

The Seismicity Of North East India- Its Strain Release, Accumulation And Potentiality And Seismic Indifference In The Assam Gap: An Analysis

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Abstract: North-East India (N.E. India) is highly earthquake vulnerable area surrounded by the Himalayas, Arakan Yoma, Hills and plains of Bangladesh, etc. it falls within the zone V of seismic intensity and one of the sixth active zones of the world. Its earthquakes are all of morphometric mainly due to collision between India and Chinese plates in the north and Indian and Burmese plates in the east and south and due to local rift and fault displacements that criss-cross the whole region. The region has the highest strain release in 1897 and 1950 based on which it may be observed that the strain is somehow gaining accumulation here day by day and increase the seismic potentiality of a great earthquake to be occurred in near future. Again from isostrain map, it is to be noticed that the valley part of the Brahmaputra & Barak and the Shillong Plateau have the high accumulation strain and low release of strain. Assam Gap zone named by Kayal as Aseismic Corridor has the lowest release of strain or almost nil is becoming a mysterious zone for the seismologists and apprehension of presence of future strong epicenter in this zone is increasing. But two zone shows no reaction to the morphotectonics of the region except few in the long history and the sign of future presence of epicenter in this zone is still remain uncertain as per theory and applied seismological sciences. North-East India may be divided into six seismotectonic zones as Eastern Himalayan Collision Zone, Indo-Myanmar Subduction Zone, Syntaxial Zone of Himalayan Arc and Burmese Arc (Mishimi Hills), Plate boundary Zone of Tripura-Mizoram Fold belt and the Aseismic Corridor or Assam Gap Zone.

Key words: Seismicity, Morphotectonics, Aseismic Corridor, Seismic Potentiality, Strain Release, Strain Accumulation, Assam Gap.

1. INTRODUCTION

N. E. India is highly tectonically sensitive zone where mountains and valleys are of very recent origin. The Himalayas in the north is existing over the collision zone of two plates under viz. the Indian Plate and the Chinese or Asian Plate and the Arakan Yoma in the east is over the subduction zone of the Indian Plate and Burmese Plates. It is an arcuate zone of plate consumption where in the north, the plate collide at the rate of 5.5 cm/yr (Minster and Jordan, 1978). The region has been experiencing a long history of earthquake occurrence having both high magnitude and high frequencies. These are believed to occur due to its high complexities in morphotectonics. Seven high magnitude earthquakes occurred during the last 100 years as for example having magnitudes 7.5 in Cachar (1859), 8.7 in Shillong (1897), 7.6

in Assam (1918), 7.1 in Dhubri (1930), 7.2 in North-East India (1943), 7.9 in Main Boundary Fault (1947), 8.7 in Indo-China border (1950) and 7.2 in Indo-Myanmar border (1988).

Objective

The main objective of the study is to analyse the seismicity of North East Indian terms of Strain Release, Accumulation and Potentiality & Seismic Indifference in the Assam Gap.

Database and Methodology

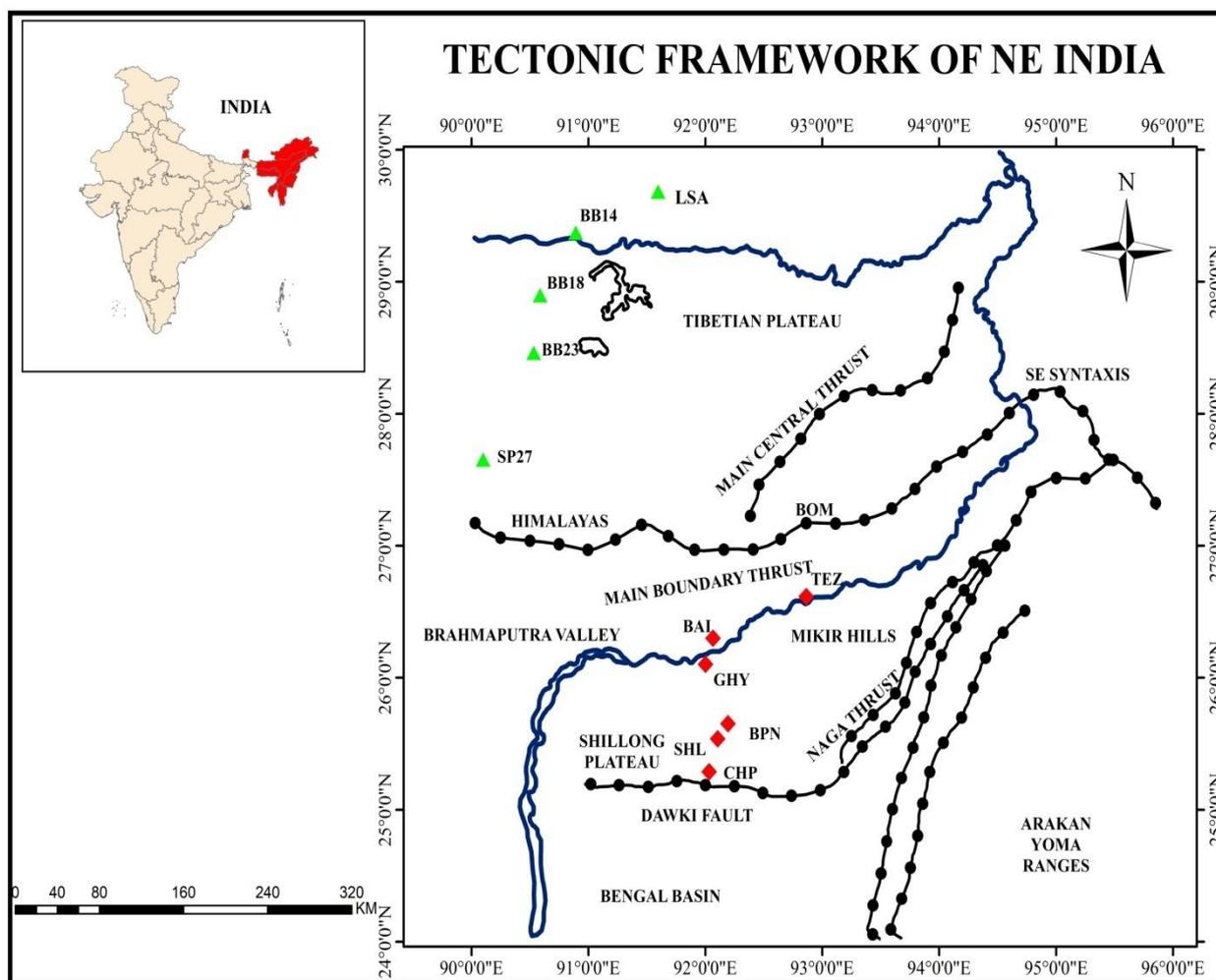
The present study have been done using secondary databases in respect of journals, books, Ph. D, M. Phil Dissertations and monographs with a view to develop a broad theoretical framework of the work. For mapping purpose Geographical Information System has been applied.

Review of Literature

Seismicity in North-East India is studied by many seismologists as Chouhan et al. (1966). Tendon and Srivastava (1976), Verma et al.(1976), Kaila et al., Guha et al. (1984), Khattri and Wyss (1975), Arun Bapat, etc. on many fields.

Morphotectonic and Geo-tectonic framework of North-East India

The Himalayan mountain of recent origin in the north, Shillong plateau, Karbi Anlong and Barail range in the middle, the Patkai-Arakan Yoma in the east and south-east exhibit a congested mountain-valley-plateau combined complex physical as well as geotectonic framework of the region (fig: tectonic framework map). The valley, mountain and the plateau are bounded by faults, thrusts etc. as the great boundary fault in the south of the Himalayas and the north of the valley, steep fault in the north of Shillong plateau bordering the Brahmaputra valley, the Dauki fault in the south of the Shillong plateau (dextral transcurrent fault by Evan, 1964 moving 250 km towards east), Naga thrust east of Shillong Plate – syntaxial bend and faults in the east by Himalayas and Arakan Yoma in the north-east Valleys have crustal shortening to the extent of 150-300 km (Evan, 1964). Geology of the valley is alluvium above, 4-5 km thick tertiary rock in the middle and the pre-cambrian basement rock in the below- extending from Karbi Anlong and Shillong Plateau. Indian plate is dipping northward that is evident from earthquakes occurred uptill now (Fitch, 1970; Molner et al. 1973; Rastogi, 1974; Das and Filson, 1975; Tandon and Srivastava, 1975; Chauhan and Srivastava, 1975; Chanda, 1978 and Srivastava and Chowdhury, 1979). In the east , Arakan Yoma is characterized by fault thrust and strike slip; dauki fault is Thrust faulting in E-W trend-all indicate the northward movement of the whole landmass and the lithosphere under eastern Himalayas, Assam Valley and Shillong Plateau is still rising. Indo-Burma border faults and geological structures are all in north-south direction. The pressure and tension axes plunge nearly parallel and perpendicular to the trend of the mountain range (Ichikowa et al., 1970). The important fault and lineament over which the epicenter exists are Jamuna fault, Main Boundary fault, Dauki fault, Kapili lineament and Brahmaputra lineaments.



Seismicity: The seismicity may be studied in two directions.

Spatial: The seismicity of N. E. India follows the following characteristics:

1. Seismic epicenters in N. E. India follow the line of major faults, thrusts and lineaments- JF, MBF, KL, BHL, etc.
2. Concentration areas are whole of Manipur and south of Nagaland and most active. The areas extended between $92^{\circ}-93^{\circ}\text{E}$ & $26^{\circ}21' \text{N}$ and the middle part of the Shillong Plateau are more active. Western part of Tripura is active due to aftershock of 1950 great earthquake. Southern part of Meghalaya (where 1897 earthquake occurred) and Assam Gap have practically absence of seismicity and the area between Shillong Plateau and Karbi Anglong are less active.

Temporal: Space –time plotting study from the Shillong Plateau and other region, it is not that the major earthquakes decrease after last part of seventies, but small earthquakes are increasing in number, of course, there is the limitation of availability of data. There was a quiescent period of seven years before 1950 great earthquake may raise question which signifies the strain accumulation beneath. The highest earthquake frequency of occurrence was during 1950-51 and 51-52 but the frequency of occurrence around 1897 when the highest

magnitude earthquake occurred was not as high as that occurred after one or two years of 1950's earthquake. Now the frequency decreases which may indicate the accumulation of strain.

Strain Release and Accumulation Study: The strain release may be studied in the light of the Gutenberg and Richter (1956) method.

1. $\text{Log}\sqrt{E} = \sqrt{(11.8 + 1.5M_s)}$ for surface wave

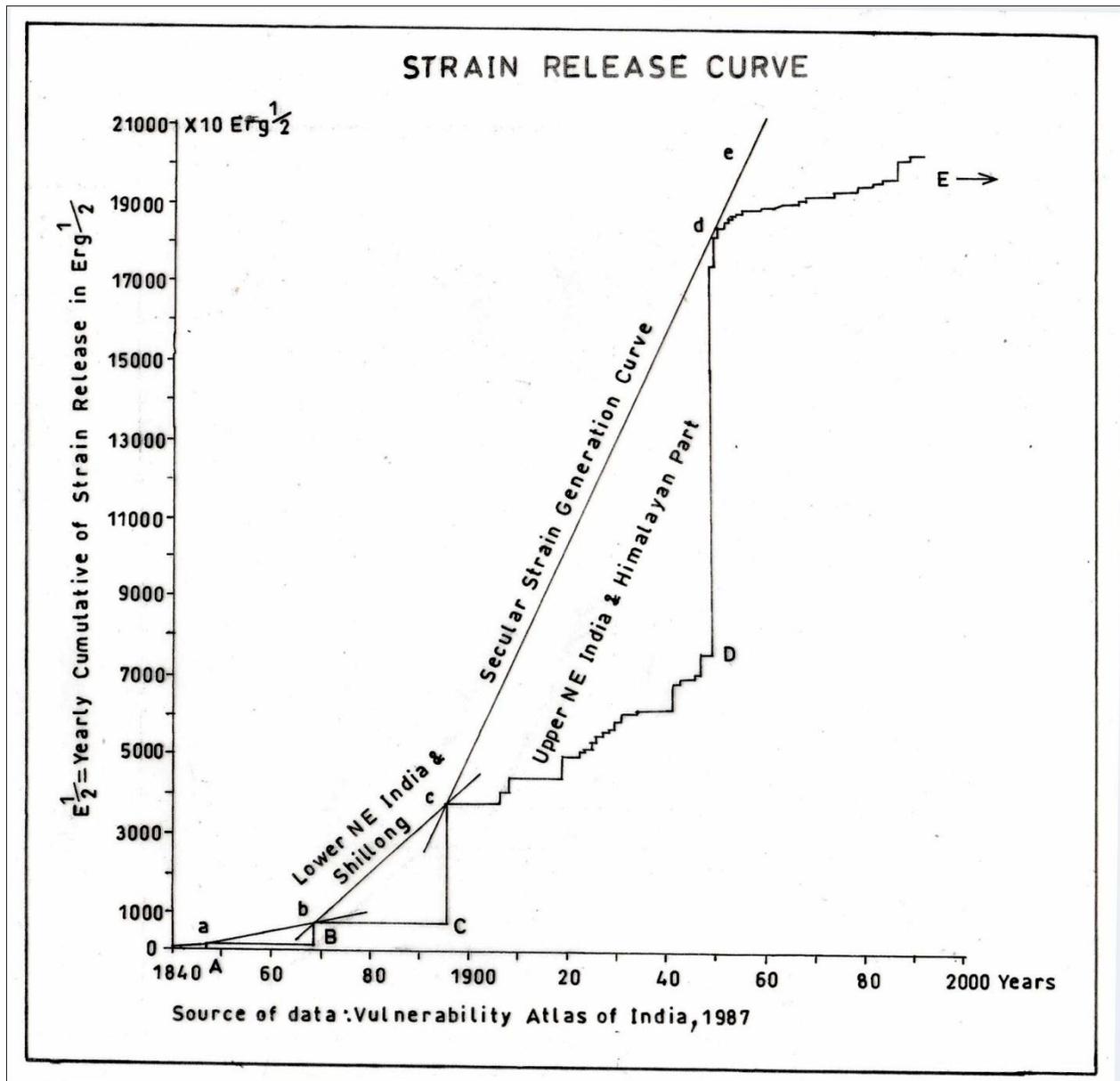
Where E= Energy, M_s =magnitude

2. $\text{Log}\sqrt{E} = \sqrt{(5.8+2.4m_b)}$ for body wave

Where E= Energy, $m_b=2.5+0.63 M_s$

$$\text{So, } E^{1/2} = 10^{(5.8+2.4m_b)/2} \\ = 10^{2.9+1.2m_b}$$

With these methods, the energy release is studied from the N. E. India within 25° N to 29° N and 93° E to 97° E area and major earthquakes that occurred in N E. India are also included and incorporated in the study (fig: strain release curve, based on earthquake date 1846-1993). We must consider N. E. India as single regional entity and great earthquakes of 1869, 1897, 1906, 1908, 1918, 1923, 1930, 1931, 1943, 1949, 1950 and 1988 that occurred in different parts of N. E. India are to be considered. The study reveals that the strain was gaining before after 1950 in the whole region. From the earthquake strain release graph, it is noticed that there are 4 periods of maximum earthquake activities (a, b, c, and d) and 4 periods of stress accumulation (A, B, C and D) before 1950. The present ongoing earthquake period will have a "e" point elsewhere of maximum activities and a "E" point of maximum stress accumulation towards right-hand side. From the graph, it is also noticed that the length of quiescent period increases with the increase of time and the increase of maximum stress accumulation and release. So far record is available, the maximum activity years are 1846, 1869, 1897, 1950 and the years of maximum stress accumulation are the years just before the years of maximum earthquake activities. The periods of maximum stress accumulation are before 1846, 1846-1869 (23 years), 1869-1897 (28 years), 1897-1950 (53 years) and 1950 onwards. So the gap periods are 23 years, 28 years and 53 years. The gap period increases first by 5 years and second by 25 years (5 times than the previous year) and it may be



envisaged that the ongoing gap may not be less than 125 years (5 times at minimum as the previous one). But it is not a problem of mathematics or statistics, but depends on the actual reality. The volume of stress accumulation and released is tremendously increasing with the yearly rate, but the geometric rate of progression (number of time increased than the previous ones) is decreasing with the increase of time- e. g. 1846-68 (8.6 times), 1869-97 (5.2 times), and 1897-1950 (4.6 times). Again it is noticed that the aftershocks last for long time- for many years may be. The yearly individual release of stress may be noticed as follows:

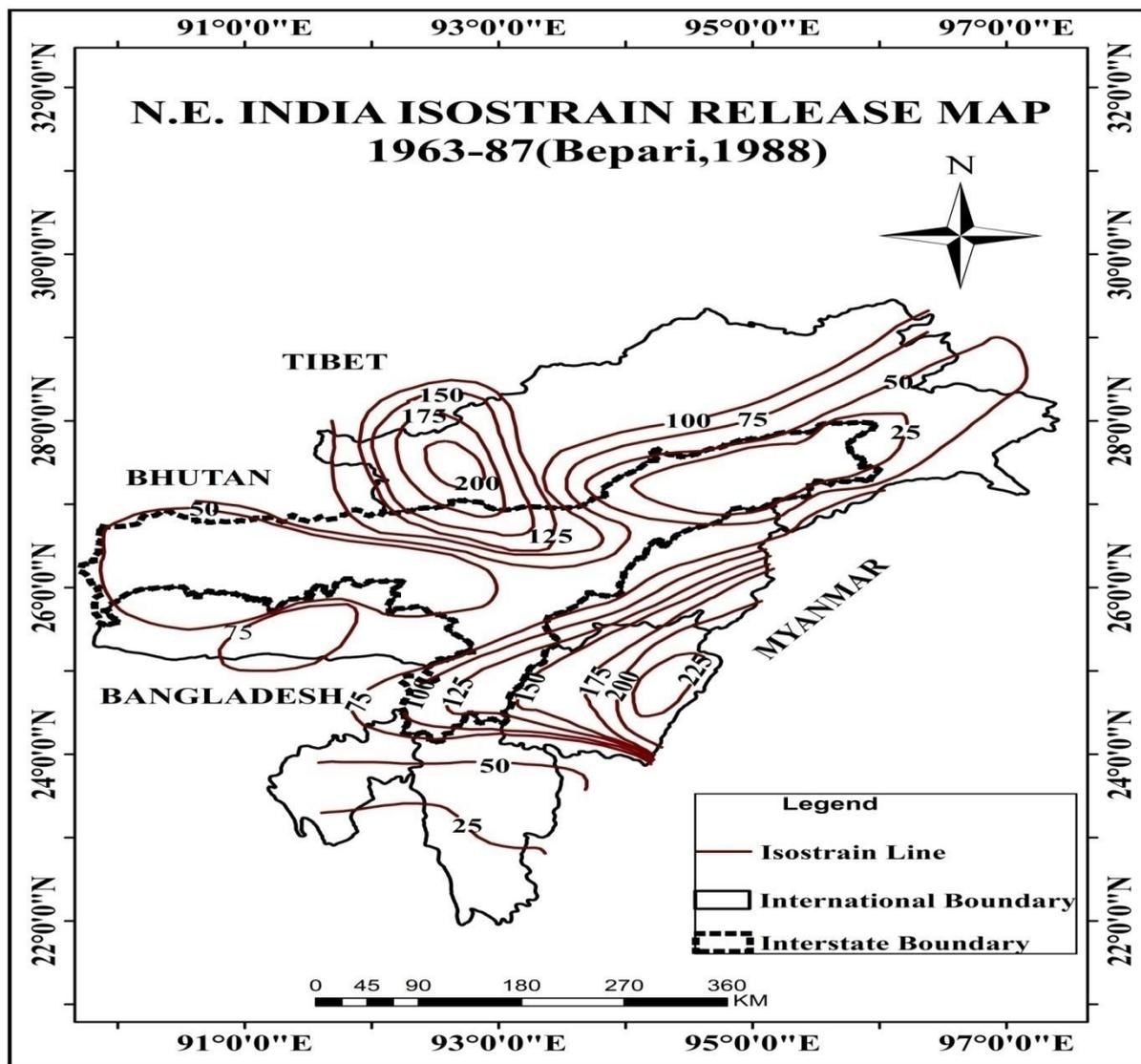
1846 - 82 ergs^{1/2}

1869 - 626 ergs ^{1/2}

1897 – 3000 ergs $\frac{1}{2}$

1950 – 9863 ergs $\frac{1}{2}$

Study on isostrain map of recent years exhibits that the strain release is maximum in whole of Manipur, south-east Nagalad, western part of Arunachal Pradesh and release is minimum in Upper Assam, Karbi Anglong upto south-east of Shillong Plateau (fig: isostrain release map). The valley part of the Brahmaputra has the lowest release of strain throughout history or it is a domanat basin which has very less number of epicenters within it.



b Values:

The study of b value indicating stress condition also may be of some indicators about the impending earthquake. b value may vary from time to time and if it is found high, there is the release of stress and when decreases, the stress increases. During aftershock time of major earthquake, b values are found slowly increasing and during foreshock time b values are found smaller. b values vary from 0.5 to 1.0 for tectonic earthquake and larger values are for volcanic earthquakes. From the studies of b values (Bepari, 1988), it is found ranging from 0.25 to maximum 1.43 having some 3 periods of ups and downs during 1963 to 1987 with 1975 at minimum. Where b values are minimum, it indicates the earthquake may come soon. Sudden up and down of b values will indicate instability in stress and increasing of stress.

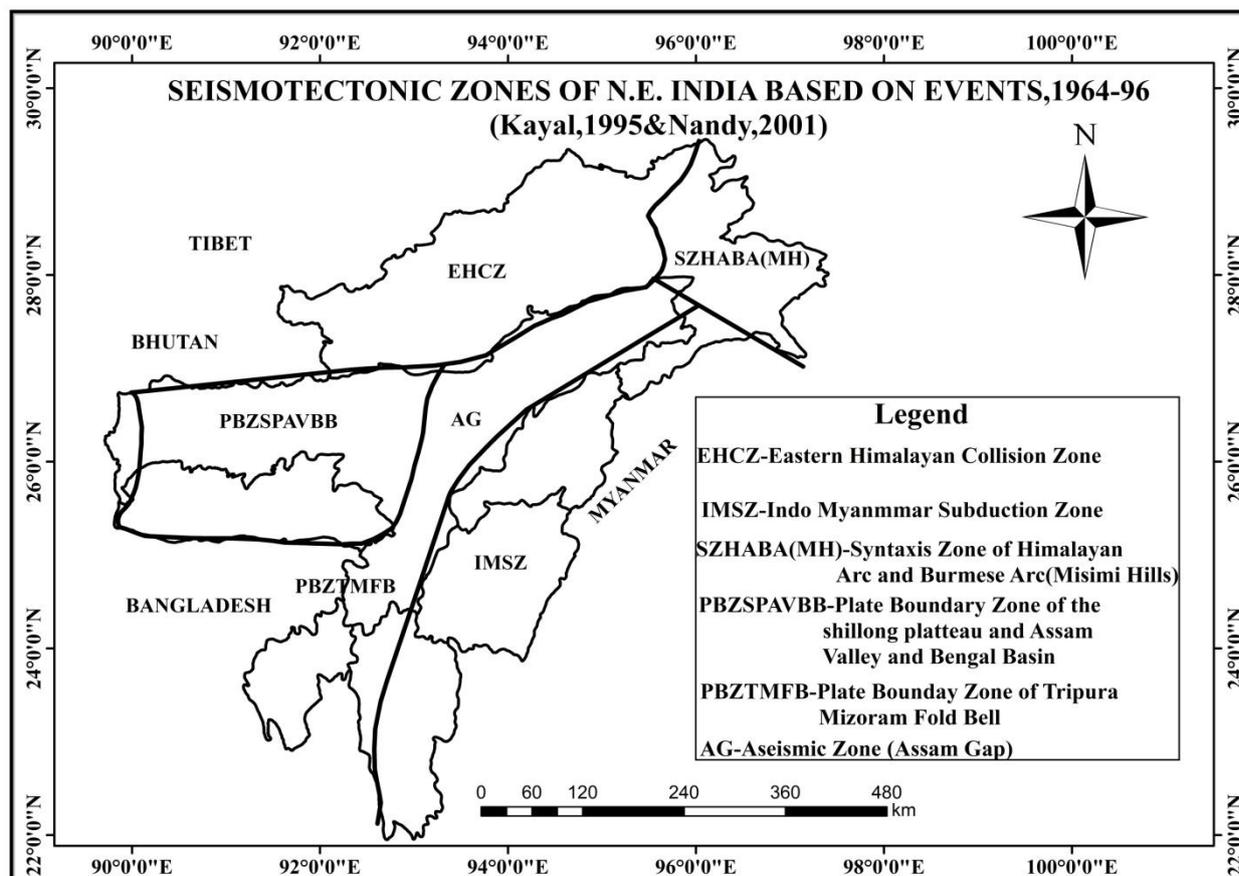
The Assam Gap:

The Assam Gap (Khattri et al. 1983) may be a region of accumulation of strain. But it is not behaving usually as we assume. The Assam Gap is located $25^{05'}$ to $28^{045'}$ N and $92^{05'}$ to $95^{05'}$ E (Khattri and Wyss, 1978). The Assam Gap is defined as region where earthquake activity is less corresponding to neighbourhood areas along plate boundaries (Srivastava, 1978). The Assam gap (Khattri and Wyss, 1975) is lying between rupture zone of 1897 and 1950 earthquakes in Assam, formerly known as seismicity gap (Fedotov et al. 1970; Kellehar, 1970; Sykes, 1971) extends for 400 km (previously) but later on due to demarcation of boundary by liquefaction and slides and Kapili asperity, the length is reduced to 240 km (Khattri et al., 1983).

According to Khattri et al. two criteria are there regarding gap:

1. The segment is a part of the major seismic belt characterized by strikeslip or thrust faulting,
2. Not ruptured for at least 30 years.

After 1943, no earthquake epicenter is located in the Assam gap. There are six grades of gap region having different seismic potentiality. The highest one is categorized as no. 1 and in this way; higher values are given up to six to mean less to lesser potentialities. The Assam Gap is assigned to category 2, because it experiences only 1 large shock (epicenter) in the past 30 years ago but less than 100 years ago. The region except western part is in quiescence for sufficiently long time. According to Kanamori (1981), though earthquakes are preceded by a period of quiescence, but it does not necessarily indicate an impending great earthquake. This type is not found similar to Japan's doughnut pattern (Mogi, 1979) or swarms (Evison, 1977; Wyss et al., 1978) or foreshocks (Ishida and Kanamori, 1977; Jones and Molner, 1979), and decrease in activity (Ohtake et al., 1977). So this region, though has high potentiality, but is uncertain regarding the time of occurrence of great earthquake in future and so can't be forecast (fig:seismotectonic zones map).



Micro-Zonation of Earthquake in N.E. India:

Kayal (1996) and Nandy (2001) have divided N. E. India into five seismotectonic zones based on distribution of epicenters, fault-plane solutions and geotectonic features. These are-

1. Eastern Himalayan collision zone.
2. Indo-Myanmar subduction zone.
3. Syntaxial zone of Himalayan arc and Burmese arc (Mishimi Hills).
4. Plate boundary zone of the Shillong plateau and Assam valley.
5. Bengal basin and plate boundary zone of Tripura-Mizoram fold belt.

The Assam Gap may be isolated from Shillong Plateau plate tectonic zone. So it will be consisted of as sixth zone (fig:seismotectonic zones map).

2. CONCLUSION:

It is noticed that as the accumulation of stress between 1897 and 1950 was growing, the stress is also gaining after 1950 which finds rare chances to release. The accumulation and released volume of stress increases tremendously with the increase of time. The observation into the gaps between earthquake events brings into light that as the gaps increased with the increase of time, now it may be felt that there is no possibility of occurrence of a great earthquake soon. Again the Assam Gap though is having tremendous possibility of the occurrence of a great earthquake, yet it remains as uncertain regarding occurrence or the time of occurrence. The study of b values indicates the accumulation of stress and possibility of early occurrence of a great earthquake. But the forecasting systems are yet to get maturity in this region which to be taken care of with definite fruitful technology and effective methods.

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DEVELOPMENT OF BODOLAND MOVEMENT IN ASSAM: IT'S TREND

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Abstract

Historically Bodoland Territorial council was inhabited by the Bodos or Boros. Along with other parts of Northeast India, regional aspiration in the region reached a turning point in the 1980s. The isolation of the region, its complex socio-economic character, and its backwardness compared to other parts of the country have all resulted in the complicated set of demands ranging from demand for autonomy and opposition to 'outsiders' to movements for secession. The Plains Tribes Council of Assam (PTCA) had demanded, since its inception in 1967, for a separate union territory for the Bodo or Boro and other plain tribes to be called *Udayachal*. With the failure of PTCA, The All Bodo Students' Union (ABSU) allied with National Democratic Front of Bodoland (Progressive), People's Joint Action Committee for Bodoland movement which is an amalgamation of over three dozen Bodo organisations and its supporters are demanding from the Government of India that a separate state be created where significant numbers of Bodo people live. On the other hand, it is also claimed as a sovereign state (Complete Independence) by the Separatist group NDFB launched the Bodo Movement in 1987 with the demand for a separate state to be called Bodoland, ending with Bodo Accord of 1993 with the formation of Bodoland Autonomous Council following a further agreement, the Bodo Territorial Council was formed, with a mission to accomplish development in the area of economic, education, preservation of land right, linguistic aspiration, socio-culture and ethnic identity of the Bodos and above all to speed up the infrastructure development of communities in the Bodoland area.

Key words: bodoland, movement, ABSU, BTC, Separatist groups.

DEVELOPMENT OF BODOLAND MOVEMENT IN ASSAM: IT'S TREND

The Bodo is a major plain tribe of Assam. The Bodos are one of the earliest settlers in Assam. They migrated to Assam say at about 5000 BC from central Asia such as China, Mongolia, Tibet, and Siberia. Bodos are the branch of great Mongoloid stock. According to Dr. N. N. Acharya, in his book "The History of medieval Assam" he mentioned that the Kacharis are the earliest known indigenous inhabitation of Assam. They are known under different names in different places and ages through out the North East corner of Indian sub-continent. In the Brahmaputra valley the Kacharis are called themselves as Bodo or Bodo fisa. The society of Bodo is basically a rural based agrarian society in which majority of Bodos remained as farmers and weavers. The Bodos were also known as peace lover for centuries.

The awareness among the Bodos noticed today is due to the spread of Brahma religion among them. The beginning of the 20th century is significant in this regard because of the emergence of the Bodo middle class, who had certain level of formal education. In course of time it gave birth to an elite category who contributed substantially to leadership component of the Bodos.

Following the Indian independence with the framing of the new constitution in India Bodos were given the opportunity to take advantage of scheduled Tribe (ST) status. This opportunity leads to the creation of Tribal belts and Tribal blocks. These belts and blocks are identified as protected land for farming and grazing, especially for the Bodo people.

Plain Tribal council of Assam (PTCA) -Demand for Udayachal:

In the early 1960's the plain Tribal council of Assam (PTCA), a political party represented Bodos and other plain Tribal of Assam. It realized certain fact that –

- Tribal belts and blocks are gradually being acquired by rich land lords and new immigrants through illegal means.
- They had little economic aid provided by the central govt. is not sufficient for their educational and other development.
- The financial packages meant for Tribal development are diverted to other heads and misused.
- In Assam Bodo areas were very much neglected. There were hardly any roads and other communications that connected Bodo dominated area to the main cities of Assam etc.

For all these reasons in 1967 the PTCA demanded a Union Territory named Udayachal with the Territory of Assam. The proposed Udayachal map included mainly those areas known as tribal belt and blocks .By the end of 1970's it became clear for them that Bodos had a little or no influence in Indian political process.

All Bodo Students' Union (ABSU)-Movement for Bodoland:

With the question of Self determination and identity issue the All Bodo Students Union (ABSU), formed on Feb.15, 1967 at Tribal rest house of Kokrajhar. On March 2, 1987 the ABSU launched vigorous Bodoland movement for a separate state of Bodoland under the leadership of Upendra Nath Brahma, the then President of ABSU. The ABSU created a political organization, the Bodo People's Action Committee (BPAC) to spearhead the movement. The ABSU/BPAC movement began with the slogan of "Divide Assam 50-50". Since 1987 Bodoland movement is basically known as ABSU led movement. The ABSU/BPAC led movement ended with the first tripartite Bodo accord on Feb.20,1993.The Accord paved the way for the creation of the Bodoland Autonomous Council (BAC) .The BAC come as a failed experiment as its territory was not fully demarcated. On July 1994 the ABSU launched agitation against the Accord and revived their demand for Bodoland.

Birth of insurgency groups –Demand for Bodoland:

The Bodoland movement became more violent during the later part of 1990's. With the demand of separate Bodoland a number of insurgency group emerged in Bodo areas. On Oct.3, 1986 Bodo Security Force (BSF) under the leadership of Ranjan Daimary was formed. On Nov.25, 1994 BSF renamed as National Democratic Front of Bodoland(NDFB).On 30,1996 Another outfit the Bodo Liberation Tigers (BLT) under the leadership of Hagrama Mohilary emerged.

Both the outfits began an ethnic cleansing campaign in the proposed Bodoland areas. A large number of people were killed and thousands become homeless. Moreover, they involved in various disruptive activities including road blocked, kidnapping, extortion etc. On July, 1999 BLT declared unilateral ceasefire in response to the Central Govt. appeal for peace talks and in the same year informal talks started between the BLT and the Govt. of India. Under the leadership of Hagrama Mohilary the BLT laid down their weapons on Dec. 6, 2003. On Feb. 10, 2003 the BLT finally signed an Accord with the centre and the Govt of Assam to pave the way for the creation of a Bodoland Territorial Council (BTC). The map of Bodoland overlaps with the districts of Kokrajhar, Baska, Chirang and Udalguri. ABSU was not a signatory of the Accord but supported it. Currently the map of Bodoland includes the Bodoland Territorial Area Districts (BTAD) administered by Bodoland Territorial Council (BTC). Kokrajhar serves as the capital of Bodoland. Hagrama Mohilary is the chief of the BTC.

However, the demand for separate Boroland is still standing among the ABSU and the other organizations of the Bodos. The reasons behind this ----

- The creation of a council is not enough to protect their identity.
- It failed to fulfill the hopes and aspirations of the Bodo people.
- To them BTC failed to take effective steps for the improvement of the law and order situation in the BTC area,

- The Govt. of Assam is yet to take effective steps for the protection of the Tribal belts and blocks.
- On the development front, the ABSU alleged that adequate funds are not provided to the BTC etc.
- Adequate reservation is not fulfilled as has been mentioned in the constitution.

Thousands of Bodo people assembled on March 2, 2012 at Amingaon of Kamrup (Rural) Dist. To attend a mass rally under the banner of the ABSU, vowed to identify their struggle for the creation of a separate state of Bodoland. The students' body also brought cycle rallies and held public meetings time to time to organize the Bodo people in different parts of the state. The ethnic violence emerged in three districts of the BTC in the last July-Aug. 2012, fires the struggle more to protect their issue of identity. Veteran Bodo M.P. S.K. Bismutiary has joined hands with the ABSU for the creation of Bodoland. To him the demand is just and birth right of the Bodos.

NDFB and the development of Bodoland movement:

In the development of Bodoland movement, the NDFB which was formed in 1994, first split in the year of 2005 after signing the bilateral truce with the centre. The first faction of NDFB is known as NDFB (progressive) led by Gobinda Basumatary. Remaining adamant on its demand, involved in political dialogue with the centre, raised the issue in such a mood that even if the the centre declines the state hood demand of Telengana, they will continue their movement .A faction of the NDFB led by Ranjan Daimary declared unilateral ceasefire truce in Aug. 1, 2011 On Nov.2011 Assam Govt. asked the centre to appoint an Interlocutor for peace talks with the anti-talk faction led by Ranjan Daimary. P.C.Haldar a former Director of Intelligence Bureau has been appointed as the representative of the Govt. of India to negotiate with the outfit. Meanwhile informal talks on the issue of NDFB(R) are continuing. Regarding formal talks with the NDFB(R) is depend on the release of Daimary on bail according to an official source of Assam Tribune on Feb.26, 2013 .On the other hand, talks with the NDFB (P) hit a roadblock With the outfit demanding that the next round of talks should be held at the political level and not with the Interlocutor, who has no the power to take political decision. Recently, there was a split in the NDFB (R) led by one of the trusted lieutenant, I.K.Sogbijit alias Sirsing Ingty he is known as the close to Paresh Baruah, against peace talks and adamant for sovereign Bodoland.

Bodo National Conference and Bodoland movement:

On Nov.18-19, 2010 two day open session of Bodo National Convention was held at Kokrajhar. The aim of the convention was to form a new organization, Bodo National Conference in which various political and non- political organizations involved to unite and integrate the Bodo people to meet their variety of issues including formation

of Bodoland, peace talk with the NDFB etc. It has four executive members committee, the BTC Chief, Hagrama Mohilary, the Dpty. Chief of BTC Khampa Borgairy, Anjali Daimary the President of Women's Justice Forum and Gobinda Basumatary, NDFB(P).

The people's Joint Action Committee for Bodoland Movement (PJACBM)-Demand for Bodoland:

The NDFB (P) backed People's Joint Action Committee for Bodoland Movement (PJACBM) an umbrella organization of 52 Tribal and Non-Tribal organizations in the west to Sadiya in the eastern part of Assam. The PJACBM also warned the Central Govt. that if the centre creates Telengana state without curving out a separate Bodoland, the organization will restore a mass agitation in Assam. The PJACBM claimed that creation of Telengana without a similar move for Bodoland would be "discriminatory" one 9. Besides other programmes, from Feb.28, 2013 midnight, The PJACBM has been called 100- hours BTC bandh , demanding talks of the NDFB (p) at the political level with the Union Home Minister and also press for a separate Bodoland. The bandh paralyzed the normal life and number of violent incidents reported in BTAD area.

Conclusion:

One of the most important factors is to why the Bodos have gone to become alienated from the main stream of Assam. From their variety of issues it is come to know that they were often been neglected by the state and the Central Govt. since independence. But when we go through the Constitution of India it is come to clear that as like the other Tribal community the Bodos are also not neglected. They have been given the equal status with certain special privileges to other Indian citizen. But it is one of the general belief of the Bodos that the majority of non- Bodo Assamese of the state have never like to accept them as the part.

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Morphometric Characteristics Of Beki River Basin, Assam

Saurabh Barman

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studies relating to environmental and human area in different parts of the world have become the subject matters of fluvial geomorphology.

Among many works so far available in theoretical as well as applied geomorphological fields, notable ones go to the publication of geographical monographs by the University of Chicago under the initiative of G. F. White and his fellow students from 1945 onwards. Some of the works worth-mentioning here are of Jervis (1926), Schumm (1956), Wolman and Miller (1964), Harvey (1965). Chorley (1969) applied morphometric indices to analyse the development of erosional topography. He perceived relationships between the morphometric indice such as channel length, drainage basin area. Coleman (1969), worked on channel processes and sedimentation of Brahmaputra river. Strahler (1971), Smith (1972) and Gregory (1977) contributed valuable works especially on morphological works. Mangelsdorf et al., (1990) in their book discussed 'River Morphology' has elaborated the interplay of flowing rivers and their immediate environment. Any changes in the flow dynamics induced by anthropogenic or any naturally occurring processes brings subtle changes in flow regime and sediment transport calibre of a particular river system.

In India, many scholars have contributed works to the field of geomorphology and problems relating to flood. These works have been done mainly by Tanaskar (1969), Bhattacharya (1973), Sinha and Syatya Ram (1978), Gupta (1982), Das (1987), Goswami and Biswas (1988). Kale, V. S. and Karlekar, S. N. (1988), worked on the relief and drainage morphology where they came with the conclusion that in spite of geo-environmental conditions the fluvial systems reflect different basin and network characteristics. Agarwal (1998) in his study on drainage pattern of Naugarh area of Varanasi district used aerial data and the basin characteristics were studied and evaluated on the basis of morphological and its related parameters. Singh et al., (2013) quantified various morphometric parameters in their study on Morar river basin.

A few works, namely of Goswami (1985), had been done on the river Brahmaputra. The other works namely of Bordoloi (1986) on channel migration of the Brahmaputra near Palashbari, Kamrup. Bora (1991) in his study on Jia Bharali river incorporated geomorphic analytical base, deciphered nature of bed and bank materials, sediment transport characteristics and the dynamics of channel change of the river. Barman (1998) has conveyed the use of morphometric parameters in his study on geomorphological characteristics of the Kamrup district. Bhattacharjee (2008) explored various fluvio-geomorphic aspects of Darrang district of Assam, made vital contributions in deciphering the drainage characteristics of seven river channels draining the parts of the district. Taher (1975), Barman (1982, 1984), Barman (1989), Singh (1988), Gogoi and Barman (1991), Goswami, Dutta and Kalita (1991), Kar and Goswami (1992-93), Roy & Bora (1994) etc. also deserve mentioning.

As the study area is large in terms of spatial extent it is not possible to study the entire area thoroughly within a limited time. The work is designed in the following steps -

Morphometric Characteristics Of Beki River Basin, Assam

Saurabh Barman

Assistant Professor Department of Geography Tinsukia College, Assam.

Abstract

Morphological analysis of a particular river shows the topographic situation and hydrological condition of the catchment area. Morphological parameters indicate the hazards like erosion, flood, channel shifting and other landform development. Therefore, the morphological analysis of a particular river is very useful for the future generation of geomorphologists, planners, administrators and other field scientists. The present paper is an attempt to analyse the morphological characteristics of the Beki river channel and its basin. Data based on primary like field visits, secondary like satellite images and landsat images incorporated with toposheets were meaningfully calculated with high accuracy. Here, we are going to discuss about relief characteristics, basin and channel profiles, basin shape, Elongation and circularity ratios and channel morphology. The relative relief fairly represents the variation of altitude. It is also concerned with the channel morphology- standard, hydraulic and topographic sinuosity indexes.

Keywords: morphology, beki river, relief, elongation ratio, circularity ratio.

Introduction:

Rivers are the dynamic entities and their characters vary over time and space in response to environmental controls. They usually drain over their basin delineated by well-defined boundaries. They can be analysed by a set of quantifiable basin characteristics. The characters and behaviours of the fluvial system at any particular location reflect the integrated effect of an upstream control, viz. climate, geology, physiography and land use. These basin controls in a coherent way determine the drainage regime and the quantity and type of sediment supplied. Assuming importance as a fundamental geomorphic unit (Chorley, 1969), a river basin has thus been considered as the favourable and effective unit for geomorphological studies. Such a unit-based study provides physical basis for a planning-oriented approach towards integrated management and development of land and water resources.



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Conclusion:

Here we discussed about relief characteristics, basin and channel profiles and channel morphology. The relative relief fairly represents the variation of altitude. From the analysis we may say that the basin as a whole shows an uneven physiographic characteristics with varying relative relief. The northern part of the basin is bounded by the 80m contour. Similarly, the area of the basin as a whole shows the diversification in slope distribution. The longitudinal profile of the basin is smooth and concave in nature. This pattern gives an idea that the river has been in dynamic equilibrium. Here also analyse the basin shape. Elongation and circularity ratios are used to analyse the shape of the basin. From the analysis it is seen that the basin is mainly elongated in shape.

It is also concerned with the channel morphology- standard, hydraulic and topographic sinuosity indexes. The average standard sinuosity index of the Beki basin is 1.36 which prove, the channel is slightly meandering. The hydraulic and topographic sinuosity indexes reveal that the channel is mainly controlled by water force not by topographic one.

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Channel Morphology:

Standard Sinuosity, Hydraulic Sinuosity, Topographic Sinuosity:

Table 2: Sinuosity Index of the River

Beki River	Standard Sinuosity Index	Hydraulic Sinuosity (in p.c.)	Topographic Sinuosity (in p.c.)
Overall Sinuosity	1.36	81.63	18.36
Sinuosity of Upper Reach	1.21	91.66	8.33
Sinuosity of Middle Reach	1.3	73.80	26.19
Sinuosity of Lower reach	1.46	84.12	15.87

The sinuosity pattern of the channel indicates the ratio of the channel length to valley length (Schumm, 1963). Through this index we can understand how far a channel deviates from its straight course. The channel is said to be meandered when its sinuosity index is more than 1.3 or 1.5 (according some authorities). Any value less than 1.5 indicates the stream is straight. The Beki river from its entrance at Mathanguri to the mouth near Baghbar is of slightly meandering in nature. The nature of meandering reveals the nature of ruggedness of physiographic base over which the river flows. The sinuosity index of upper reach of Beki river less than 1.5 directing it to be straight, while the middle reach also having straight channel and the lower reach of the Beki river is slightly meandering in nature.

The complex sinuosity index is - Hydraulic Sinuosity Index (HDI) and Topographic Sinuosity Index (TSI). The important role of hydraulic index and topographic sinuosity index is to find out the relationship of topography and water (Muller). These are calculated in terms of percentage.

The hydraulic sinuosity index and topographic sinuosity index of the Beki river reveal that the whole of the river has more hydraulic force. This indicates that the channel is controlled mainly by water forces not by topography. The upper part of the Beki basin gets for more hydraulic control than the topographic control. Because, at the time of storm rainfall, the Beki river other rivers of Assam get full of flood water. Moreover the water along the channel passes over dead flat plain. A very loose nature land surface over which the river flows is not having topographic control on the water passing over the channel in the basin. Similarly the middle and lower reach of the Beki river also get greater hydraulic control than the topographic control.

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Objectives:

The main objectives of the study are as follows -

1. To examine the physical basis of the Beki river channel.
2. To study the morphological characteristics of the Beki river channel and its basin.

Methods of Study and data Base:

Pre-Field Stage:

In this stage the researcher has consulted the existing literature in libraries and different websites (e.g. Shodhganga, , Google Scholar, Jstor etc.) in respect of journals, e-journals, books, Ph. D, M. Phil Dissertations, monographs, personal experience with a view to develop a broad theoretical framework of the work.

Field-Stage:

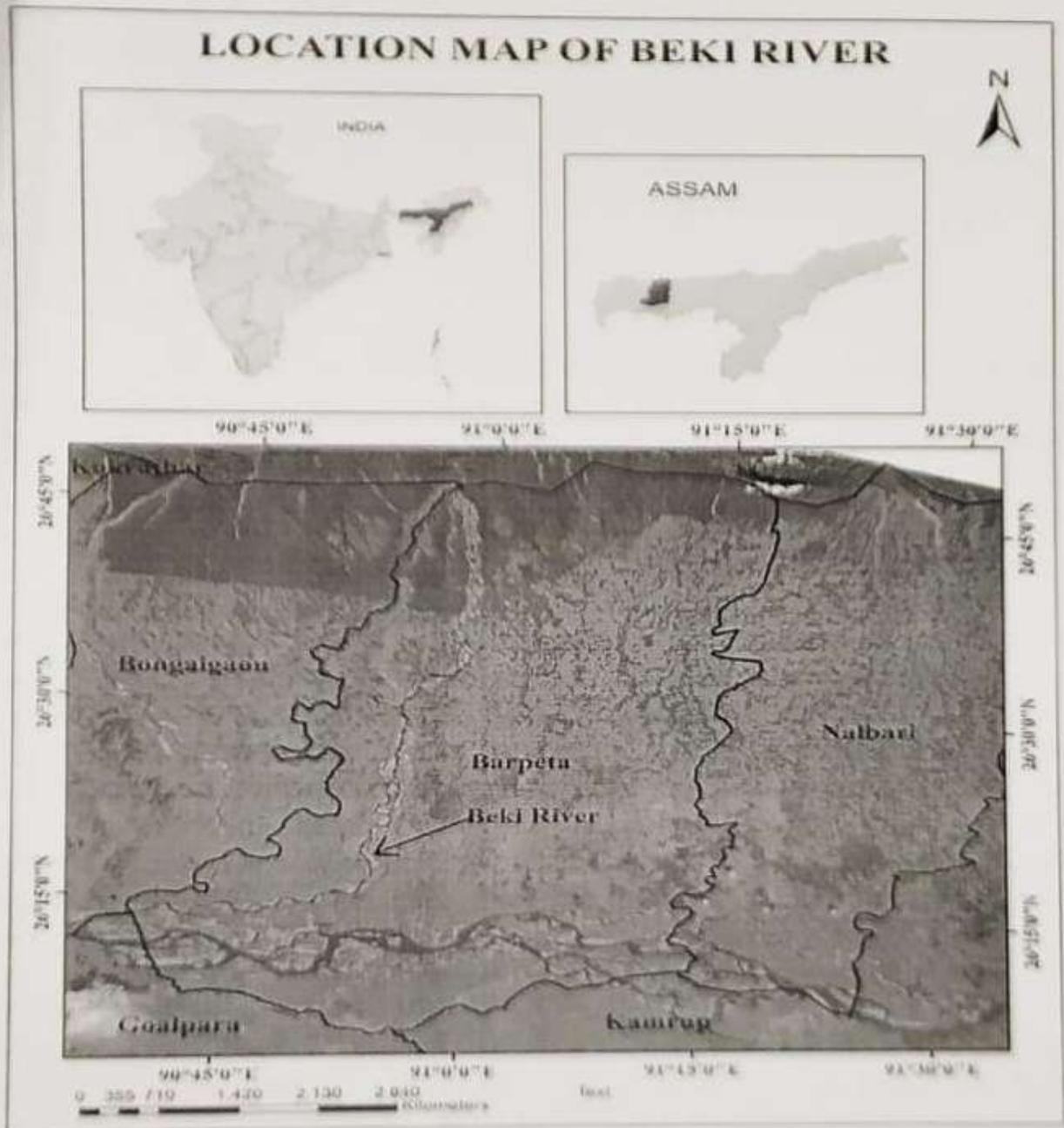
The toposheets of years 1952, 1972, and 1912-13 has been acquired which are calibrated with available satellite images. Satellite images and Landsat images have been acquired from USGS website for various years. Secondary related to rainfall, temperature, water level, discharge, runoff at certain stations has been collected from the Water Resource Department and office of the Manas Tiger Project, office at Barpeta Road, Gabardhana Block Office (Barpeta Road) and Statistical Handbook of Assam. The Head office of the Water Resources department at Chandmari, Guwahati has been visited to collect the same. Atlases along with necessary maps for the purpose published by NATMO has been collected. Morphological changes of the main trunk have been carried out with the help of manual extraction of the drainage network from the available toposheets of various years.

Post Field Stage:

During this stage, the data collected from both primary and secondary sources has been processed and analysed using meaningful software and statistical techniques. Necessary maps, graphs, charts, tables have also been prepared with the help of appropriate cartographic techniques to clear the exposition of the problem of the area. The measurement of morphometric parameters such as Relative Relief, Elongation Ratio (Re), The Longitudinal Profile, Circularity Ratio, Standard Sinuosity, Hydraulic Sinuosity, Topographic Sinuosity has been computed using pre-existing mathematical equations.

Review of the Relevant Works:

A review of some of the existing works pertaining to the line of study is being presented here. The present trend shows that geomorphological and morphometrical



Significance of the Study:

The area under study has remained unexplored in the field of channel morphology. Hence the study has been a great significant one in the applied geomorphology of the basin. The major task lies with understanding and indentifying the morphological characteristics of the Beki channel and its basin related to fluvio-geomorphology. The study will, therefore, be helpful to the future generation of geomorphologists, planners, administrators and other field scientists.

In addition to the study of magnitude, frequency of flows and the probability of both the low and high slope in a drainage basin also focus a great relevance with the significance of changing morphology of landforms. Flood genesis along with its hazard zonation and floodplain management have now received due attention of a host of field scientists towards exploring ways for sustainable human habitation, society and economy.

The river channels are in no way confined to symmetrical and definite tracks. They persistently shift their courses over the space through time. A river has its tendency to attain an equilibrium condition so as to adjust itself with varying fluvio-geomorphic as well as climatic condition. Morphological pattern of any drainage basin is a reflection of a number of dependent and independent factors involved in water and sediment discharges. Adjustment with channel gradient or slope, cross-section, width, depth, velocity etc. has been achieved by the channel as well as by the basin at specific location.

The morphological characteristics associated with channel over time and space is seen to develop mainly due to climate and man-induced effects. The Beki river is no exception to the above conditions. The problem arising out of frequent damage of embankment along the river, especially at Narayanguri, in the upper part of the river, recurrent flood evenly in the lower part and bank erosion at Chafakamar village and other places, for example, have been considered as serial annual events. With this in mind the present problem "Morphological Characteristics of Beki River and its basin, Assam" is undertaken for the study. Hence an attempt is made here to examine mainly the channel morphology of the Beki river.

Study area:

The Manas River is one of the north bank tributaries of the Brahmaputra river. The Beki or Mora Manas originates at the debouching point of the Manas at Mathanguri at an altitude of 97m approximately. It is the easternmost channel of the present Manas network. It flows in a southerly direction by the side of Narainkuri, Chafakamar, Chengla, Jaipur, Goraimarigson, Karakura, Kadang, Majidbhita and meet the Brahmaputra near Baghbar at an altitudinal level of nearly 30m. The channel distance of the Beki river is 90 km whereas the actual river distance is 69 km.

The area under investigation is covered by the survey of India toposheets numbering 781/14, 781/15 and 781/16. It lies latitudinally from $26^{\circ}14'N$ and $26^{\circ}46'N$ and longitudinally from $91^{\circ}0'E$ and $91^{\circ}55'E$.

For the Beki Basin, area of the basin 128.4 km² diameter of the circle with

$$R = \frac{\text{Same area as basin}}{\text{basin length}}$$

Thus,

$$\begin{aligned} R &= 2 \sqrt{\frac{A}{\pi L^2}} \\ &= \frac{2}{\sqrt{\pi}} \sqrt{\frac{A}{L^2}} \\ &= \frac{2}{\sqrt{3.1416}} \sqrt{\frac{128.4}{76^2}} \\ &= 1.128 \times 0.149 \\ &= 0.2 \end{aligned}$$

The value of 'R' varies from 0 (highly elongated shape) to unity i.e. 1.0 (circular shape).

Thus, the value of R is 0.2 the basin is elongated shape.

Circularity Ratio:

Similar to elongation ratio, the measure of circularity ratio acts as a perimeter of basin morphometry. Miller (1953) used the measure which is the ratio of circumferences of a circle with same area, as the basin to basin perimeter. The value range around 1.

The Basin area 128.4 km²

Circumference of the basin = $4\pi \times 128.4$ km²

Perimeter (P) of the basin = 142 km

$$\text{Circularity ratio} = \frac{4\pi A}{P^2}$$

$$\begin{aligned} &= \frac{4 \times 3.1416 \times 128.4}{142^2} \\ &= \frac{5539.38}{20164} \\ &= 0.27 \end{aligned}$$

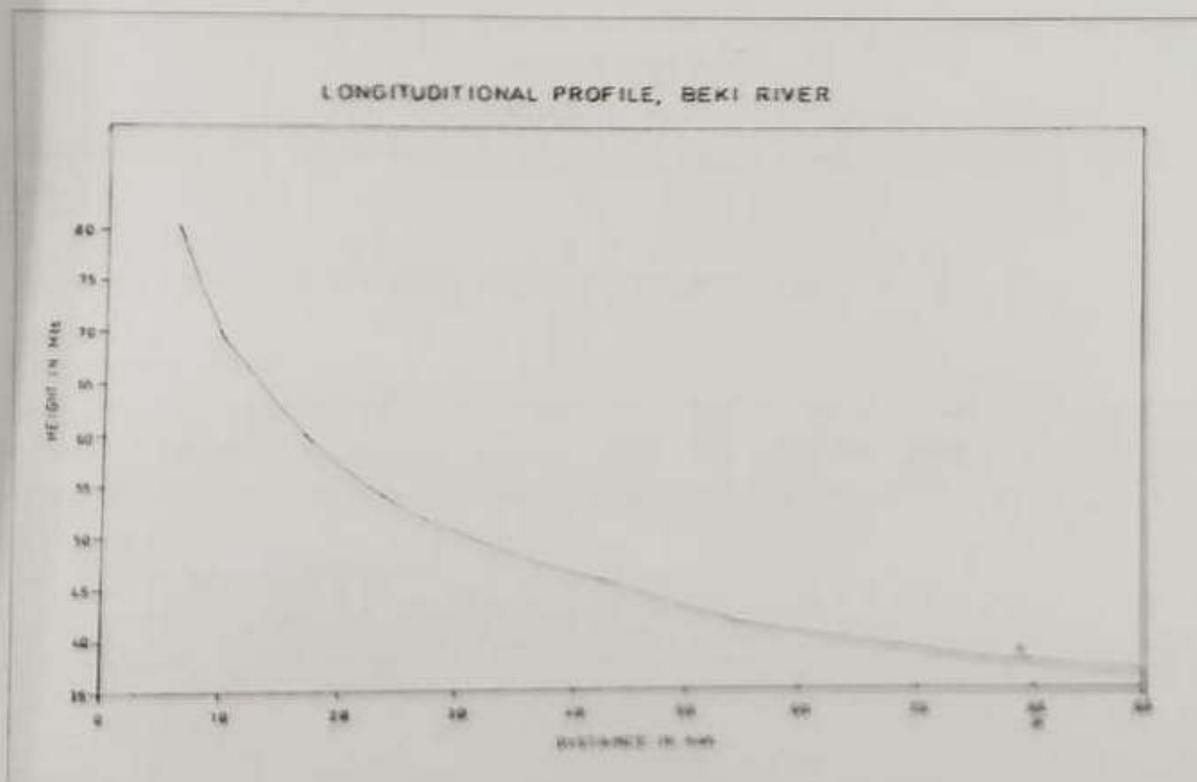
This value shows that Beki basin tends to an elongated shape.

20-40	Medium low
40-60	Medium
Above 60	High

Profile Analysis:

The Longitudinal Profile:

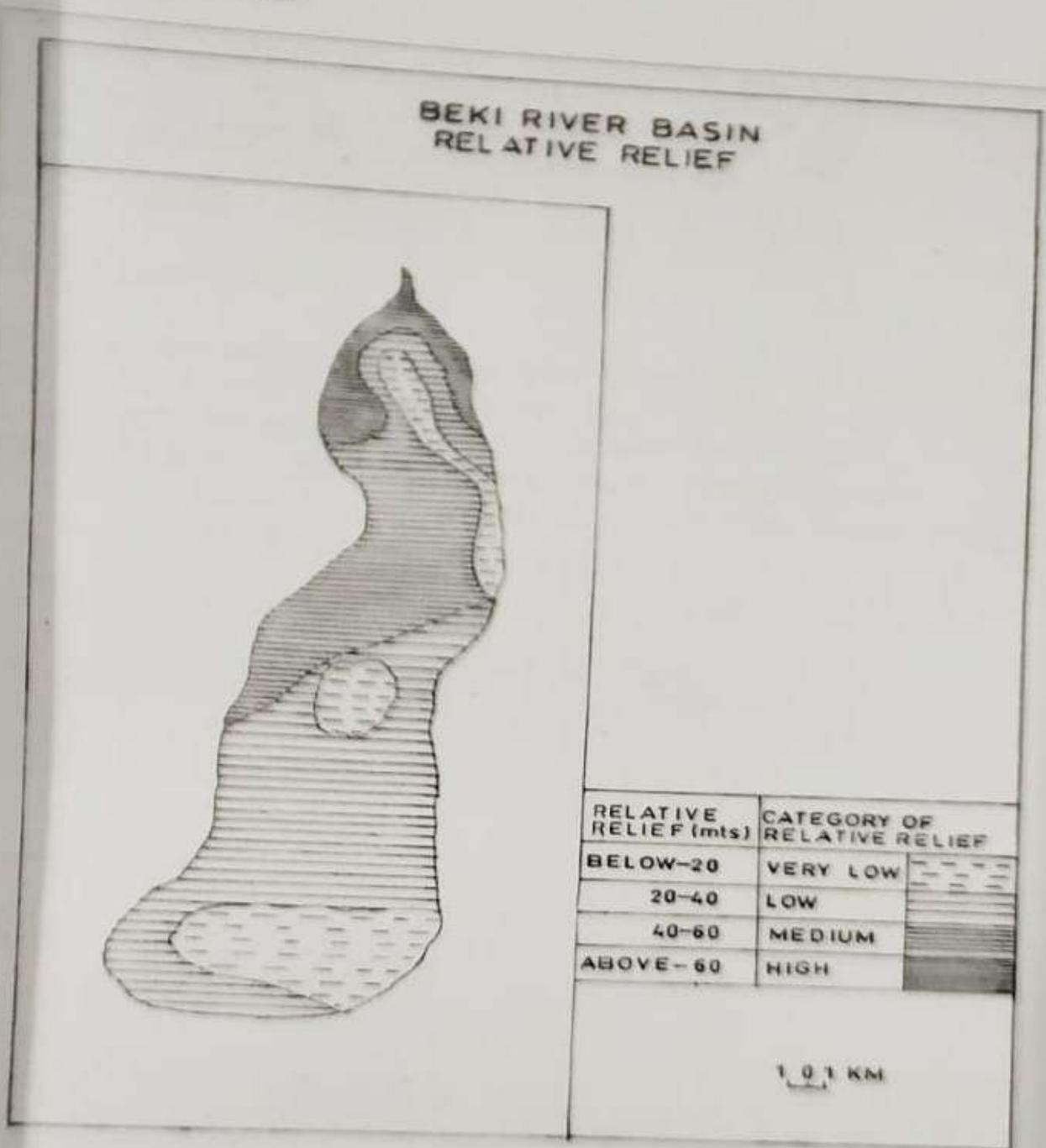
The longitudinal profile of a river represents channel gradient of the river from its source to mouth. Each river uses to develop such a longitudinal course (profile) that it may be able to transport the bed-load downstream. The longitudinal profile of the Beki River follows a smooth path which is concave in nature with very low gradient up to the river Brahmaputra. The patterns give an idea of the dynamic equilibrium associated with the river itself and its basin too.



Basin Shape:

3.21 Elongation Ratio:

According to Schumm's (1956) the shape of any drainage basin can be expressed by elongation ratio that is the ratio between the diameter of a circle with same area as of the basin and the length of the basin.



The relative relief map of the Beki river basin reveals that there is variation in local relief. The minimum relief in the tune of less than 20m lies on the valley areas, while the maximum local relief (above 60m) is seen on upper part of the basin.

Table 1. Relative Relief of the Beki Basin

Relative Relief	Categories of Relative Relief
Below 20	Low

Relative Relief:

The term relative relief indicates the actual variation of height per unit area with respect to its local base level.



The relative relief of the basin is determined in order to have a view of the whole basin which yields various factorial impacts in controlling the morphometric characteristics of landform. Following the G.H. Smith's technique of Relative Relief (1935), 1:50,000 topographical maps of the basin have been divided into grid square 5 square km the whole area under study. As the major portion of the study area is plain, the contour interval is interpolated at 20m interval. The difference of the highest and lower elevation of each grid has been marked and on isopleth map has been prepared and analysed and interpreted.

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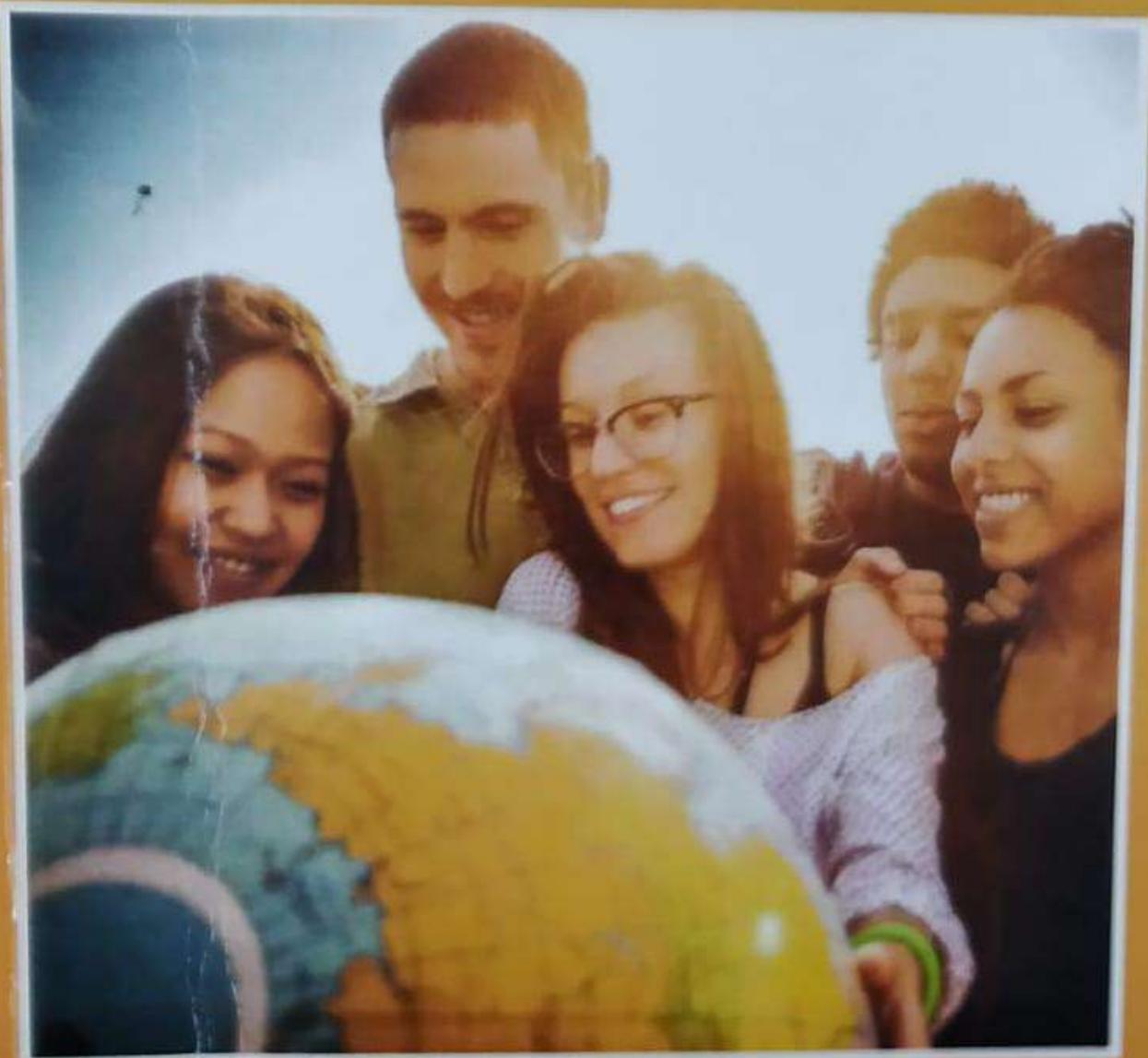
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population. As a result women of this part of the world enjoy greater access to education, work opportunity and a higher standard of living. Although no country has yet succeeded in eliminating the gap, it is narrowed in case of Nordic countries. The 2015 report throws a valuable snapshot of the current performance of 136 countries. On average, over 96 percent of the gap on health outcomes, 93 percent on educational attainment, 60 percent on economic participation and 21 percent on political empowerment has been closed. The three highest ranking countries--- Iceland, Finland and Norway have been able to close their gender gaps significantly (over 80 percent), while the lowest ranking country; Yemen has closed only around 46 percent of its gender gap. India's position is 101 among 136 countries in global gender gap report.

The status of women is high in comparison to in some other states of India as there was the absence of dowry system. But in this modern society it is invading with a result of some dowry death cases have been reported.

Area of Study: The Chakchaka Community Development Block of Barpeta District in Assam was established in 24, 1997. The Block area extends longitudinally from $90^{\circ}48'30''$ E to $90^{\circ}59'$ E and longitudinally from $26^{\circ}40'$ N to $26^{\circ}55'$ N. The circle is bordered by Manas National Park on the North, Kalgachia Revenue Circle on the south, Sarthebari Circle on the east and Bongaigaon district on the west. It has 171 villages surrounding Sorbhog town. Covering an area of 190.88 sq. km. the circle constitutes 5.88 percent of district's total area. As per 2011 census, it has the total population of 306786. The study area is largely inhabitant by different communities like indigenous Muslims, non-indigenous Muslims, Koch-Rajbongshis, Scheduled Caste, Scheduled Tribes and other Assamese communities.

Objective: Women are the most vulnerable sections of society often being sidelined from taking any important decision. The present paper is an attempt to analyse the status of gender disparity of Indigenous Muslims Community of Chakehaka Development Block, Barpeta, Assam using various indicators based on data from primary sources.

Data and Methodology: The extent of gender gap in Chakchaka Development Block has been studied in four fundamental areas like economic participation and opportunity, education and political participation using the indicators like work participation rate, literacy rate, enrollment ratio, sex ratio, infant mortality rate and political participation using primary data. For this a 90 households were sampled. The necessary primary data have been collected through sample survey using a well designed household schedule. The villages are selected at different locations like roadside, riverside, and remote areas. While drawing the sample households stratification is done based on economic conditions of the households, i. e., high income and lower income groups. During survey, head of the households in the community has been interviewed towards understanding the above mentioned indicators. Gender differentials in these areas are calculated and analyzed after collecting the data.

Secondary data relating to the indicators have been collected from the concerned Circle office, Block office, District Headquarters (Barpeta) etc. besides census and other statistical handbooks to compare with the primary data at state and national level.

Literature Review: Many studies have studied on the subject of gender disparities to focus on realization of gender equality. Niroj Sinha, editor "Women in Indian Politics", (Gyan Publishing House, New Delhi, 2000), it has clearly depicted the role of women in Indian politics. Dhruva Hazarika, (2011) in his research work emphasizes the need that each and every citizen should be careful and responsible to promote the equal status for

progress in reaching equality worldwide. Similarly in human development front, it is gradually realized that if the women, who constitute almost half of the population, have remained as passive, human development in its real sense cannot be possible. Therefore in 1995 Human Development Report, the main emphasis was on gender equality. The first global gender indices were launched in the 1995 HDR--- the Gender related Development Index (GDI) and the Gender Empowerment Measure (GEM) --- just before the 4th world Conference on Women, held in Beijing. The GDI considered inequalities by gender in the HDI dimensions. It measures the inequalities confronted by women in achievement of those which are very essential for overall development of human being. The GEM focused on political participation (measured by women's shares of parliamentary seats), economic participation (shares of high level and professional positions) and power over economic resources (income gaps). The disadvantages facing women and girls are a major source of inequality. Very often, women and girls are discriminated against health, education and the labour market--- with negative repercussions for their freedoms. Human Development Report 2010 introduce a new measure of these inequalities built on the same framework as the HDI and the LHDI--- to better expose differences in the distribution of achievements between women and men. This is known as Gender Inequality Index (GII).

The Gender Inequality Index shows that:

- Gender inequality varies tremendously across countries--- the losses in achievement due to gender inequality (not directly comparable to total inequality losses because different variables are used) range from 17 percent to 85 percent. The Netherland tops the list of the most gender-equal country, followed by Denmark, Sweden and Switzerland.
- Countries with unequal distribution of human development also experience high inequality between women and men, and countries with high gender inequality also experience unequal distribution of human development. Among the countries doing very badly on both fronts are Central African Republic, Haiti and Mozambique.

The Gender Inequality Index (GII), estimated for 138 countries, reveals gender disparities in reproductive health, empowerment and labour market participation. The losses in these achievements due to gender inequality, as expressed by the GI, range from 17 percent to 85 percent, with larger losses concentrated in the Arab States and South Asia (HDR 2010).

Along with these measures of measuring gender inequalities the Global Gender Gap Index, introduced by the World Economic Forum in 2006, is another measure for capturing the magnitude and scope of gender-based inequalities and tracking their progress. The index benchmarks gender gaps on economic, political, education and health based criteria, and provide country rankings that allow for effective comparisons across regions and income groups, and over time. The Global Gender Gap Index examines the gap between men and women in four fundamental categories: *economic participation and opportunity, educational attainment, health and survival and political empowerment.*

According to the reports of WEF, the large populous nations such as India, Pakistan and Egypt hold some of the lowest ranks in respect of gender gap. The study puts Sweden, Norway, Denmark and Iceland on the top of the list. These countries are characterized by strong liberal society, with an impressive record of openness and transparency in government and comprehensive safety net which provides security to vulnerable group of

GENDER DISPARITY IN INDIGENOUS MUSLIMS COMMUNITY: A CASE STUDY IN CHAKCHAKA DEVELOPMENT BLOCK OF BARPETA DISTRICT, ASSAM

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Abstract

The present paper is an attempt to analyse the status of women and men in terms of various socio-economic indicators based on data from primary sources collected with the help of stratified random sampling. It is widely believed that empowerment of women through equal rights, opportunities and responsibilities to women will go a long way in removing the existing gender discriminations. Gender discrimination and gender disabilities are not uniformly found in all the communities in Assam. It is no different to the indigenous Muslims community of the Chakchaka Development Block of Barpeta district of Assam.

Here gap does exist and in absolute term also the status of human development indicators like literacy rate, employment level, sex ratio, political participation etc. are not so satisfactory compared to the national level. Giving property right, access to employment or educational opportunity on the part of the government will not change the picture. There is only social barrier and no legal or constitutional barrier to equality

Key words: Gender disparity, stratified random sampling, literacy rate, work participation rate, sex ratio.

Introduction:

Mahatma Gandhi, while defining empowerment of women, had described it as a situation "when women, whom we call *abala* become *sabala*, all those who are helpless will become powerful." Gender equality refers to that stage of human development at which the rights, responsibilities and opportunities of individuals will not be determined by the fact of being born male or female, in other words, a stage when both men and women realize their full potential and become a partner in every sphere of their lives. Realizing the extent of gender inequality throughout the world, the United Nations Development Fund for Women was established as a separate fund within the United Nations Development Program (UNDP) in 1984. At that time, the General Assembly instructed it to ensure women's involvement with mainstream activities. The platform of Action resulting from the 1995 Beijing World Conference on women expanded this concept, calling it "gender mainstreaming"- i.e., the application of gender perspectives to all legal and social norms and standards, to all policy development, research, planning, advocacy, development, implementation and monitoring - as a mandate for all member states. In this way, the gender factor is no longer is to be only a supplement to development but central to the practice of development. As a result of Beijing conference—and the many years of work leading up to it— more than 100 countries announced new initiatives to improve the status of women. In 2000, the follow-up Beijing +5 conference further strengthened the application of the mainstreaming concept, and used it to highlight the need for more

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Table 3: Gender Disparity in Household Decision Making (in Percentage), 2017

	Major Household Decision taken by			Gender Gap
	Husband	Wife	Both	
Indigenous Muslims	12.23	13.54	74.23	-1.31

Source: I. field survey.

Findings: The major findings are as follows:-

1. Gender gap exists in literacy rate. But this is much more than state and national averages. In absolute term also the literacy rate of both male and female is very low. The gap is 20.51 percentages in the study area whereas it was 11.58 p.c. and 16.68 p. c. in 2011 census in state and national averages respectively.
2. Gender gap exists work participation rate too. The gender gap in work participation rate (22.93 p. c.) is far more than that of state and national rate. It is only 13.47 p. c. in India Here, the total male and female work participation rates also lower than that of state and national level. Hence the rate of unemployment is quite high in the study area.
3. The sex ratio of Indigenous Muslims in the block is only 729 which are much lower than that of state (958). The prevailing lower sex ratio among the Indigenous Muslims may be associated with domination of males at birth and higher child mortality among females.
4. Generally decisions are taken by both husband and spouse. But in some cases husband alone take decisions and in the female headed households decisions are taken by the women.
5. The entire respondent cast vote but not their own. They are influenced by their spouse and other members of the family.
6. All the respondents said that they show no discriminations against the girl Childs and female members.
7. Another very important aspect of this point is that women themselves are still ignorant about their own rights and policy formulated especially for them.

Conclusion:

1. Government has undertaken various efforts to empower women and to eliminate gender gap; they are not to that extent successful in achieving the goal. In national level and in state level gender gap exists and the condition is no more alarming among the below poverty level. Here, gender gap exists in all the indicators taken in the study area and are not satisfactory compared to state and national level. Giving poverty right, access to employment or educational opportunity on the part of the government will not change the picture. A revolutionary change in the social

Table 3: Age composition of the community (in Percentage) in the Block

community	0 – 15 years			15 – 59 years			Above 60 years		
	person	male	female	person	male	female	person	Male	Female
Indigenous Muslims	24.89	23.60	26.64	67.08	68.70	65.75	8.03	8.33	7.61

Source: Primary Survey (2018)

Attitude towards Unequal Gender Role: Attitude towards unequal gender role in one of the important indicator of women empowerment. A society with high degree of gender inequality exhibits a positive attitude towards unequal gender role. Data of NSSO (2004-05) shows that in India 54.3 percent women accept unequal gender role. However in the study area it is found that the entire respondents are agreed that they treat equally both male and female child of their family. The field surveyed data shows that the sex ratio in the community is 729 females/1000 males which are much lower than that of state level (958 females/ 1000 males) in 2011. The prevailing lower sex ratio among the Indigenous Muslims may be associated with domination of males at birth and higher child mortality among females.

Gender Disparity in Political Participation: Women's political participation is another input to their empowerment. It is one of the important factors that contribute to their wellbeing. Empowered women have political freedom which in turn translates into their decision making capacity both at the community and state level. Women's representation in political field even in most modest form of local government has the ability to transform and reinterpret the practice of politics. It helps to create better village communities based on harmony and cooperation achieved through gender balance and justice. However in case of India and even in the north east, the strong family based structure of Indian politics makes it difficult for women to assert independent political choices, as distinct from the male headed families. Therefore judging women's political agency on the basis of their representation in political bodies is hazardous; women standing proxy for men are quite common in India (Assam Human Development Report, 20013).

It is fact that the status of women in the community is worst in terms of their position in decision making bodies. However the representation in local bodies does not always indicate that women are politically empowered as in most cases they act as proxies of their male counterparts. Here, it is found that the entire respondent cast vote but not their own will but with influence of their spouse and other members of the family.

Gender Disparity in Household Decision Making: Since of late modern women has become very conscious of their rights, and empowering the women as a whole has become a new motto of the world around. It is another indicator of women empowerment and thus can be a source of gender inequality: empowered women can take major household decisions by their own. However it is found that in the study area in most of the cases the major household decisions are taken by both respondent and spouse. From the table it is found that in the study area their exist gender gap of -1.31 p. c. in household decision making, i. e., women decision making is more than that of men, but this cannot be interpreted as women are superior in this indicator than their counterparts as all those households of the area where wife alone make decision are female headed households.

Table 1: Gender Gap in Literacy Rate (in percentage):

	Total	Male	Female	Gender Gap
Indigenous Muslims (2018)	70.13*	79.26*	58.75*	20.51*
Barpeta District (2011)	61.47	67.09	55.56	11.53
Assam (2011)	72.19	77.85	66.27	11.58
India (2011)	74.04	82.14	65.46	16.68

Source: I*, field survey.

II. Census of India (2011).

Gender differentials in Work Participation Rate:

The participation of women in the secondary and tertiary sectors is lower in the Block. An attempt has been made to access the occupational pattern and economic conditions of the people of the study area. Female participation rate is one of the indicators of employment status of women. The gender differential in employment level is analyzed taking the difference in male and female work participation rate of the area.

Table 2: Gender differentials in Work Participation Rate (in percentage):

	Male	Female	Unemployment	Gender gap
Indigenous Muslims (2018)	51.16*	28.23*	20.61*	22.93*
Assam (2011)	53.59	38.36	8.05	15.23
India (2011)	53.26	39.79	6.95	13.47

Source: I*, field survey.

II. Census of India (2011), Office of the Registrar General, India.

Female work participation is another indicator of women's status in the society. The gender gap in work participation rate is far more than that of state and national rate. It is only 13.47 p. c. in India while it is 22.93 p.c. in the study area. Here, the total male and female work participation rates also lower than that of state and national level. Hence the rate of unemployment is quite high in the study area. The less rate of work participation is attributed to crisis of agricultural land as compared to the growing population. Lack of industrialization is also another factor influencing the workers having considerable educational level to go for tertiary occupations including services and business.

It is worth mentioning here that sex ratio is of paramount importance as it is an index to show the socio economic condition of any population of an area. It has a greater impact on the demographic structure of any region, including the growth of population, marriage, working force and employment pattern (Das, 1999). Moreover, an imbalance sex ratio may lead to the emergence of many social and moral evils.

women in modern Indian society. Jogesh Das, (2012) reveals about gender differences, customs, traditions, social attitudes etc., as prime reasons for the inequality between men and women. Amtul Waris and B. C. Viraktamath, (2013) considered gender equality as a critical element in achieving social and institutional change that leads to sustainable development with equity and growth. Sutapa Saryal, (2014) emphasizes that the United Nations in its Millennium Summit in 2000 declared 'Gender Equality and Women Empowerment' as one among the eight 'Millennium Development Goals' to be achieved by the year 2015. However, these goals are far from being realized in a country like India. Md. Faisal & Kartik Joshi, (2015) analyses gender inequalities throughout the world are among the most pervasive forms of inequality. Priti Jha & Niti Nagar, (2015) describes the gender inequality that exists among every region, social class, which prevents the growth of Indian economy from improving the lives of Indian people. The reality of gender inequality in India is very complex and diversified, because it exists in every field like education, employment opportunities, income, health, cultural issues, social issues, economic issues etc. Dr. Subhasish Chatterjee & Lt. Col. (Rtd.) Dipali Chatterjee, (2016) in his research paper discussed the factors that are responsible for gender inequality and to understand about the inequality in sharing of ancestral land. K. S. Jayakumar, (2016) research deals with the principle of gender equality enshrined in the Indian constitution in its Preamble, Fundamental Rights and Duties, Directive Principles of State Policy and under the other provisions. Sandeep Kumar, (2016) concludes the gender equality and women empowerment has a positive relation with the socio-economic development.

Analysis: Let examine the status of gender inequality in the study area using indicators like literacy rate, work participation rate (WPR), sex ratio, women's political participation, household decision making and attitude towards unequal gender role.

Gender Gap in Literacy Rate:

Literacy rate and educational attainment are considered to be the basic ingredients of socio-economic development and transformation of society. Literacy is the first step to formal education. It is seen that in the study area the gender gap in literacy rate (6years and above) exists which indicates that male are more literate than female population. The gap is 20.51 % percentages in the study area which is significantly more than that of state and national level. It is also seen that the male and female literacy are also significantly less than that of state and national level. It is largely because of prevailing socio-economic backwardness as it is located in rural areas and lack of awareness for education and having less impact of less urbanization.

and cultural values and behavioral pattern is necessary to foster the process of achieving gender equality. When women feel that they have the capability of operate the society at the same term as men then achieving gender equality will not remains as a distant dream. There is a need to create awareness towards achieving the desired goal of women in the Block. The study concludes by an observation that access to education, employment and change in social structure are only the enabling factors to Women Empowerment.

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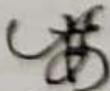
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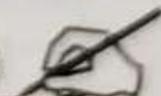
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Assam for more jute cultivation. The rapid development of jute industries in and around Calcutta more fertile land was required for the jute cultivation. Since as the area of jute cultivation in Bengal could no longer be expected, so the Government of Bengal thought it well to extend the area towards Assam. In 1905-06, the acreage of jute cultivation was less than 30,000 acres which was increased more than 106,000 acres in 1919-20 in the Brahmaputra Valley.

Moreover, the natural calamities like frequent floods, sudden storms of cyclonic intensity; pestilence like malaria, cholera, dysentery and pneumonia; famine (happened in 1915 and 1943) pushed the East Bengal peasants to migrate to Assam. The cheap and plentiful supply of virgin land and the freedom of ryotwari settlement naturally attracted land-hungry people.

Apart from the Government encouragement, the Govt. of India introduced "Grow More Food Campaign" during World War II. On the plea of the campaign the Saadulla Govt. made an extensive preparation to accelerate land settlement in then Kamrup, Nowgong, Darrang with immigrants and thereby the Govt. mixed up the Colonization Scheme with the India Govt. Some Mahajans, particularly of then Barpeta sub-division became land-businessmen and they turned into land speculators. They sold of their lands to immigrants at a good price; then they cleared new plot (pam) on wasteland and sold again. These immigrants were financed by their own headmen (matbar) as well as Marwari and Assamese (Barpetia) money landers.

The shortage of manpower was another factor behind the immigration of East Bengal peasants into the Valley. The Britishers wanted to fulfillment of their plans and collect more land revenue. As it mentioned that during the partition of Bengal in 1905 Assam had lost its separate identity as a province. And was administratively merged with Dacca Division of Bengal with a view to forming the new province called East Bengal and Assam. It narrowed down the communication gap between the people of Assam and East Bengal. Moreover, 1902 the Brahmaputra Valley was connected by railways with Western Bengal through Eastern Bengal and in 1904 with Easter Bengal through Barak Valley (Surma valley). Prior to the railway, the only conveyance between the two was navigable river transport provided by the River Brahmaputra. The development of railways definitely reduced the remoteness of Assam from rest of the part of the country and helped to some extent in immigration of people from East Bengal to Assam valley.

Consequences:

The increase of immigrants from different part of the India such as East Bengal, Jharkhand, Chhattisgarh, Madhya Pradesh, Bihar, and Orissa altered the homogeneous nature of the population in British colonial period. Prior to the Colonial rule the migration of people across the Assam border was not significant. Even Ahom rulers encouraged men from other parts of India to settle in Assam, if any identified themselves with the local people or their introduction was of advantage of the state. The tea garden labourers were 381,000 in 1901 which is increased by 809,000 in 1942. The Nepali people which were

various periodicals, WebPages, Newspapers, books and journals related to the topic.

The Study Area:

The Brahmaputra Valley is a ramp-valley. It extends from Dhubri to Sadiya with 720 k.m. in length and an average breadth of 96 k.m. The uppermost part of the valley, i.e., Sadiya has an altitude of 135 mts. above sea level and at Dhubri it is only 35 mts. The average slope is 12 cm. per km. The valley is also known as Assam Valley and it covers an area of 56,194 sq. kms i.e., 72 p. c. of the total area of the state of Assam. The alluvial plain from East to West which is not only the most densely populated plain but also supports the cultivation fields. The Brahmaputra River is highly braided and as a result there are a large no of Chars and Riverine Island in the bed of the river.

Bangladesh is a low lying, riverine country located in South Asia. The country has an area of 1, 47,570 sq km and extends 820 km north to south and 600 km east to west. Bangladesh is bordered on the west, north and east by a 4,095 km with India. The country is densely populated except Chittagong Hill tract on the south eastern border with Burma and India.

The prolonged internal border and conflicts among the officials of the Ahom court indirectly facilitated the ultimate annexation of Assam by the East India Company in 1826. For about half a century since the acquisitions of Assam by the British Assam remained a part of Bengal. Thereafter, Assam area constituted into a chief Commissioner's province in 1874 and the District of Sylhet was separated from Bengal and attached to the chief Commissionership of Assam. Finally, the Eastern Bengal and Assam came into existence as separate provinces on 16th October, 1905 and was under the single administrative division with the capital city at Dacca till 1911.

Causes of Migration: The census report of 1911 mentioned the first time movement of people from East Bengal to the Assam. The immigrants came at first as single adventures. But by the next decade they started to settle by families. The men generally came first to secure the land and built houses. Out of those families 85% were Muslims and rest was Hindus.

During colonial rule Ryotwari settlement prevailed in Assam except Goalpara and Bengal was under Zamindari settlement. Under the Zamindari system, the peasants were subject to inhuman oppression and exploitation which resulted in increasing the number of landless peasants and agricultural labourers. Sometimes the peasants rose in revolt against the Zamindars. But the Zamindars tactfully flushed out large number of peasant into Assam. The Britishers also felt that unless Assam is colonized from Bengal, there is no prospect of the province. Some Assamese elites Like Anandaram Dhekial Phukan too was zealous to welcome people to the wasteland or jungle of the Brahmaputra Valley to make up the shortage of people in the Assam Province. However, in 19th century the outsiders were brought only to the industrial sectors.

The colonial scheme of jute cultivation was another factor to the migration from East Bengal to Assam. Britishers encouraged the land-hungry peasants of East Bengal to flow to the char areas of

available. Jobs and other economic opportunities, facilities, amenities are usually considered as factors which attract people to certain areas. Migration is generally viewed as an economic phenomenon; however, non-economic factors have also important.

The first ever group of people to settle in this region were Mon-Khmer speaking Austro-Asiatic in the prehistoric past (Khasis and Jaintias). They were followed by the Tibeto-Burmen language-speaking people. Most of the hills and plain tribes belong to this group. Thirdly, came the Indo-Aryans from the west with Vedic culture, Hindu religion and Higher technology of sedentary agriculture Fourthly, about 1205 another group of Indo - Aryans, professing Islam came as soldiers and craftsman of the invading Sultans and Nowabs. Fifthly, Tai-Ahom people came in 1228 under Sukapha that lasted till 1826. In the 16th and 18th centuries there came in five small groups of Tai people (Khamti, Khamyang, Aiton, Phake and Turung). After 1826, some Bengalis, Rajasthanis, Nepalis who were engaged in jobs associated with British administration, various crafts, trade and commerce and law and order came in the newly annexed territory along with the Britishers Seventhly, the British Tea Companies brought in thousands of labours from Chotanagpur plateau. Their immigration started from 1850's and continued up to 1940. Eighthly, in the nineteenth century many Kuki-chin, Naga and Kochin people took place from Upper Myanmar across the international border to Mizoram, Nagaland, Manipur and eastern District of Arunachal Pradesh. Ninthly, then from about 1880's, there started a migration-stream of the landless Muslim peasants of the then East Bengal. The last major wave came to this region following of the country in 1947, when thousand of Hindu refugees left the Erstwhile Pakistan. Thus the present population of this region is essentially made up of ten streams and waves of migration.

Prior to the British rule in Assam the migration across the border to Assam was not a countable factor in initial stage. But in the 20th century it became burning problems in the socio-economic-political aspects in the people of Assam. The large scale migration of Muslim peasants from erstwhile Bangladesh occupied the chars areas of Brahmaputra Valley and changed the demographic and cultural structure of this region. Now those peasants have become the part and parcel of the Assamese Society.

The present study is attempted to find the causes of migration from East Bengal Muslim peasants particularly to the Brahmaputra Valley of Assam before independent. An attempt is also made to analyze the effects and highlights the historical issues on demographic, socio-economic life of the people of Assam.

Objectives:

The main objectives of the study are:

1. To find out the causes behind the migration of pre-independent Assam from Erstwhile Pakistan.
2. To analyze the socio-economic consequences due to this migration.

Database:

Various data and information are collected from census of India, Statistical Handbook of Assam,

Causes and Consequences of Migration of Pre-Independent Assam: With Special Reference to Bangladeshi Migrants

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Abstract

Migration is an unavoidable part of human history. It is a human phenomenon. Migration may be defined as a movement of a person or persons involving a permanent change of residence and migrant is generally a person who moves his residence, either 'during emigration, immigration, internal migration'. The immigrants of Assam may be classified into six categories: East Bengal Muslim Peasants, East Bengal Hindu Refugees (post partition refugees), Tea Garden Labourers, Nepalese, Rajasthani Traders and North Indian Wage Labour Immigrants. The first influx of migration from East Bengal was in the first decade of the twentieth century of Colonial Government because colonial Government encouraged people to migrate into Assam for its own economic benefit. It was mostly from the Mymensing district of erstwhile Pakistan. The total numbers of such migrants in 1911 was near about three lacs.

In this regard the 'pull' and 'push' factors are generally considered as provoking factors. The homogeneous nature of the people of 20th century of Assam has changed and became heterogeneous complex with ethnic, religious, demographic, linguistic, social differences particularly in the Brahmaputra Valley. Those who were granted asylum as refugees from erstwhile East Pakistan are legal citizens now. 24th March, 1971, is the date for identifying illegal migrants (Assam Accord, clause, 5.8). The present study is to explore the causes of migration of peasant from erstwhile Pakistan to the Brahmaputra Valley during Colonial rule and also attempt to make an analysis of the effects of great historical issue.

Key Words: *Emigration, Immigration, Colonial Government, Pull and Push factors, Great Historical Issues.*

Introduction :

Migration is an interdisciplinary academic study. Migration is not a new social problem. According to Eisenstadt, "every migratory movement is motivated by the migrants' feeling of some kind of insecurity and inadequacy in the original setting." Poor economic condition, lack of opportunity for advancement leading to economic misery push the people out of the region for searching of the better livelihood and opportunities. Pull factors encourage migration to such an area where employment opportunities are

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ment. Some Govt. servants and other local people particularly the Mahajans of Barpeta Sub-division, prominent persons like Gunabhiram Barua, Anandaram Dhekial Phukan welcomed immigration for economic development of Assam. The improvement of Railway connectivity between East Bengal and Assam, population pressure of East Bengal were also no least important factors of immigration.

The large scale migration impact on the homogenous nature of population of 20th century Assam and the society was shifted to heterogeneous complex with ethnic, linguistic and religious differences. The society becomes multilingual, multi-religious with diverse ethos. The census data till 1941 reveals that the percentage of Bengali speaking population was 44.00 whereas Assamese speaking percentage was 25. Though the fear of Assamese people of losing their own language in their homeland has gradually diminished as because of Muslim immigrants accepted Assamese as their mother language. The gradual increasing no. of immigrant people from East Bengal peasant brought down the p.c. of Hindu religion in Assam since they were Muslim by religion (more than 85 %). Many clashes were happened between the indigenous and immigrant peasants across the valley due to land.

A Land settlement issue was an immigration problem in Assam, many public protests was there, even the issue was discussed and debate in the Assam Legislative Council but with the emergence of "Grouping System" the debate was submerged. The questions of "Line system" created furore throughout the province. The Line System Enquiry Committee submitted its report in Feb. 1938. The Muslim members unitedly condemned the Line System and advocated its abolition, but the non-Muslim members commended it and supported some restriction in the future. Later Gopinath Bordoloi's Govt. attempted to implement the policy of Saadulla Govt. Again the "Line System" issue was dropped due to the "Grouping System."

The Muslims of Assam consider themselves as an inseparable component of Assamese society, and thus, have been accomplishing a difficult task of assimilation and identification with socio-cultural life of the Neo-Assamese. Mohendra Bora explains in his presidential address of Sahitya Sabha (Pathsala Session, 1987) "how they are immensely contributing to the Assamese literature and day to day life of Assamese society."

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	1911-21			1921-31			1931-41			1941-51		
	A	B	H	A	B	H	A	B	H	A	B	H
Brahmaputra Valley	35	18	15	28	51	30	72	80	149	53	43	36

Source: Census Report of Assam, 1901-1961, PP.255-258

A - Assamese

B - Bengali

H - Hindi

More than 85 % of immigrants were Muslim by religion which altered the socio-religious structure of the Valley. The following table shows the p.c. increase of Hindu and Muslim religion district wise:-

District/State	Religion	1911	1931	1951
Goalpara	H	58.68	43.69	51.54
	M	35.19	53.89	42.94
Kamrup	H	68.68	72.69	69.74
	M	9.66	24.61	29.29
Darrang	H	58.94	57.90	59.40
	M	5.20	31.60	40.54
Nowgong	H	58.94	57.90	59.40
	M	5.20	31.60	40.54
Assam	H	68.33	70.29	72.01
	M	16.23	22.78	24.68

Source: Census Report of Assam, 1901-1961, PP.255-258

The gradual increasing no. of immigrant people other than East Bengal brought down the percentage of indigenous people in Assam.

Conclusion:

The movement of Population generally called human migration. It has social, economic, political, demographic and environmental implications. "Pull" and "Push" factors are considered for migration. The colonial Govt. encouraged people of other parts of India to migrate into Assam for its economic Benefit. The biggest influx of immigration was from East Bengal districts mostly from Mymensing. Initially they came in small no. but in course of time in large proportions including children and family. The total no. of such migrants in 1911 was nearly 3 lacs and rose to 18, 46,457 on the eve of the partition.

The peasants from East Bengal to Assam were exploited by the Zamindars and they were victims of natural calamities like flood and famine. Moreover, colonial Government's plan to extend jute cultivation to the wasteland a Brahmaputra Valley, Saddula Government's "Grow more Food" campaign became the main factors of immigration of East Bengal peasant into Assam apart from the colonial Govt. encourage-

21,347 in 1901 rose 88,300 in 1931.

Prior to the 20th century, only a few thousand migrants migrated from Mymensingh, Dacca and Rongpur districts. It is reported in the census of 1891 too that no cultivators from over-crowded Bengal did come to Assam. The western part of the Goalpara district was the earliest and most affected. In 1881 census the number of migrants was 49,059 persons which were 119,000 in 1911 migrants in the District of Goalpara. They constituted 20% of the populations. Day by day, the no. of immigrants increased in the valley. Next to Goalpara, Nowgong become the favourite district of the migrants. The no. increased rapidly from 4,000 in 1911 to 1, 20,000 in 1951. Then the Barpeta Sub-Division of Kamrup District has fallen to their home and Darrang, Sibsagarh and Lakhimpur are being attacked. The following table shows the immigration from East Bengal into Assam.

Years	Goalpara	Kamrup	Darrang	Nowgong	Sibsagarh	Lakhimpur
1900-11	77,000	4,000	7,000	4,000	14,000	14,000
1911-21	159,000	44,000	20,000	59,000	14,000	14,000
1921-31	170,000	134,000	41,000	120,000	12,000	19,000
Total	396,000	182,000	68,000	183,000	40,000	47,000

Source: Census Report of Assam, 1901-1961, PP.255-258

The large scale migration made an impact on the demographic patters of Assam. The Nowgong district witnessed an exceptional p.c. increase of by 41.35 % in 1941. In Darrang district out of the total populations of 7, 37,791 in 1941, there were 1, 20,995 immigrant Muslims comprising more than 16% of the total populations. The percentage of share of Muslims in the Muslim populations rose gradually from 0.1 % in 1921 to 49 % in 1941 which adversity affected linguistic composition.

The census report of India reveals the fact that amongst the state of India, Assam has the record of largest proportion of persons born outside the state. In 1951, nearly 14 % born outside Assam compared with 6 % in West Bengal and 5 % in Bombay.

The trend of population growth in the Brahmaputra valley may be assumed as follows:-

Year	Population	Density (Per Sq. Miles)
1911	3108669	164
1921	3991682	198
1931	4855706	237
1941	5762000	282
1951	7806558	339

Source: Census Report of Assam, 1901-1961, PP.255-258

The majority of the immigrants were of linguistically Bengali. Hence, obviously the P.C. of Bengali speaking people increased in the valley. Percentage increase of population in three major linguistic groups is as follows-



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South East Asian Nations (ASEAN) was established in 1967 by Indonesia, Philippines, Malaysia, Singapore and Thailand. Other members of ASEAN are Brunei, Cambodia, Myanmar, Laos PDR and Vietnam. In 1992 India became a sectoral dialogue partner of ASEAN and a full dialogue partner in 1996. The other full dialogue partners of ASEAN are USA, Russia, the Republic of Korea, Australia, Canada, China, European Union, Japan and New Zealand. During last six years, India was negotiating with ASEAN for a Free Trade Agreement and on August 13, 2009 it was entered into a multi-trade agreement with the ASEAN. In the contrary, it has been observed that during 2001 to 2007, the trade with ASEAN countries increased from \$ 7 billion to \$ 39 billion but at the same time trade deficit increased from \$ 3.5 billion to 14.5 billion, there is an urgent need to constitute Indian trade policy with the South Asian countries in border trade sector to bridge the gap of the deficit.

The importance of border trade sectors in North East Region (NER) are as follows:

1. To raise the GDP, 2. To create employment avenues, 3. To promote hotel business, 4. To improve the infrastructural facilities, 5. Conservation of cultural resources, 6. To raise foreign exchange reserves, 7. Promotion of wildlife wealth, 8. Promotion of handlooms and handicrafts, 9. Regional infrastructural development, 10. Protection and preservation of historical monuments and archeological sites etc.

Study Area

The North-East India (NEI) comprises eight states namely Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim and Tripura. North-East India is located between latitudes 22° N and 29°3' N and 89°46' E and 97°30'E longitudes. It covers an area of 255,083 square kilometers and support a population of 3.84 crore population as per 2011 census. It accounts 7.7 per cent of the land surface of India and contains 3.74 per cent of the total population of the country. The region borders with China, Myanmar, Bhutan and Bangladesh. With its long border extending over 4, 800 km, it occupies an extremely strategic position and it is connected with the main land by a narrow corridor of foothill land in North Bengal which width is only 33 km on the eastern side and 21 km on the western side and the land is subjected to occasional disruption due to heavy rains and floods. Moreover, the region is land-locked. Thus the strategic importance of the region is highly significant.

Physiographically it is not a homogeneous unit. The region has Tertiary mountains, Archean plateaus, river valleys, intermontane plain and piedmont plain. The tertiary hills and mountains cover a major part accounting 60 percent of the region. The senile plateaus account 12 percent of the whole area. The major plains are the Brahmaputra valley, the Barak valley, the Manipur Basin and Tripura piedmont plain which constitute 28 per cent of the region. The

22. India's Act East Policy & Challenges of Border Trade with North East India: A Geographical Study

Saurabh Barman

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Abstract

Look East Policy was initiated by the Govt. of India in the year 1991, from when economic reforms were launched. According to the Prime Minister, Dr. Man Mohan Singh, "India's Look East Policy is not merely an external economic policy; it is also a strategic shift in India's vision of the world and India's place in evolving global economy. The term "Look East Policy" was first used in Annual Report of the Ministry of External Affairs, 1995-1996.

The Govt. of India should take initiatives to facilitate trade promotion programme with ASEAN countries. In this regard, the Govt. of India should create impetus to the ASEAN members for early completion of the two major projects, namely, Trans-Asian Highway, and Trans-ASEAN Railway. The reopening of Great Silk Route, i.e., Nathula Pass, on July 6, 2006 has enhanced the connectivity between and China. If this route is utilized properly, it will promote trade between China and North East Region of India. Recent developments widen the potentialities of India's trade with countries bordering North East India like academic initiatives, a regional co-operation among these countries, proposed development in transport and communication, prospect of border trade of the region by exploring new frontiers with its rich bio-diversity like beautiful orchids, horticulture crops, major and minor forest products, mineral resources, tourism and tourism products, plantation sector including tea, coffees, rubber etc.

Inadequate and poor infrastructure, inhospitable terrain and comparatively late start in the development process, insurgency are some of the reasons for economic backwardness of the region.

Key words: India's Act East Policy, Border Trade, SAARC, ASEAN, Potentiality, Challenges, Geostrategic.

Introduction

The Government of India took several initiatives to enhance economic cooperation with the eastern economies through increased trade relations. Most of all it is about reaching out to our civilization neighbours in South East Asia and East Asia". The term "Look East Policy" was first used in Annual Report of the Ministry of External Affairs, 1995-1996. The Association of

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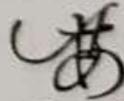
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prosperity to the region. With the development, the North East India with its geostrategic location advantage could emerge as a business transit centre for the SAARC and ASEAN groups of countries. The prosperous East and Southeast Asian countries are attractive destinations for Indian export. Most of the ASEAN populations have similar cultural background as in India. Affinity in cultural background will make Indian products acceptable and saleable in ASEAN markets. Accordingly, India decided to diversify its export direction towards the East. It is true that with bringing in lot of benefits, the outward looking development strategy of the region may also import a few vices such as erosion in social bond in tribal society, emergence of economic inequality at the initial stage, spread of Sexually Transmitted Diseases, HIV, drug addiction, women trafficking etc. the economic benefits of the market oriented, trade-led, outward looking economic strategy would definitely outweigh the costs in the form of importation of vices, imaginary or real. Thus the globalization and India's "Act East Policy" can accelerate border trade between India and the Southeast Asian countries, which can bring in progress and prosperity for the entire country including North East India.

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and linguistic fragmentation, are the root cause of the problems. Democratic reforms, improved political governance and institutions for economic management are needed in the societies to manage effectively the challenges to maintain political stability and also to diversity by their economies.

4. Structural Corruption: There is no way of bends to hasten the development of the North- East India. Since 1996 when the former prime minister H. D. Deve Gowda first declared a package of Rs. 6100 crores for the infrastructural development in the region. But, one does not know how much of the bends actually flowed down the development pipelines. The leakages of development bends in the region have been at a higher level than it is in the rest of the country. All financial allocation for the development has flowed out of the region or into the hands of corrupt politicians, bureaucrats and contractors.

5. Other factors:a) Each nation has its own specialty and characteristics. India should tailor the bilateral relations with every country in different way to suit the requirements of that particular country and that of India which very rarely in India.

b) It is noticeable that without inclusion of China Act East Policy of India makes no Sense. Therefore initiatives under BCIM are very important. The visit of Chinese Prime Minister Li Keqiang's to India on 2013 paved the way for exploring a BCIM economic corridor. Later on, Indian Prime Minister Manmohan Singh's visit to Beijing in October, a joint study group was formed for the carry forward of initiatives for exploring a BCIM economic corridor which organizes stakeholders conferences. One such conferences was held in Kolkata on 2nd May, 2014 to frame out strategies on the BCIM economic corridor for the enhancement of border trade, investment and connectivity between India and countries immediate East extending up to Southeast Asia, and the Pacific.

c) Informal or Illegal trade is a feature of border trade taking place with both sides. This trade is taking place through well established trade points that have historically been by the people of the region. The illegal trade is taking place through Moreh-Tamu is thriving on the back of the supplies being provided by both China and Thailand. As a result, trade comprises of products that are well beyond the 40 items that have been identified by India and Myanmar as a part of their Border Trade Agreement of 1994, as amended in 2008. The magnitude of illegal trade taking place on Moreh-Tamu border may promote the authorities to put regulations to check the growth of this trade.

Conclusion

In the context of North-East India, it may be stated that the trade has tremendous potentiality to accelerate the development process of the region and it may bring economic

landslides coupled with erodibility of rocks, steep slopes and high seismicity constitute the natural causes of two important river systems of the region again with anthropogenic factors.

2. Topography and Transport and Communication facilities: North- East India is characterized by hills, plateaus, mountains, intermontane plains, piedmont plains and river valleys. The most prominent physical feature is in the narrow Brahmaputra valley with the Arunachal Himalaya to the north, the Mishmi and Miju Hills to the east, the Patkai Naga-North Cachar Hills to the southeast, the Karbi, and the Meghalaya plateaus to the south, southeast of the North Cachar hills is the Barak Plain of the Surma valley. The Naga Hills extend to the south into the highlands of Manipur and to the southeast into the Mizo Hills and the adjoining Hills in Tripura and then into the alluvial plain of Bangladesh.

The trade among Bangladesh-China-India-Myanmar (BCIM) countries can flourish only when people, goods and vehicles can move with minimal technical and procedural obstacles across the border well developed transport and communication system greatly contributes to rapid progress of the merchandize trade. Connectivity and transport cost leads to a significant determinant of competitiveness. In hills, the construction as well as the reconstruction of roads in the NER involves rock cutting, soiling soft batches, construction of retaining walls etc. which requires a lot of human labour throughout year. The whole of topography is dissected into isolation by numerous rivers and streams, many of which being big and at the same time full of rocks as well as subjected to very strong cross current rendering navigation impossible to a considerable extent. As the region is very heavy rainfall, the road suffers from surface and gully erosion. The situation is further deteriorates by the loose sand base derived largely from alluvium in the plains and such sedimentary rocks as sandstone, mudstone. The roads have therefore to be constantly repaired and maintained in serviceable condition, needing a huge expenditure. Railway services are yet reach the nooks and corners of the region while the road network is not free and smooth. The roads need to be frequently bridge and many culverts, retention, walls; spurs etc. have constructed requiring huge labour and expenditure. It must be noted that unless exportable surpluses are produced, within it regarding roads, airports, power, railways, telecommunication, the NER could not be able to derive the full benefits of all developments simply by acting as an exports of other countries.

3. Insurgencies: North Eastern Economy have already affected by insurgency problem. A consensus is emerging among scholar that contrary to popular belief, civil wars and ethnic conflicts in several parts of the world are not due, primarily to ethnic and religious; but rather to high levels of poverty, failed politically institution and economic natural resources. Deep political and economic development failures not tribalism, ethnic hatred

climate of the region is identified as tropical monsoon with local variations, the hot seasons being shorter than usual with low average of about 30° C. The terrain condition, soil types, rainfall, humidity and temperature conditions of the region support an altitudinally distributed vegetations which provide habits and niches for different types of herbivores and their predators, birds, insects, reptiles and fishes. The region is endowed with a variety of minerals, like petroleum, coal, limestone, sillimanite and a large reservoir of hydel power potential.

Objectives

1. To study the challenges of the Policy with relation to trade in North East Region.

Methodology

Secondary data is the main source of this paper. As secondary source, the printed materials in the forms of books, journals, newspapers, office records are used in gathering the data and information. This paper is basically descriptive in nature.

Challenges of the Policy with relation to Trade in North East Region

Instead of numerous available potentialities there have been several challenges which obstruct the development of the North-East India. Alienation, exploitation and insecurity are being used across the region to instigate the menace of insurgency. To develop border trade there are so many challenges which should be overcome first which are given below.

1. Environmental problems

Seismically North- East India is on very active zone. North- East India has experienced a large number of earthquakes of tectonic region. The region is located in the subduction zone of two giant tectonic plates, namely Euro-Asian plate and Indo-Australian Plate. It may be mentioned that the two major earthquakes of 1897 and 1950 caused major changes in the configuration of physical landscape by faulting, fracturing, subsidence, upheaval and landslides, river regimes including the Brahmaputra and the Barak river systems.

Landslide is a common phenomenon of the entire region particularly in rainy season. Extensive landslides on the territory mountains and hills and loosening of the soils, subsidence and fissuring are some of the outcomes of the earthquakes and heavy rainfall. The terrain of recent origin of the Arunachal Himalayas, Nagaland, highlands of Manipur, Mizoram, Tripura and East and West Karbi Anglong and Dima Hasao hills are highly susceptible to easy degradation by climatic, weathering and hydrological factor.

Floods are extremely dynamic feature especially in the North- East India due to the nature of relief features, unstable hills and loose soils, heavy rainfall and a variety of newly emerged anthropogenic activities. North- East India has been exposed to seasonal floods particularly in its plains and foothills. The high intensity of monsoonal rains and devastating

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MODE OF HUMAN INTERACTION AND ADJUSTMENT TO THE FOREST ENVIRONMENT: A CASE STUDY IN DIBRU-SAIKHOWA NATIONAL PARK, TINSUKIA, ASSAM

Saurabh Barman

Introduction

Man himself is the most significant component of man-environment relationship and its concept is not a new one. Human beings and his surrounding natural environment both are interrelated and interdependent. Dependency of man on nature and their adjustment to the environment is as old as human civilization. Thus man modifying nature and vice-versa, yet it is the nature itself which determines when and how man shall be active and effective (Marthur, 1988). As the activities of man determined by environment and have some probabilities beyond the two and also man have definite response to them. Thus man becoming the "creator of environment". Another important aspect is the culture of the people that determines the forms and process of human interaction and adjustment with the environment (Taher, 1993). It is very critical and interesting to study about the adjustment and interaction of man to a forest environment. It is because man has to be keeping his environment in balance without lost. For this man has to adjust with nature while acting as modifying factor. The mode of modification of adjustment is the primary concern in respect of today's environmental conditions.

The study of man-environment concept is not a new one. The idea and theoretical framework are dated back to the dawn of modern geography (Beyer, 1974). With a new environment awareness started from early part of the 80's of 20th century, the study got a new dimension. Man and environment study is mostly related to natural and man-made hazards. Geographers are attempting continuously to correlate the age-old concept of human impact on nature are newly added. In this field of study Burton, Beyer, Kates, Swell, Kayastha, Taher, Bhagabati, Gogoi, etc. showing their efficiency in terms of man-environment interaction and adjustment.

The Study Area

Dibru-Saikhowa is one of the largest biodiversity hotspots situated in the extreme east of Assam. It lies between 27°30' N to 27°48' N latitude and 95°03' E to 95°35' E longitude at an average altitude of 118 meters from mean sea level (Fig. 1). The average rainfall ranges from 230 – 380 cm and the temperature ranges from 7° C to 34° C. The forest type of Dibru-Saikhowa comprises of semi-evergreen, deciduous forest, littoral and swamp forests patches of wet evergreen forests. The National Park is having about 35.00 % moist mixed forests, 10.00 % degraded forests and 21.00 % grasslands and rest are the streams, hills, channels, sands etc. A total of 36 species of mammals have been recorded in Dibru-Saikhowa National



Figure 1: Map of Dibru-Saikhowa National Park showing its geographical location.

Fig. 1. Dibru-Saikhowa National Park

Park. It is equally rich and diverse in herpetetic fauna. Besides these, 2 species of monitor lizards, 8 species of snakes, 62 species of different fishes and more than 385 species of birds have also been recorded in the Park. In 1980, Dibru Reserved Forest was declared and in 1929 Saikhowa was declared as Reserved Forest. Further in 1986, it was declared as Dibru-Saikhowa Wildlife Sanctuary by the inclusion of both Reserved Forest and some other adjoining areas, while in 1999, it was declared as National Park with a total core area of 340 sq. km.

Laika and Dadhiya are the two forest villages locating in the westernmost part of the park. Though the villages are now occupied by the Mishing, but in reality the village Dadhiya was a winter camp for the Nepali people. It was the famous dairy farming area for the Nepali community before the great earthquake of 1950's. "Dadhiya" is derived from the word milk (Das, 2004). After the earthquake the Nepali community shifted their camp to some other places due to the continuous flood in their dairy farm. In 1943 there were only 5 number of Mishing family at Pamua Chuburi. In 1951-52, the Assam Forest Department permitted 75 numbers of Mishing family to stay at Laika as forest villagers in 135 hectares of land. Again in 1956-57, 90 numbers of Mishing family permitted to live at Dadhiya in 234 hectares of land. In the park area the people living are very much advance to adjust themselves with floods and forests. Therefore they had found that area a suitable habit for them at the time of 1950's with available support from the forest. At present there are all together 790 households with 6360 numbers of population. Socio-economically the study area is very much backward and most of the people are illiterate. Further medical facilities, mode of communications, transportation etc are not available in the said area.

Objectives and Methodology

The present study is carried to find out:-

- i) The human adjustment with the forest,
- ii) Man-environment relationship and human interaction to the forest,
- iii) Adjustment of the people with continuous flood and bank erosion;

For the findings and analysis a total numbers of 120 households are selected as sample data in two villages namely Laika and Dadhiya. Besides these, data from the secondary sources also collected for the comparative study. Further maps and some other related information are collected from the DFO Office, Tinsukia. But the overall discussion is made from the sample data collection and empirical observations.

Analysis

The average family size is more than 7 persons and total population of the surveyed households is 876. Of these total population 53% is male and is 47% female. So far the age group is concerned 61.64% of the total population are below 20 years indicating high growth rate; 26% of the total population are between 20-50 years and are 11.36% above 50 years. The area is still suffering a high growth rate of population with a very low literacy rate.

Human Interaction: During 1950-57, there were only 165 households in the newly established Laika and Dadhiya forest villages. Now the figure is increased up to 792 and population pressure is also increased more than 7000. This large base of population is totally based on the surrounding forests of Dibru Saikhowa. They turned out regularly to the forest, for collection of their necessary requirement like food and firewood, animal pasturing, housing materials, etc. Dependency to the forest is tremendous from both the villages. Out of the total population 15% people moved for firewood and collection of housing materials, 34% for food collection, and 25% for fishing. But more than 32% of the total population turned out every day for animal pasturing.

These activities are not considered for the rainy season, because in the rainy season the movement is restricted by the flood hazards. As per the official report, inside the park area, there are more than 15000 domesticated animals. Cow, buffalo, and goats and pigs are generally domesticated by the people living in the park. For their grazing, and all other activities as mentioned, obviously people moves to the interior area of the forest.

Settlement is a model of interaction between man and environment. The mode of interaction of the forest villagers in Dibru Saikhowa is same that with other. All the people move out at the day time for food gathering, collection of firewood, animal grazing, fishing etc. Sometimes people are also stayed inside the forest for fishing at the nighttimes.

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Regarding better interaction, fair adjustment and proper development of the forest villages it is necessary to do some innovative work in the said area. Government interference, strict maintenance of Forest Act, restructures and rebuilt of the forest village are necessary. Since both the villages were already being there and government did nothing at the time of declaration of Reserved Forest so alternative way of rehabilitation is very necessary. The alternate policy of rehabilitation or restriction to allegation encroachment or abandonment of unfair and illogical pressure of evacuations of land may ameliorate the condition. The present paper is a part investigative study of the environmental problems and human interaction in the forest village of Dibru-Saikhowa. This is, in turn, helps in understanding the mode of interaction and adjustment of the people living within the forest lands and consequences problems and their mitigation. Beyond this, forest Dept. has no clear cut outline map of the park. In comparison to Kaziranga National Park and Manas National Park of the same state, Dibru-Saikhowa facing lots of problems in terms of finance, staff and infrastructure. The National Park has only 32 staffs for management and protection and operation. For a core area of 340 sq. km, this is really a tough job to handle the situation with such a minimum number of staffs. So Govt. must have to look after such a serious condition with some sound policies. Thus, in summery it can be said that mode of adjustment of the people living in Laika and Dadhiya Forest village is still very critical. It can be say that the people are trying their best to stay there with a minimum damage of the park environment. But it is going to be a serious problem with the increase of population density in future. Govt. should take care of the forest as well as people living there.

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