

A Study of Ecological biodiversity in Dudhia of Darjeeling district, West Bengal

Dr Md. Hanif¹,

¹Assistant Professor, Trinity B.Ed College, Siliguri, Darjeeling

Rubinur Choudhury²,

²PhD Scholar, Coochbehar Panchanan Barma University

Abstract:

The present investigation is an attempt to study of ecological Biodiversity in dudhia of Darjeeling district. Ecology enriches our world and is crucial for human wellbeing and prosperity. It provides new knowledge of the independence between people and nurture that is vital for protection of our Environment, maintaining clean air and water and sustaining biodiversity in a changing climate. Ecology provides the essential basis for nature conservation. Investigator were used to collect the data primary and secondary source and interactive to local people's. To find out the Ecological Biodiversity of an area that concert ration of Water pollution, forest degradation, landslide, land use, human settlements and plants and animals. So, maintaining a mosaic of habitats ensure the survival of a rich variety of species.

Keywords: Ecology, Biodiversity, Flora, and fauna, Ecosystem, Sustainable development.

Introduction:

Ecological biodiversity addresses the combined characteristics of biotic properties. It is the variation in ecosystems found in a region or the variation in ecosystems over the whole planet. Ecological diversity includes variation in both terrestrial and aquatic ecosystems. An example of ecological diversity on a global scale would be the variation in ecosystem, such as forests, deserts, grasslands, wetlands and oceans. The word 'biodiversity' has been coined from 'biological diversity' for the first time by Walter G. Rosen in 1985 (Heywood and Watson 1995) and came into force after the formulation of the United Nations Convention on Biological Diversity (UNCBD) during the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro in June 1992. It has been defined as 'the variability among living organisms formal sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; that includes diversity within species, verse effects of human impacts on biodiversity are increasing dramatically and threatening the foundation of sustainable development. The major problems associated with the biodiversity loss are the habitat fragmentation, due to human activities followed by the climate change, nitrogen loading and biotic exchanges (Sala et al. 2000). The predictions suggest that the land-use pattern will further change the biodiversity drastically because of increasing population, especially in tropical regions. Loss of biodiversity resources threatens our food supply chain, sources of wood, medicine and energy etc. Thus systematic biodiversity conservation efforts would be required to preserve the global biodiversity, with special attention in tropical regions. These efforts would require a critical monitoring and base line information in quantitative terms at each level of biodiversity organization at different scales ranging

from region to the verse effects of human impacts on biodiversity are increasing dramatically and threatening the foundation of sustainable development. The major problems associated with the biodiversity loss are the habitat fragmentation, due to human activities followed by the climate change, nitrogen loading and biotic exchanges (Sala et al. 2000). The predictions suggest that the land-use pattern will further change the biodiversity drastically because of increasing population, especially in tropical regions. Loss of biodiversity resources threatens our food supply chain, sources of wood, medicine and energy etc. Thus systematic biodiversity conservation efforts would be required to preserve the global biodiversity, with special attention in tropical regions. These efforts would require a critical monitoring and base line information in quantitative terms at each level of biodiversity organization at different scales ranging from region to the globe. India encompasses a variety of globe.

The surveyed area Dudhia is located on the outskirts of Siliguri along the meandering Balason River. It is a small village under Kurseong P.S. of Darjeeling district developed on the way of the river Balason along Siliguri-Mirik Highway. It is about 27 km away from Siliguri, 4 km from Pankhabari, 10 km from Kurseong and 15 km from Mirik.

The village is situated at an elevation of about 300m above the sea level. It is extended between 26°47' N and 88°18' E. The river Balason descends at this site through the interlocking spurs in the north and takes the braided pattern. Dudhia is surrounded by some of the best tea gardens of the area such as Longview Tea Garden, Gyabari Tea Garden, Panighatha Tea Garden.

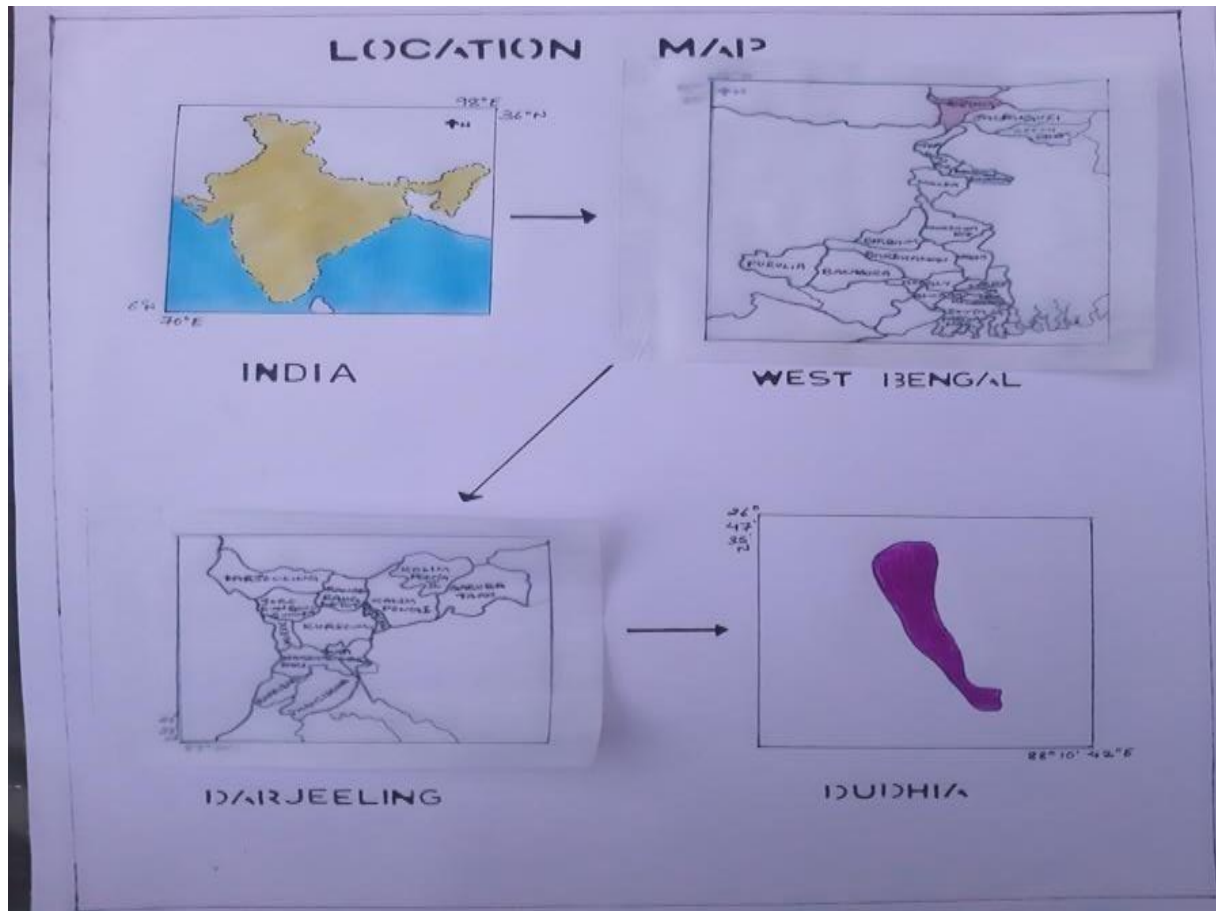
The village is located which makes foothills in the landscape very beautiful. With its tranquil ambience and mesmerising landscape, Dudhia has become a favourite picnic spot of Siliguri.

The climate of Dudhia resembles to those of tarrai region of the district. During summer it is hot and humid and during winter it is cool and cold. It also experience heavy rainfall during monsoon which also sparks widespread flooding in the village.

The region is situated on the bank of the River with a gentle slope which does not enables fine sediments to settle down rather than boulders. So, the soil here is less fertile due to this agriculture is quite difficult to practice. However, people practice subsistence farming to meet their some needs.

The villages close the forest, the terraced paddy fields and therefore the Balasun stream snaking through the deep dark jungles. The occasional calls of the peacock, the chirps of unknown birds and therefore the constant grumbling of the Balasun stream.

LOCATION OF MAP:



Concept of ecological place about Dudhia:

The origin can be traced back to the days of ‘land’s grab’ movement of 1967 during the regime of United Front Government at West Bengal.

- spaces were forcibly occupied by landless people.
- Dhudia is one of such village. Its original name was Jamadar Bhatta (Faloda Tea Estate)
- Because of desertion of tea garden, the area converted to forest.
- In 1967, six families from Pankhabari and Tindharia encroached on this area and coined the site Dudhia after Dudhia Jhora, a rivulet originated from New Faloda Tea Estate, meeting the river Balason just opposite to this settlement site.
- The colour of this this jhora was as white as dhudh (milk) and so when the immigrants settle here, they coined name Dudhia.

Objectives:

- evaluate the present scenario and ecological biodiversity of Dudhia.
- identify the flora and fauna of an area.
- correlate the growth of population with the ecological biodiversity of Dudhia .
- To identify the ecological changes.
- To identify the physical, environmental and climatic condition of the area.
- To identify problem and challenges faced by people of Dudhia.

Methodology:

The study has been conducted with the aims of understanding ecological biodiversity of dudhia and to analyse the problem and challenges of the area. In order to meet the above mentioned objective mainly mixed method has been used for the study. This method is procedure of collecting, analysing both quantitative data within a single study to understand the research problem more completely (Creswell, 2002). The main aim of using mixed method is that neither the quantitative nor qualitative method are sufficient by themselves to capture the details of the situation, thus both methods are used in combination as they complement each other and allows for more complete analysis (Green et al. 1989).

Both primary and secondary source of data have been used for study. Primary data were collected through survey, interview and field observation. Survey was conducted in order to obtain individuals views, perception of people about the ecological biodiversity of the study area. The survey was conducted with the help of structured schedule that include both open ended and close ended questions. This has been done with the aim that close ended question will help to capture direct response from respondent and open-ended questionnaire will allow the respondent to express their view as they wish.

Field observation was conducted in order to examine natural vegetation, soil, climate, flora and fauna etc. Purposive sampling methods were used for the selection of key informant like were required. Relevant journal, article, book etc. were referred for the collection of secondary data required for the study in order to understand the phenomenon in wider perspective.

Finally, the data collected for the field study were coded, summarized and analyzed using relevant techniques to come up with the appropriate results.

Physical Characteristics (Climate/ Weather Report) :

The surveyed area is a pictorial hilly hamlet on the bank of meandering river Balason along Siliguri-Mirik Highway. Dudhia lies between 88°24'49" East Longitude and 26°08'19" North Latitude. The area is surrounded by lush green forest and tea garden. The landscape of the Balason river bed is completely mesmerizing and breathtaking. "The hanging bridge" over the Balason which connects Dudhia with Panighatta, is an additional attraction for the tourists. There are number of manmade and natural beauties in this place. The climatic condition is also pleasant which supports tourism. Dudhia experiences warm and temperate climate with annual range of temperature of 13°C and the mean annual temperature is 34.33 °C. The warmest month of the year is May.

The region receives rainfall from south-west monsoon winds particularly Bay of Bengal Branch from June to September and sometimes continues rainfall till the mid of October. The average annual rainfall of the Dudhia is 24cm. January is the driest month in Dudhia. The direction of the wind in the surveyed area is NorthWest. Overall the climate during December is very pleasant, making this one of the best month for the visitors.

Relief Features: Dudhia valley is located 27 km away from Siliguri. It is a panoramic hilly hamlet on the banks of river Balason at an altitude of about 290mtr above sea level. Because of its tranquil ambiance and vivid landscape the valley has become a favoured picnic spot of Siliguri.

Dudhia lies in between the scenic hills of Mirik on its northwest and Kurseong on its northeast. The valley mostly consist of sedimentary rocks. The area is surrounded by some best tea gardens – Longview Tea Garden, Gayabari Tea Garden, Marianbari Tea Garden and Panighata Tea Garden.

Dudhia valley is a link to the Panighata village which is on the other side of Balason river. The location of the valley has largely been responsible for shaping the lives and livelihoods of the people in different ways.

**Soil:**

Dudhia valley consist of coarse and silty soil which are not much fertile because it is acidic in nature. And since the valley lies in the bank of river Balason, the silty and coarse textured soils are found in the stream deposits. Mostly boulders, pebbles and silts are found alongside of the river.

The soil in the Dudhia valley is less fertile therefore, the people in that area mostly cultivate millets, maize as their sustenance crops, as these types of crops are dry crops and does not require much soil fertility.



NATURAL VEGETATION

Dudhia is located in eastern foothills or foothills of Darjeeling district . The luxuriant vegetation of the region is the result of favourable physiography, climate, soil and biotic factors.

In Dudhia region mainly two types of vegetation is found i) Forests of the plains ii) Forests of the Hills: a) Lower hill forests — mixed evergreen V and deciduous. Most important amongst the plain forests are the excellent sal (*Shorea Robusta*) forests of the foot-hills. Sal is gregarious but it is found in mixture of varying proportions like Chilauni (*Schima Wallichii*), Champ (*Mjchelia sp.*), Panisaj (*Terminalia myriocarpa*), etc. Besides, sal forests drymixed forests with occasional sal are also common, the dominating species being Panisaj, Simul (*Salmalia mallarica*), Gamari (*Gmelma arborea*). The riverine forests are found in sandy soils near the river beds. Most important amongst them are Khair (*Acacia Catechu*) and Sisoo (*pelbergia Sisoo*). These are found along the beds of the Tista, Mahananda, Balason, Mechi, Lish, Gish and Chel rivers.



The epiphytic flora is not rich as compared to the subtropical zones. Most of them are ferns, Selaginellas and Lycopodiums. Among the flowering plants, which are by no means abundant. The predominant species of the Lower Hill Forest is Sal.

The undergrowth consists of numerous shrubs and herbs. Steep slopes are occupied by other deciduous associates of sal like Paccasaj , Chilaum, Maina, Simul, Gamari, Harra, Barraha, Amla etc. Moist land is mainly occupied by Lampati, Mandam, Toon, Champ, Pamsaj , Malagiri, Gokul, Tejpat, Angare and so on. The forest often abounds in climbers which do considerable damage to trees.

Agricultural land:

Darjeeling hill area is different from environmental eco-perception. There are different climatic zones with distinctive attributes. Dudhia experiences monsoon influenced humid sub tropical climate. It is placed in the bank of balason river. The soil here is acidic and not very fertile.

As the region is situated in gentle slopes so the river is fast flowing in this area and deposits only big boulders stones and no fine sediments is deposited, so the soil here is not fertile for agriculture to be practiced by the people of dudhia.

Small subsistence farming is carried out to fulfill their own need. Plants like beans, quash, bottle guard etc are grown in small quantity. They are mostly dependent on the nearby markets for food and vegetables. Most of the land here are left barren due to soil infertility.



Though the area surrounding the dudhia village has lots of forest cover and tea plantation. Even if we go upwards towards mirik plantation like oranges, mandarine and other temperate food can be seen, but particularly in the village of dudhia agriculture is not practiced due to hard hilly infertile soil and lack of water harvesting structures.

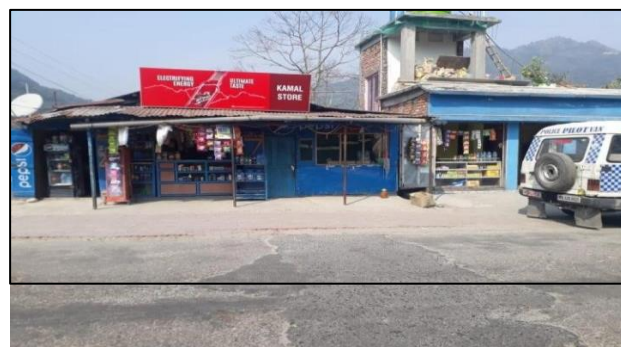
Transport and Communication:

Dudhia is a small hamlet on Mirik – Siliguri highway on the bank of river Balason. It under National Highway 12. The way to Dudhia is from Mirik, Siliguri and Bagdogra. It is covered with forest and greenery on both side of the road. There is a small kutchra road near the Balason bridge which is connected to the nearby villages and the army base camp in Dudhia.

Dudhia is connected by the road with Mirik and Siliguri by the following routes:

- Dudhia- Soureni- Mirik.(23.2 Km)
- Dudhia- Sukna-Salbari- Darjeeling More- Siliguri. (25 Km)

Rail Nearest Rail-Heads are NJP siliguri, Siliguri Junction .Nearest Airport is Bagdogra about 25 km from Dudhia.



Communication in Dudhia is very developed and is well connected via roadways. In this place 2 wheelers, 3 wheelers and 4 wheelers all are available and Siliguri town is very near from this place so it has become more easy for the people to transport goods and communicate with people of main market. Dudhia is well known picnic spot amongst the people of Siliguri and surrounding area and near to it there is Balason river. From the river side the crushed sands and stones are supplied by the forest department of Dudhia to the different places of Siliguri , Darjeeling Kurseong etc. in this communication plays vital role. Most of the people in Dudhia have opened shops near the picnic spot

which helps the people of the village in earning. There are small hay huts, shops and the view from Dudhia view point attracts the tourists a lot. Overall Dudhia is good at transport and communication.

Forest and Ecological System:

Forest ecology is basically the scientific study of the interrelated pattern, processes, flora, fauna and ecosystem in forest. The management of Dudhia forest consists of all plants, animals and micro-organisms (Biotic components) in the area functioning together with all of the non-living physical (abiotic) factors at the environment. The forest ecosystem is very important in Dudhia.

Dudhia and its surrounding have an integrated forest ecosystem consisting of many components. Short-term changes in the structure of the forest do not constitute loss of the forest, as long as the processes of the forest ecosystem remain in operation at acceptable levels. There is a likelihood that the degeneration of forests “because of the presence of old trees which are prone to disease and pest attack and indiscriminate cutting of the vegetation, led to the decay of mature and young trees thereby leading to rapid depletion of the forest wealth. To check the rapid degeneration of the natural vegetation of the region, working plans have been prepared for this plain region. Working plans have been prepared and put into effective use to check soil erosion, minimize damage from landslides, to take necessary measures to combat forest-fires and control diseases and pests, to arrange for drainage and irrigation in forest areas, raising nursery beds to have improved types of seedlings and bring the deforested land under vegetative cover. The working plans, therefore, are being implemented with twofold objectives, which is by improving the natural resource by better management and conservation measures and secondly on afforestation programmes, that is bringing the already depleted land areas under forests.

The forest products of the region are partially utilized in the saw and plywood factories concentrated in the vicinity of Siliguri and other areas of the Dooars. Most of these factories are located at lower elevations because of the obvious advantage of assembling raw materials and marketing of finished products. Some of these forest products are used in making plywood's and match sticks. Both the programmes are being operated simultaneously and need to be implemented in the face of rapid encroachment on natural vegetation by the growing urban areas, expanding settlement sites and by military encroachments.

Human interference on the ecological Biodiversity:

Humans impact the physical environment in many ways: overpopulation, pollution, burning fossil fuels, and deforestation. Dudhia is a buzz with activity during the winter months as it is one of the most popular picnic spot for the locals including people from Siliguri and the nearby regions. This has triggered climate change, soil erosion, poor air quality, and undrinkable water. These negative impacts can affect human behaviour and can prompt mass migrations or battles over clean water. There is no doubt that due to the rapid spread of urbanisation and increase in the human population, the biotic factors play a very important role in moulding the vegetation of Dudhia. Due to increase of domestic animals, grazing influences the vegetation remarkably. The ground is also used by city adventures during winter months for camping.

The ecosystem encompasses all living things (animals, plants and micro-organisms) and non-living things (earth, climate, soil, sun, weather, and atmosphere). All these components make up the environment, and they are critical for the natural and normal functions of all the activities on the planet. In short, they are the foundations of the ecosphere and influence the health of all the systems on earth. This study outlines the various human activities affecting an ecosystem. These various human activities which affect an ecosystem are as follows;

	Deforestation	Agricultural	Overpopulation	Drainage system
Factors Affecting	<ul style="list-style-type: none">) Barren Land) Loose the fertility of the soil i) Alter wildlife habitats v) Loss of biodiversity) Global warming and climate change disrupting the cycle of condensation and evaporation 	<ul style="list-style-type: none"> (i) Destruction of wildlife (ii) Lead to desertification (iii) Soil degradation 	<ul style="list-style-type: none"> (i) Exploitation of land (ii) Environmental pollution (iii) Hunting (iv) Over consumption (v) Construction of building and houses 	<ul style="list-style-type: none"> 1) Aquatic resources Degradation (ii) Aridity and erosion (iii) Water pollution (Destruction of fresh water, aquifer recharge areas) Climate change and extinction Fishing for food

With the increasing number of population in dudhia, there is a soaring demand for sufficient food. The population growth rate is hence driving the region to clear forests in order to create more room for houses. Forests are critical habitats for wildlife, and as ecosystems supporting the intricate relationship between the living and non-living things, they have been adversely affected by agricultural practices. A larger percentage of forest in dhudia was densely covered with temperate forests, but with time it has been cleared to make room for farmland, transport and construction of houses and shops in the vicinity.

The dhudia region is at risk of excessive evaporation, losing what little moisture their systems are currently able to utilize. Due to this unusually dry weather, wildfires threaten to destroy the few plants that grow there more often than they would otherwise. Irrigation by humans has changed the makeup of the soil in these regions, nuclear waste depositing, as well as the presence of vehicles driving through the area have all caused additional damage. Unsustainable practices in the use of this land has depleted its once-rich soil and contributed to the extensive loss of habitat for wildlife and disrupted the natural food chain. Additionally, global warming could potentially shift weather patterns that provide the precipitation currently necessary for the survival of grassland regions. Construction of new houses, home stays and other similar projects also threaten the ecological biodiversity of the region. Whether directly or indirectly, human intervention has Permanently altered the face of this region. Unfortunately, this unchecked human influence has led to dire Threats to the overall health of numerous biomes, especially as a result of global warming.

Problems:

- Lack of Proper Educational Institution: Few primary schools were found in the surveyed area but they lacked to deliver proper education and so the students had to travel a long distance especially for higher education.

- Lack of Medical Facilities: The area did not have any hospitals or medical centre, the residents there had to travel many kms for any medical support.
- Poor Economic Condition: People living there were mostly dependent on subsistence farming which didn't provide them with any economic gains.
- Absence of clean drinking water: clean water was not available for drinking.
- Infertile Soil: The area mainly consisted of Silty Soil which is acidic in nature .Hence, the agriculture did not flourish.
- Lack of local transport and communication: Especially during emergencies the residents face a lot of trouble due to the lack of local transport facilities.

Suggestions

- Hospitals or Health Centres should be build in order to get proper medical facilities or proper treatment.
- Soil fertility can be improved by incorporating cover crops that add organic matter to the soil structure and promote a healthy fertile soil.
- Home water treatment capability through the use of filters, solar disinfection to make drinking water clean and safe.
- Transport and Communication can be easier if more local vehicles (Auto, Public Buses) is added.
- More trees should be planted which also helps in purifying the air, attract wildlife and birds, prevent soil erosion, clean the water and add grace and beauty to our home.

Conclusion:

The detailed information about the surveyed area was gathered with the help of survey method and from the gathered information we can conclude that Dudhia has become a perfect gateway destination for the people. Situated on the bank of river Balason, Dhudia has become one of the famous picnic spot in Darjeeling District and acts as a source of income for many people living in that area. People are mostly dependent on the Balason river, they perform activities like fishing, washing clothes and drinking water for animals. People are mostly dependent on Agriculture, subsistence farming were seen to be practised mostly because of the infertile soil, the agriculture could not be grown in large proportion. Due to human activities natural environment here is slowly being degraded. Washing clothes, throwing garbage on river adds pollution to the air. The gun firing of SSB (Sashastra Seema Bal) also adds pollution to the air. The area has slowly become polluted due to human activities. Ecosystems determine the niche played by each and every organism and how they interact with non-living things such as water, light, air and climate. It's otherwise said to be an intricate and interconnected system where living and non-living things function. Due to this intricacy and interconnectedness, any activity that disturbs the natural balance of these components affects the ecosystem. Anthropogenic activities top the list as there are numerous human actions affecting this balance. The dudhia region was systematically cleared for settlements and tea plantations. Immediate attention must be paid to control for the degradation of these natural environment.

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