0.248	100	1	1.5	1153	E
2	Barnacles	0	2	1	3	0.115	-2.16	-0.248	66.6	1	1.5	11.53	D
3	Hermit Crab	2	5	2	9	0.119	-0.16	-0.366	100	3	3	34.61	E
4	Gastropod molluscs	5	0	0	5	0.036	-1.65	-0.267	33.33	1.6	5	19.2	B
5	Crabs	2	2	1	5	0.036	-1.65	-0.267	100	1.6	1.6	19.2	B
6	Sea Anemone	1	0	0	1	0.001	-1.65	-0.124	33.33	0.3	1	3.48	B

Fig11. Hermit crab observed on Kargil Beach

- **SIMPSON'S INDEX OF DOMINANCE = Σ Pi 2 =0.218**
- **SPECIES RICHNESS** = [(s-1)/ ln N] = 1.53

  [where, s= Number of species observed;

  N= Total number of individuals of all species]
- **EVENNESS INDEX** = (H/ lnS) = 0.84

  [where, H = Shannon-Weiner diversity Index;

  S = Number of species observed]
- **SIMILARITY QUOTIENT** (Between the two places) =[2c/ (s 1 + s 2)] = 0.18

[where, c = Number of species common to both sites; s 1 = Number of species observed in Henry's Island Beach; s 2 = Number of species observed in Kargil Beach]

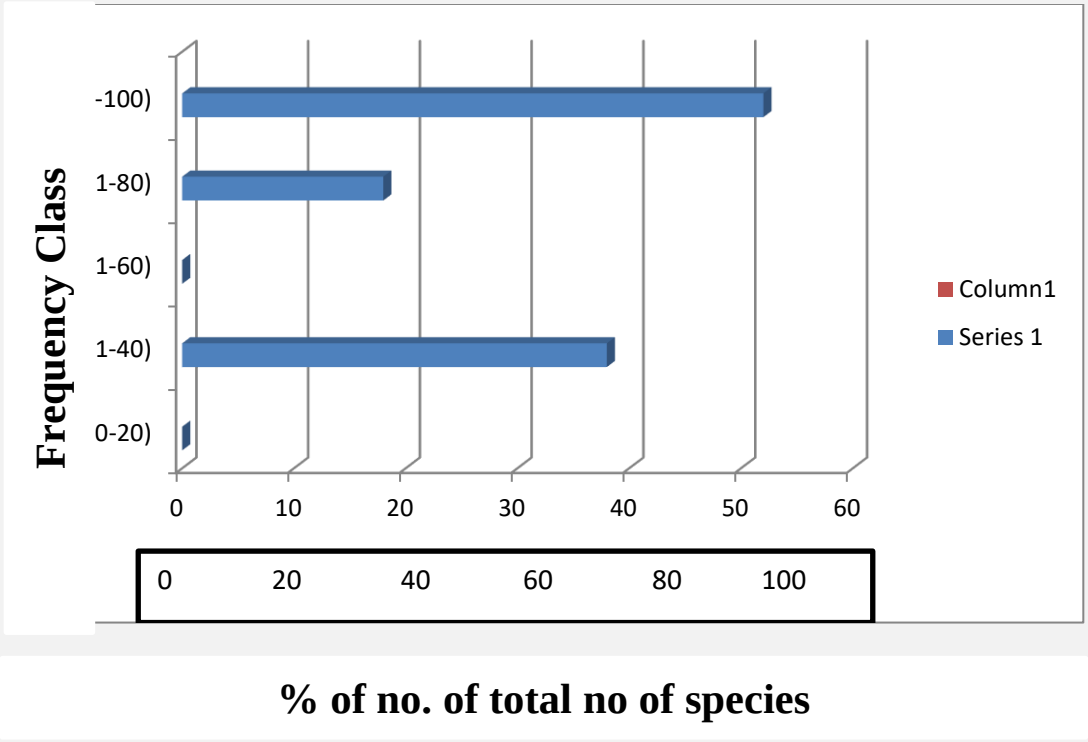

Fig12. Frequency Diagram of Faunal of Kargil Beach

<u>Interpretation</u>: from this frequency diagram we can interpret that E>B>D>A=C. This does not fulfill the Raunkaier's law of frequency class.

> A>B>C=D<E

<

Frequency Class E> then the respective value in the normal frequency diagram, so the faunal community study is heterogeneous.

- **Simpson Diversity Index**

Observed specimen	Simpson diversity index
Jelly Blobs/ Salps	0.009
Barnacles	0.009
Hermit Crab	0.110
Gastropod molluscs	0.030
Crabs	0.030
Sea Anemone	0
	= 0.188

- Place- Henry Island
- Date- 03.11.22, Time: 9:05 AM

Shan on index:

Sl no.	Observed specimen	Spot 1	Spot 2	Spot 3	No of Sp.	Pi=n/N	ln(Pi)	% fre.	Piln(Pi)	Density	Abandance	Relative density	Fre. class
1	Horse shoe crab	1	0	0	1	0.01	-2.30	33.33	-0.23	0.33	1	10	B
2	Bivalve Molluscs	1	2	0	3	0.03	-1.20	66.66	-0.36	1	1.5	30	D
3	Polychaete worm	0	1	0	1	0.01	-2.30	33.33	-0.23	0.33	1	10	B
4	Crab	2	1	1	4	0.04	-0.91	100	-0.36	1.33	1.3	40	E
5	Little beach spider	0	0	1	1	0.01	-2.30	33.33	-0.23	0.33	1	10	B

Fig13. Horseshoe crab on Henry's Island Beach

- **SIMPSON'S INDEX OF DOMINANCE:** ΣPi2 = 0.1

It gives the probability that any two individuals drawn at random from an infinitely large community belong to different species.

- **SPECIES RICHNESS** = [(s-1)/ ln N] =1.73

[where, s= Number of species observed;

N= Total number of individuals of all species]

- **EVENNESS INDEX** = (H/ ln S) = 0.87

[where, H = Shannon-Weiner diversity Index;

s = Number of species observed]

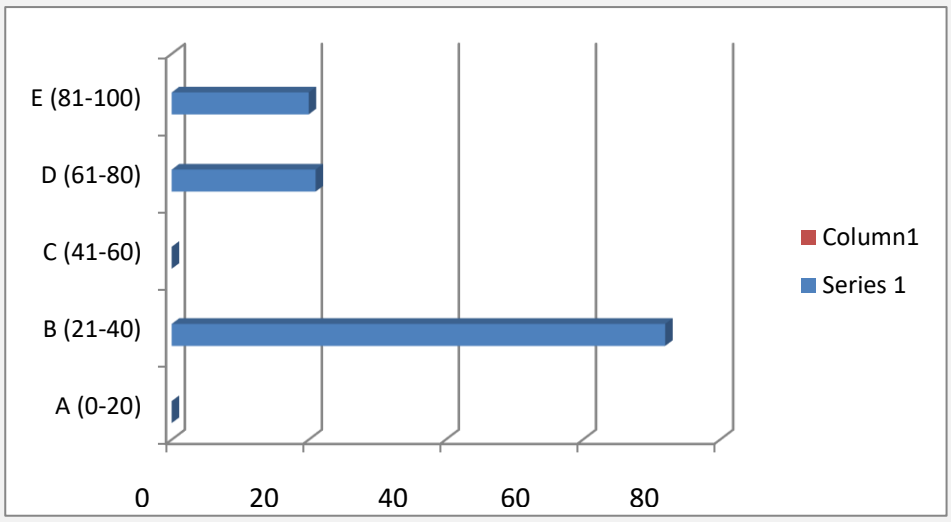

Fig14. Frequency Diagram of Faunal of Henry Island.

Interpretation: from this frequency diagram we can interpret that B>D=E>A=C. This does not fulfill the Raunkaier's law of frequency class.

> A>B>C=D<E

<

Frequency Class B> then the respective value in the normal frequency diagram, so the faunal community study is heterogeneous.

- **Simpson Diversity Index:**

Observed specimen	Simpson diversity index
Horse shoe crab	0
Bivalve Molluscs	0.066
Polychaete worm	0
Crab	0.133
Little beach spider	0
	=0.199

Interpretation : The range of biodiversity index is form (0-1), where (Close to 1) indicated high diversity, (0-1) indicate moderate diversity and (Close to 1) indicated low diversity.

From our data It can be concluded that biodiversity index is moderate because It ranges from (0-1). high diversity was not found may be because of some anthropogenic causes or pollution.

D. Study of different fishes at ben fish herbour in frasergunj:

- **About the area:** Frasergunj is a hub of fishing activities and houses a large herbour, a beempy cycle can right connects the beach to the harbor. Hundred of fishing boats of all possible shape and size line up the harbor. It is a place of fanatic activities with fishes being uploaded and packet with eyes. Ben Fish also rinsed a actions center at the harbor.

Fig15. Benfish Harbour

- **Fish Diversity at this area:** Fish diversity that was observe from previous data are Ilish, khaira, Amude, Bogo, Bhetki, noli, pakal, parse, rai-parse, kholse, topse, bhola, pabda, pomfret, lote, gule, Chanda etc.

According to local report from fisherman, the fish species that are available at this area are pomfret, chinese-pomfret, bhola, topse, rupchand, churi etc. and at 4pm-4:30pm all kinds of fish can be seems which they catch. From this species abundance of fish species are less available in march-april month then the rest of the year.

Sl. No.	Local Name	Scientific Name
1	Ilish	Tenualosa ilisha
2	Kachki	Corica soborna
3	Bhetki	Lates calcarifer
4	Topse	Polynemus paradiseus
5	Pomfret	Pampus argenteus
6	Lotte	Harpadon nehereus
7	Telia Bhola	Protonibea diacanthus
8	Mackerel	Rastrelliger kanagurta

Fig16. Taking report from local fishermen

- **Fishing Nets**

A fishing net is a net used for fishing. Nets are devices made from fibers woven in a grid-like structure. Some fishing nets are also called fish traps, for example fyke nets. Fishing nets are usually meshes formed by knotting a relatively thin thread. Early nets were woven from grasses, flaxes and other fibrous plant material. Later cotton was used. Modern nets are usually made of artificial polyamides like nylon, although nets of organic polyamides such as wool or silk thread were common until recently and are still used.

Fisher folk of Frasergunj use both non-mechanized and mechanized boats for fishing. A large number of fisher folk uses "Dingi nouko" for the purpose of fishing. Their traditional knowledge helps them to get success over fishing. A huge number of population is dependent on fishing. The variation in fishing practices (times of fishing and fishing trips) brings us to the different gears which the fishers in different regions and of different fishing groups use. Mainly three types of nets are often used in Frasergunj fishing harbour.

Fig17. Fishermen sewing fishing net

➢ Fish Drying

Fish drying was adopted as a low-cost, traditional mode of fish preservation. Dried and fermented fish contributes substantial micronutrients to the Indian diet and thereby, plays a fundamental role in combating malnutrition and health issues.

Fig18. Fish drying in Frasergunj

➢ Windmills

A windmill is a structure that converts wind power into rotational energy using vanes called sails or blades, specifically to mill grain (gristmills), but the term is also extended to windpumps, wind turbines, and other applications. WBREDA installed 8 X 250 kW Wind Energy Generators at Frasergunj. A Wind Energy Farm that generates 1 MW and is soon going to be extended to produce 2 MW is located in Frazerganj.

Fig19. Windmill in Frazerganj

E. Study of different birds species:

- **Study of Avian Density:**

Materials: One big DSLR Camera, Naked Eye, Phone

Method: Birds are observed by naked eye and photos are taken by phone camera and one DSLR Camera.

- **Transect:**

T1= Namkhana Station to Bakkhali

T2=Bakkhali to Henry's Island

T3= Henry's Island to Kargil Beach.

Fig20. Study of different birds

SL NO.	COMMON NAME	NO. OF BIRDS	SCIENTIFIC NAME	TRANSECT		
				T1	T2	T3
1.	SPOTTEN DOVE	8	Spilopilia chinesis	7	1	
2.	ASIAN PLAM SWIFT	8	Cypsirees baleesienesis	6	2	
3.	PACIFIC GOLDEN PLOUR	7	Pluviallis apricceries	3	4	
4.	ASIAN GREEN BU-EATU	4	Merops orientalis	1	3	
5.	LARGE BILLID CROW	20	Corvus macrohyrchos	10	6	4
6.	COMMON MAUNA	20	Acridotheren tristis	8	6	6
7.	SANWICH TERN	15	Thaleusses sandvieensis	2	10	3
8.	LASSER WHITLING DUCK	8	Dendroeygna javanica		8	
9.	RED KENERT	12	Calidris carulees	1	9	2
10.	KINGFISHER	10	Alcedinidae	4	4	2
11.	WOOD PUCKER	10	Picidae	3		7

- **BIDRS TRANSECT:**

TRANSECT ZONE	NO. OF BIRDS	NO. OF SPECIES
T1	45	10
T2	53	10
T3	24	6

- **T1:**

Total no of bird observe: 45

Total no of species observe: 10

Total minutes of bird watching: 90

Encounter rate of birds: 0.5

Species encounter rate: 0.11

- **T2:**

Total no of bird observe: 53

Total no of species observe: 10

Total minutes of bird watching: 90

Encounter rate of birds: 0.58

Species encounter rate: 0.11

- **T3:**

Total no of bird observe: 24

Total no of species observe: 6

Total minutes of bird watching: 90

Encounter rate of birds: 0.26

Species encounter rate: 0.06

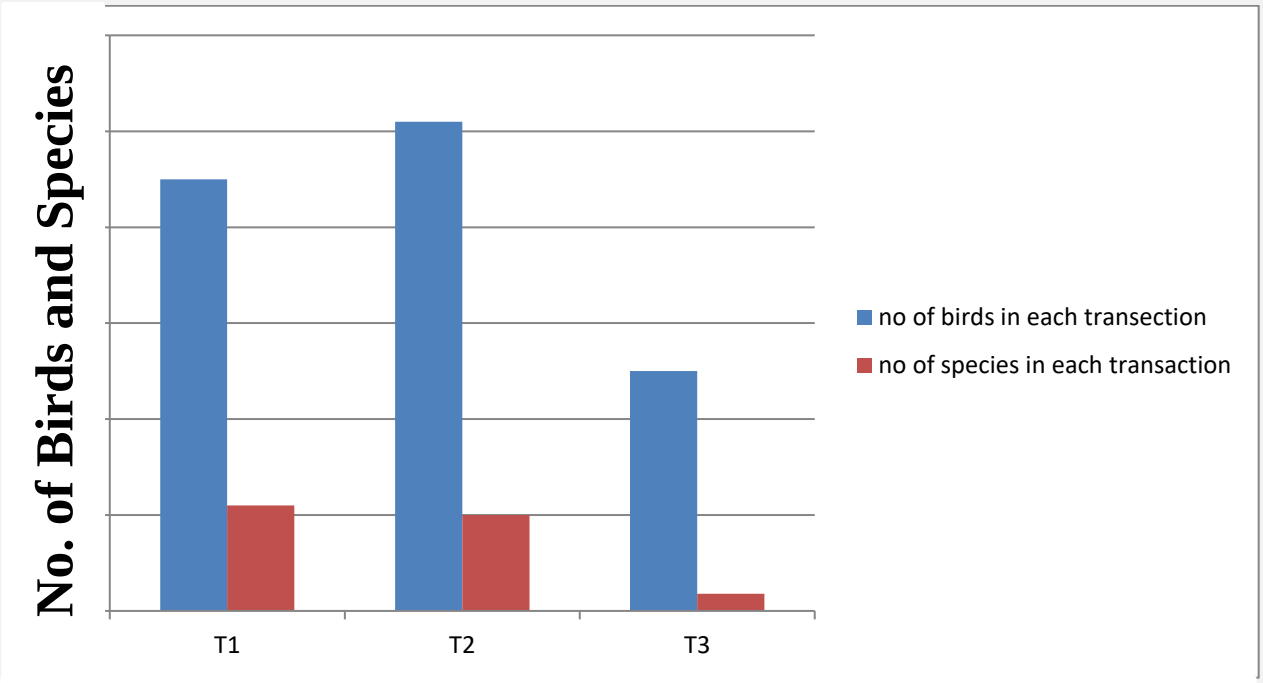

Fig21. Transect zone
Graphical representation

- **Interpretation:-**

In this field work we have seen many birds with different species some of them are very colorful the encounter rate of birds is high in T1 and T2 and low in T3. Some of the bird species are in ericitically dangered status from IUCN (data in collected from Internet). Government should consume the species of birds by controlling the pollution and Poacher. The species encounter rate is also high in T1 and T2 and low in T3. We have seen maximum bird in Bakkhali Sea Beach.

F. VEGETATION STUDY/ANALYSIS OF VEGETATION STRUCTURE AT HENRY ISLAND BEACH

Bakkhali is riparian side of Bay of Bengal. There mangrove trees are seen. Mangroves are salt-tolerant trees, they have stilt roots/ breathing roots that help them adapt to the hard condition not also have breathing roots or pneumatophore. Mangroves are one of the productive ecosystems, which can efficiently fertilize the sea, potentially protect the coastal zone. However, world over, Mangroves are facing degradation, mainly due to anthropogenic pressure, where the mangroves are as a fodder, fuel, timber and the areas being converted for aquaculture and other developmental purposes. Loss of Mangroves. The bakkhali beach is perhaps the most breathtaking Beach.

Some Mangroves trees name given below:

Common Name	Scientific Name
Sundari.	Heritiera fomes
Hetal .	Phoenix paludosa
Keowra.	Pandanus odorifer
Harakancha	Acanthus ilicifolius
Bani.	Avicennia marina
Kala bani	Avicennia alba
Hentala	Phoenix paludosa
Nona jau.	Tamarix gallica

Fig22. Vegetation study.

G. Study of different insects:

- **Study of Insect Diversity at Bakkhali Beach**

Insects are very important as primary or secondary decomposers. Without insects to help break down and dispose of wastes, dead animals and plants would accumulate in our environment and it would be messy indeed. Insects are underappreciated for their role in the food web. They are the sole food source for many amphibians, reptiles, birds, and mammals. They are a rich source of protein, vitamins, and minerals, and are prized as delicacies in many third-world countries.

On our excursion to Bakkhali we have visited different beach and the coastal area around from where we have studied about different insects like Butterflies, grasshopper beetle. We performed two experiments

1. Light trap experiment 2. Pit fall experiment

- **Butterfly:** We have seen various butterflies on our trip and its hard to capture as they flown away so many times. But we were able to spot two butterfly one in Henry's Island another while travelling near a paddy field. As we know it is a flying insect with a small body and large often colorful wings.

- **Description of Butterflies**

1. Red Bodied Swallowtail

Systematic Position

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Description:

- It spreads its wing with a span of 10 cm with its eye catching pattern of colour
- They have black long tailed wing with red spots on it and white tinges on its forewing. It was spotted in Henry's islands mangroves.

2. Pseudozizeeria Maha

   Systematic Position

   Kingdom: Animalia

   Phylum: Arthropoda

   Class: Insecta

Conservation status: This species is not protected in India under any schedules of Wildlife protection act 1972.

Description:

- The species was first described by Vincenz Kollar in 1944
- It is pale blue in colour and native to Asia and in West Bengal. It was spotted during travelling in a paddy field.

- **<u>Grasshopper:</u>** Grasshopper are a group of insects belonging to the suborder caelifera. They are typically ground dwelling insects with powerful hind legs which allow them to escape from threats by leaping.
    - Systematic position

        Kingdom: Animalia

        Phylum: Arthropoda

        Class: Insecta

IUCN Status: They are not assessed in the red data list.

- **<u>Beetles:</u>** Most beetles are herbivores eating only plants. We saw it in hotel floor the 2nd night. It was a grown beetle with black body and their front pair of wings is hardened into wing cases called elytra, distinguishing them from other insects.

  Systematic position:

  Kingdom: Animalia

  Phylum: Arthropoda

  Class: Insecta

➢ **IUCN Status: Endangered**

SL NO.	Name of Insects	Binomial name	Number
1	Butterfly (Red Bodied Swallowtail)	Atropha Neura	2
2	Pseudozizeeria Maha (butterfly)	Pseudozizeeria Maha	1
3	Grasshopper	Caelifera sp.	2
4	Beetles	Endopterygota sp.	1

- **PIT FALL EXPERIMENT:**

Material Required	**Number**
Plastic cup	1
Fluorescent light with holder	1
Soil	Sufficient amount
Detergent	1 teaspoonful
Water	1 cup
Grass	Necessary
Scalpel	1
White napkin	1

Methodology: At first we find a soil ground near our hotel the day we reached and digged a little bit.We then placed the plastic cup on the ground level. One of us was holding a fluorescent light as it was almost dark to see things clearly. After placing a detergent solution was made with water and detergent. it was blue in colour and put inside the cup. The detergent solution was made to attract insects. After this we put some grass around the cup on the soil. This setup was prepared and kept overnight there.

Fig23. Observation: Next morning we took the cup and take it inside the hotel and some insects were attracted by the solution.

With Scalpel we separated those insects and observed them in naked eye. Some Fly , Weevil, ants and some mosquito were observed.

SI No.	Name of insects	Number	Order
1	Fly	4	Diptera
2	Weevil	3	Coleoptera
3	Bee	2	Hymenoptera
4	Ant	8	Hymenoptera
5	Mosquito	7	Diptera

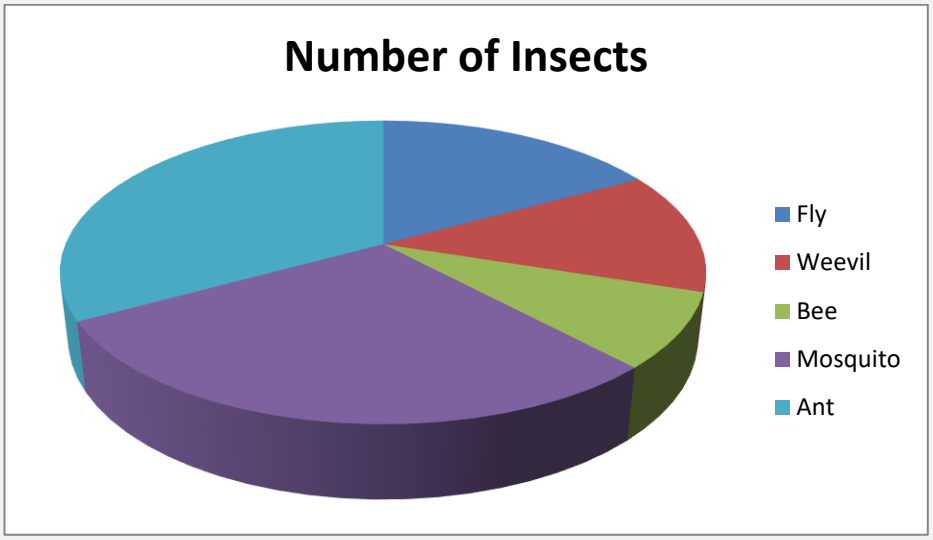

Fig24. Number of Insects

Light Trap Experiment:

Light trap method is commonly used in insect biodiversity studies.

Materials required	Number
Plastic cups	3-4
Soil	Sufficient amount
Candles	3-4
Water	4 cup
Soap	1
Matches	1
Scalpel	1

- **Methodology:** Another part of insect study was light trap experiment. We lighted 4 candles around a anthill near our hotel after sunset and 4 cups were placed horizontally after digging the anthill. Some of us from bare hand and some by sticks. We noticed many ants coming up from that anthill. The cups were filled with soap water. The reason of lighting candles was to attract phototrophic insects in night time.

Fig25. Light Trap Experiment:

- **Observations :**

  The cups were put there overnight and once the candles stopped lighting too. In those cups the most common insects attracted were

1. Flies
2. Beetles
3. wasps
4. leafhopper
5. Bug

So the light had attracted those insects which are phototrophic mostly.

SI No.	Name of Insects	Number	Order
1	Moths	3	Lepidoptera
2	Flies	3	Diptera
3	Beetles	1	Coleoptera
4	Green leafhopper	7	Hemiptera
5	Wasps	1	Hymenoptera
6	Ants	13	Hymenoptera

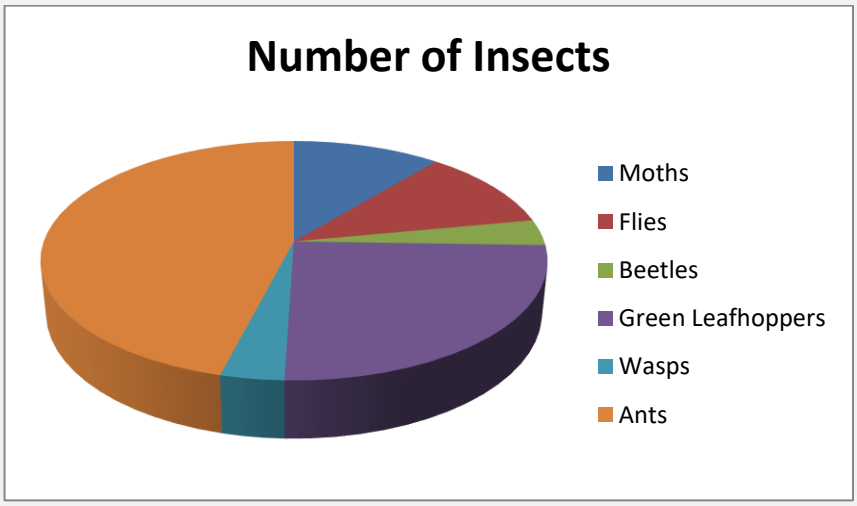

Fig26. Number of Insects.

H. Others miscellaneous observations:

1.BARNACLES:

i) Barnacles are crustoceans all through they were once thought to be related to snails, it turns out that barnacles are actually related to crabs. It we look at the animal inside the hard place, it is possible to recognize their crab like body plan.

ii) Because barnacles are sessile animal they have no need for the walking legs that many of their crustacean relatives posses.

They utilize their modified legs called Cirri. To sweep tiny food particles from the water column and pass them through their mouth parts inside their protective plates.

iii) They build hard plates surrounding their bodies which they can open to feed, and to reproduce and close protectively during low tide and other harsh condition.

2.MOLLUSCAN SHELL:

i) The molluscan shell is typically a calcareous exoskeleton which enclose and supports protects the soft part of and animal in the Phylum Mollusca.

ii) The body is divided into head visceral muscular foot and mantle.

3.MUD SKIPPER:

Mud skippers are fish with eyes on the top of the head and with front (Pectoral) fins that are more like legs then fins. They are olive brown in colour have sharp teeth and large mouth and grow upto 15cm long.

They thrive in brackish water with a salinity half way between marine, salt water and fresh water.

Mud skipper are amphibious fish, they have gills that work the those of other fish and exact oxygen from water but unlike other fish they can also breath air.

4.ANT-HILLS:

i) Ant hills usually looks like a pile of sand, a small mound that has a creator in the middle, like a bulls eye, inside the anthills is a very complex structure and has many turn ells that connect many chambers of varying size.

ii) Ants make hills to keep their queen and their larva saves. These hills are actually made by worker ants, which did subterranean turn ells.

5.BUTTERFLY:

i) Like all other insect's butterfly have six legs and three main body parts head thorax (chest or mid-section) and abdomen (tail end). They also have to antenna and one exoskeleton.

ii) They have two pairs of membranous wings that are covered with tiny scales which give colour rigidite and strength.

6.CAMOUFLAGE:

i) Camouflage also called cryptic coloration is a defense or tactic that organisms use to distinguish their appearance usually to blend in with their surroundings.

ii) Pigments and physical structure are the two basic technics by camouflage can distinguish themselves.

4.SELF ASSESSMENT:

The Bakkhali full of unique diversity and Himalayan green plants, so it was very accurate place as we are the student of Zoology and it was our educational excursion. We needed a species richness and unique diversities like Bakkhali Sea beach that we have got.

The Bakkhali Sea beach was not crowdy like the other sea-beach, so we have castly completed our work with the help of our respected teacher Dr. Subhalaxmi Ganguly and Dr. Moumit Roy Goswami.

They are very responsible about us and take care of us during the total journey of our excursion. So we are thankful to our respected teachers.

5.CONCLUSION:

Erosion features help in understanding the morpho dynamic process of this sea-beach. The morpho dynamic changes along the cost are controlled by catastrophes like cyclonic storms, Aeolian, fluvial, tidal. Erosional sedimentary structure like mud mouths, erosional l furrows and ridges are transverse to the stand in the enter tidal shore along Bakkhali stretch of west Bengal. Out of these erosional structures, obstacle scours are important which are abundantly occurred in the upper and middle intertidal zone. The Bakkhali intertidal area is faced two different types of disturbances-1. The sand deposits are removed and transferred seawards by waves and tides and 2. Scouring in the beach erodes mud and that muddy sediments are carried away to the sub-tidal region by suspension transport. This sediment load helps in the formation of tidal shoal in the sub tidal region.

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