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TRANSFORMATION OF FOREST ECOSYSTEM: A CLIMATE CHANGE AND ANTHROPOGENIC IMPACT

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Abstract: It is estimated that about 30% of the land area of our planet earth is covered with the forest providing many environmental benefits. West Bengal constitutes 13.51% of the total geographical entity of the state and out of which the total recorded forest area of Jalpaiguri district is 28.74%. At present forest are getting converted at a rapid rate to meet other land needs such as human settlement, mining, pasture for cattle and agriculture, urbanization, etc. which is termed as transformation of forest. Forest are important not only at global level but also at local level. Foremost part of the district Jalpaiguri is covered by forests even today the district considered as one of the most noticeable wildlife areas of the country which bears the best Sal forest in India. The district since year 2000 till 2017 has witnessed a great increase in forest cover from 37.64 % to 45.88% respectively. The district being an agro-based region where 72% of the total population lives in rural area, has led to change in land use pattern in positively. The district has utilized its fallow land into agricultural and forest land which also estimated to be one of the factors which lead enhance in forest cover. The population of the district is primarily based on agricultural activity as a result of their demand has altered the level of forest in the area. Certain methods to increase the forest cover were enacted in the study region such as, social forestry, farm forestry, intercropping system, strip plantation. However, the level of precipitation and temperature in the study area couldn't attain its average level from year 2000 till 2017.

Keywords: Forest ecosystem, Climate change

Introduction

It is estimated that about 30% of the land area of our planet earth is covered with the forest which provide various environmental benefits are gradually getting converted and modified at a rapid rate to meet other land needs such as human settlement, mining, pasture for cattle and agriculture, urbanization, etc. The term 'Forest Area' refers to all the geographical area

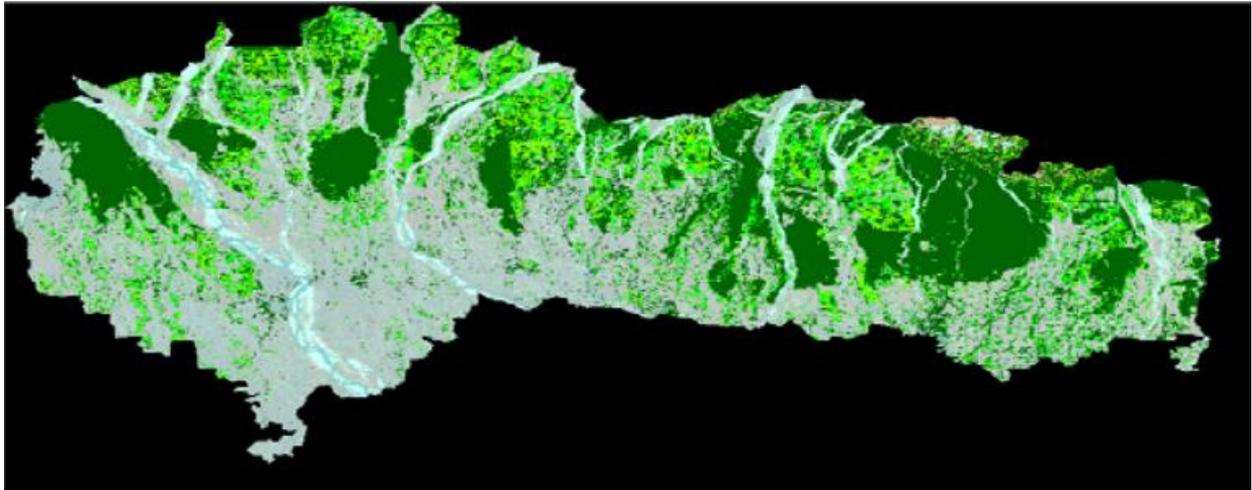
recorded as forest in government records which includes Reserved Forest, Protected Forest constituted under provision of Indian Forest Act, 1927. On the other hand, the term 'Forest Cover' is used to refer all land area more than one hectare in area, having a tree canopy density of more than ten percent. Thus, the term 'forest area' signifies the legal status of the land as per the government records, whereas the term 'forest cover' denotes presence of trees over any land (FSI, 2005).

As per statistical handbook of West Bengal (2017), forest area of West Bengal constitutes 13.51% of the total geographical area of the state and out of which the total recorded forest area of Jalpaiguri district is 28.74%. Foremost part of the district Jalpaiguri is covered by forests even today the district deliberated as one of the most significant wildlife areas of the country and abides the best Sal forest of India. The major forest cover of the district includes Semi Moist Deciduous vegetation. Apart from the high raised forests there are floodplains of rivers like Jaldhaka, Murti, Torsa covered with grasslands which nourishes a great extent of wildlife. A number of divisions of forest department of Govt. of West Bengal are working over the area for Forests like Gorumara, Chapramari declared as national park and sanctuaries for the protection of wildlife.

The total forest area of the district accounts 28.74%. But, the district since year 2000 till 2017 has witnessed a great increase in forest cover 37.64% to 45.88% respectively. According to government, the economy of the district is largely depending on agriculture and its industries are also agro based which mostly rely on tea, Jute, Tobacco.

Study area

The Indian state of West Bengal has been divided into five divisions, namely: Jalpaiguri division, Malda division, Burdwan division, Presidency division, Medinapur division. Present study is confined to Jalpaiguri district in West Bengal selected as per purposive random sampling. The problem was analysed by reviewing the statistical data from the concerned departments, news articles, editorial published in newspaper, satellite images and other web resources. The whole district of Jalpaiguri was covered in the study. The data was analysed to reach at the conclusion and reason as well as the impact of forest transformation.

Fig.1.1 Classified Image of Jalpaiguri district showing forest and tree covers

Source- Abhjit Mitra (Researcher)

OBJECTIVES

- To analyze the changes in forest cover for the period of year 2000 to 2017.
- To study the trends in changes in forest cover spatially
- To understand the factor that led to transformation of forest.

DATABASE AND METHODOLOGY

The nature of this project is to analysis forest cover of the district Jalpaiguri. The study was focused on changes in forest area/cover of mentioned district and factor that lead to ccurrence of such change, which can either positive or negative. The resources gathered are mainly from secondary sources, including books, articles, journals and other online published sources related to state of West Bengal. The aim of data collection is to get an insight upon change in the forest cover and reach at the conclusion.

STATUS OF FOREST IN WEST BENGAL

A study which was held by the Forest Survey of India has recently published, that the forest cover of West Bengal's has increased by 3,810 sq km. In an interview with The Hindu State principal chief conservator of forest Azam Zaidi mentioned that beside with other steps the

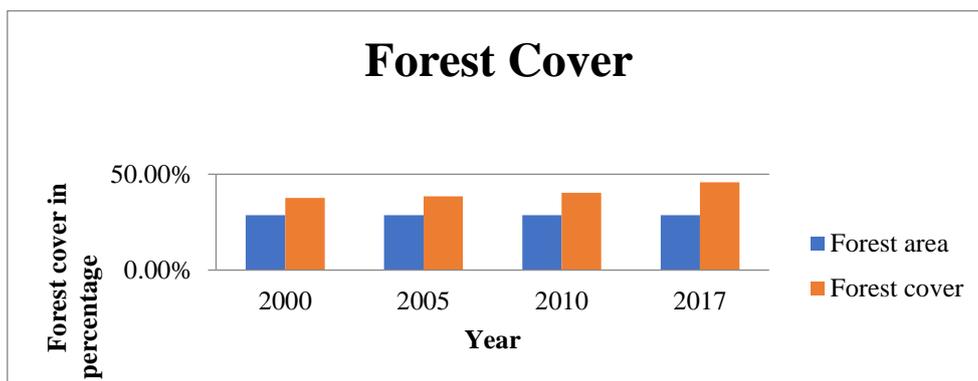
State's joint forest management, where the participation of the local people was involved, is one of the reasons for the boosting of forest cover in the state. "forest cover is increasing in the State due to coppice growth (dense growth of small trees) as well as afforestation taking place within the forests, shady trees in tea gardens, growth of commercial plantations. "But, Interestingly, the other North-eastern states like Arunachal Pradesh, Nagaland, Manipur and Tripura, whose forest cover comprises over 75% of the State's total area, have shown a decline in forest cover.

STATUS OF FOREST IN JALPAIGURI

Foremost part of the district Jalpaiguri is covered by forests, even today the district is considered as one of the most prominent wildlife areas of the country and endures the best Sal forest of India. The main forest cover of the district comprises of Semi Moist Deciduous vegetation. Apart from the high raised forests there are floodplains of rivers like Murti, Jaldhaka, torasa covered with grasslands which nourishes a wide extend of wildlife. Most of the divisions of forest department of Govt. of West Bengal are working over the area for forests like Gorumara, Chapramari, which are declared as sanctuaries and national park for the protection of wildlife. The total forest area of the district accounts 28.74%. But, the district since year 2000 till 2017 has witnessed a great increase in forest cover 37.64% to 45.88% respectively. According to government, the economy of the district is mainly depended on agriculture and its industries are also agro based which mostly rely on tea, Jute, Tobacco.

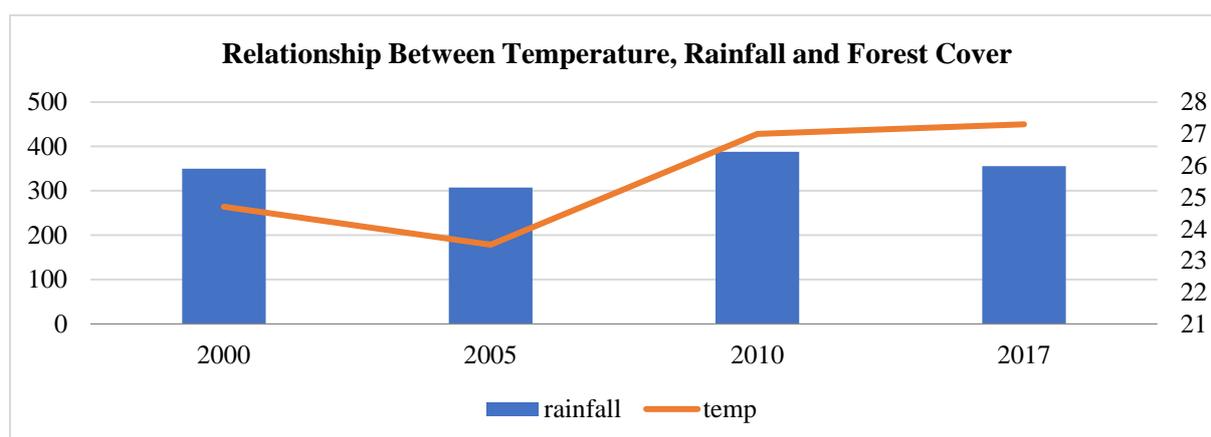
Table .1.1 - Forest Cover of Jalpaiguri District in Percentage

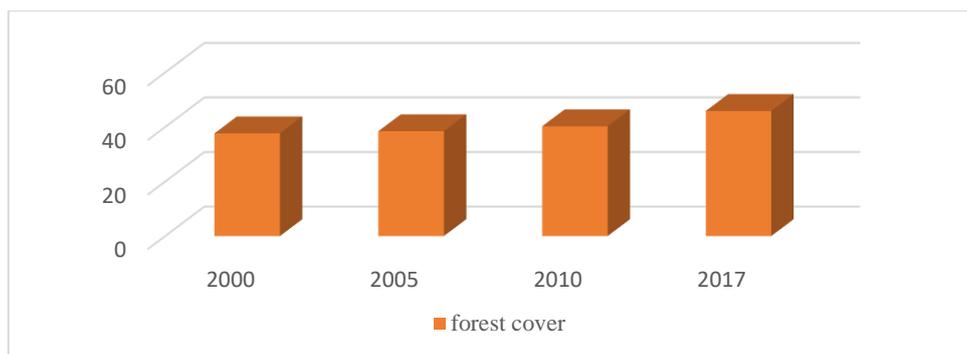
Year	2000	2005	2010	2017
Forest cover	37.64%	38.43%	40.24%	45.88%
Forest Area	28.74%	28.74%	28.74%	28.74%

Fig.1.2- Forest Cover of Jalpaiguri District

TRENDS OF RAINFALL, FOREST COVER, TEMPERATURE

In year 2000, forest cover of the study area was 37.64% with average annual temperature recorded of 24.7°C and annual rainfall as 350cm. whereas as in 2005 as the annual temperature and rainfall further decreases to 23°C (El-Nino Year) and 307cm respectively as result of which only 1% rise in forest cover was seen. In 2010 as annual temperature and rainfall both increases, simultaneously forest cover also increases to 2%. In 2017 slight decrease in annual rainfall was observed with not much deviation in temperature but forest cover was increase to 45% because of positive human efforts like agro forestry, afforestation, strip plantation etc. Hence, overall it can be said that there is no relation between temperature and rainfall in the mentioned area.

Fig 1.3- Graphical Representation of trends of Rainfall, Forest cover, Temperature

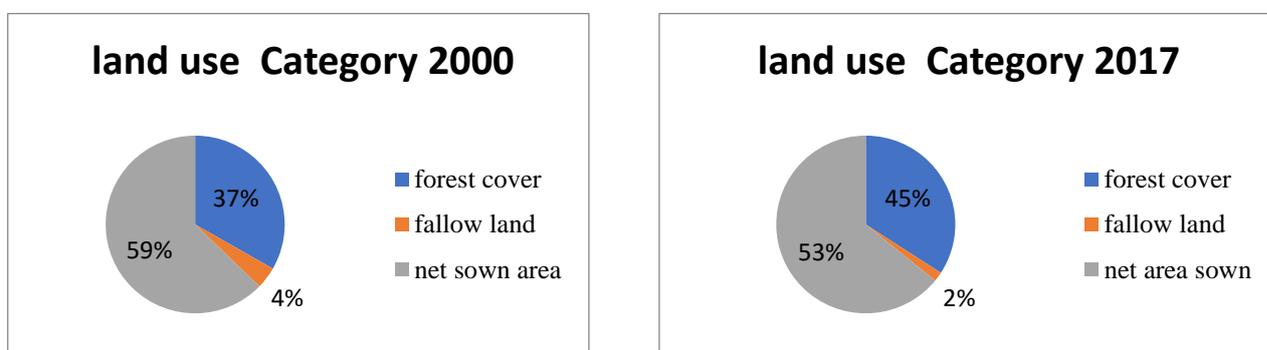


LAND USE IN YEAR 2000 AND 2017

Today rational use of land has achieved a great importance due to growth of population, the increasing demand of food grain. Land-use is generally the common use of land by human. Land utilization includes the modification and management of natural environment or wilderness into built environment such as agricultural fields, pastures, and settlements, etc. Jalpaiguri been a rural dominated area has its utilization of land in agricultural perspective.

Jalpaiguri District is an agro-based region, where approximately 73% of the total district population lives in rural area. It is quite obvious that most of the area of the district will be under the influence of agriculture activity. Thereby, the net sown area covers 59%, where forest cover 37% and 4% is covered by fallow land in year 2000. Whereas, In the year 2017 there has seen further increase of 7% in forest cover which makes it 45%. The net sown area and fallow land has decreased to 53% and 2% respectively within seventeen years.

Fig.1.4-Landuse pattern 2000 and 2017



Source- Statistical Abstracts of West Bengal 2000 & 2017

FACTOR LEADING TO INCREASE IN FOREST COVER

Few conventional methods to conserve forest cover have been witnessed in the region. As the forest cover is gradually increasing from last 15 years, it shows that the rate of afforestation has over taken the rate of exploitation. There are few non-conventional methods that are adopted to conserve the valuable forest of the area such as,

Social Forestry

Social forestry programmers were launched in 1981-82 in the Darjeeling and Jalpaiguri districts of West Bengal for overall rural development and to use the waste as well as barren lands along the roads, canals, and railway lines. There few recorded areas in Jalpaiguri district like Kalabari, where tree planting has been taken up successfully on every piece of vacant, barren lands, along roads side. Farm forestry and strip plantation are two important components of social forestry.

Agro-forestry / Inter-cropping

Agro-forestry is a system of land use which combines growing or raising crops (and or livestock) with woody plants are done. The farmers of district have adopted agro forestry practice with various forest and fruit tree crops. Agro forestry is very important for soil, conservation, timber, fibers. It plays a major role in protecting the environment as well as forest of the region. Agro forestry is an old practice which is going on not only in district but in entire West Bengal. Mango based agro forestry with rice and other suitable crop is found most profitable.

Eco-Tourism

A nature lover can truly feel the warmth of true abode of nature in form of Eco Tourism which includes the warmth of unexplored places of Bengal, especially in the north and some parts of rural countryside with its major contribution towards the promotion of Eco Tourism in India. Therefore, for economic benefits, that somewhere plays the major role in saving environment, Tourism can be considered as the most productive industry that covers all the feasible

conditions. Eco tourism is also one of factor which has enhanced the growth of forest in the region.

Plantation on Tea gardens

Jalpaiguri is a non-industrial district, though tea industry is the backbone of jalpaiguri's economy since its emergences. The northern strip of the region is hilly tract, which is compatible for tea cultivation. Jalpaiguri is the second largest producer of tea after Darjeeling. It can be said that the ample amount of tea cultivation has led the foundation of tea industries in the districts. Teas are grown under the canopy of tree which provide shade and are essential for production of good tea leaf. A good number of tree species are planted in the tea garden which also up to an extend contribute to the forest cover growth.

CONCLUSIONS

Present study is associated with change in forest cover of Jalpaiguri District. Forest plays a very crucial role in functioning of ecosystem. Jalpaiguri being an agro-based region where 72% of the total population living in rural area has led to increase in forest cover of the district. Since, more than half of its total population lives in rural area, the land use pattern has also altered within the region. The district has utilized its fallow land into net sown area and forest cover. Department of forest, West Bengal had played a crucial role in conserving the forest cover of northern districts of the state. Certain methods to increase the forest cover were enacted in the study region such as, social forestry, farm forestry, intercropping system, strip plantation due to which forest cover increased from 37% to 45%. However, the level of precipitation and temperature in the study area couldn't attain its average level from year 2000 till 2017 since; the variation is very less from its normal value there hasn't witnessed any negative impact of these phenomena on forest cover.

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