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A Review on environmental issues in north-east India: Exploring the environmental and socio-cultural implications

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Abstract
This paper presents prominent issues pertaining to environment and socio-cultural context of north-east India arising out of inevitable developmental activities. The region has enormous potential of hydropower and mineral resources where major portion of it is unexploited yet. The environmental related issues are primarily subjected to dams and mining of minerals which questions the sustainability of environment, socio-cultural, religions and identity of the people mainly in the state of Arunachal Pradesh, Sikkim, Assam, Manipur and Meghalaya. Owing to inevitability of development, we argued it is imperative to assess the socio-environmental impacts before the commencement of any developmental activities. More sustainable and cost-effective smaller dams should be constructed in lieu of large dams. This paper outlined and underpinned the existing problems and challenges associated with developmental activities and attempt to bring about a sustainable approach by considering the environment, development and society.

Keywords: Northeast India, hydropower projects, minerals, mining, rivers

Introduction

The northeast region comprises of eight states such as Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. Each state is endowed with rich and abundant forest resources. Almost 70% of the region is covered with a forest at an average. The forest in this region is unique in structure and species of innumerable endemic flora and fauna. It also has a huge reserve for mineral resources such as limestone, uranium, and coal which are mined. Joy, Mahanta and Das (2013) [9] describe that the forest of this region falls under the Indo-Burma biodiversity hotspots of the world which ranks sixth out of 25 biodiversity hotspots. Many forests primarily in the states of Manipur, Arunachal Pradesh, Sikkim and Meghalaya are considered sacred and it is preserved by worshipping the trees. In Nagaland, some blocks of the forest are conserved by the communities which restrict logging, grazing and cultivation in this area. Many medicinal plants had been discovered and extracted for commercial purposes or uses as traditional medicine from the forest of this region.

The northeast India has a huge potential for power generation through the Brahmaputra-Barak river system. However, due to unavailability of adequate infrastructural aid from the agencies, state and central government the regions could not extract its energy at the maximum level. The region has a huge reserve of minerals and oils such as coal, limestone, uranium, natural gas and petroleum. Among the northeast state, the deposits of coal are primarily found in Assam and Meghalaya. Huge reserve of uranium is found in the state of Meghalaya. Several mining related have reported in these two states. The environmental issues in other states such as Arunachal Pradesh, Manipur, Sikkim and Assam are mainly due to the construction of dams. The rich natural resources of this region primarily forest and water could be considered the wealthiest region of India. The region is also considered "The Power House of India" (Das, 2013) [3].

The Northeast India popularly known for its pristine landscape, abundant greenery and rich biodiversity is found to suffer from gradual degradation of its environment and shrinkage of genetic resources. Today, the indigenous person living in proximity experience the alienation from nature and natural resources mainly the land and forest resources and faces the threat to its environment, nature and livelihood.

However, the issue of environmental degradation and threat to its livelihood has not addressed sufficiently at the academic discussions which necessitate delving in minute details (Bhattacharjee, 2013) [1]. This paper highlights the necessity of such discussions at state, national and international level to safeguards the rights, livelihood and environment of the indigenous people.

Materials and Method

The environmental related issues of the north-east region are interesting to discuss because of its unique geopolitical location and multi-cultural identity. The region is located in between $27^0$57' N and $28^0$23' N latitude and $89^0$46' E and $97^0$25' E longitude and lies in the south of Himalaya (Das, 2013) [3]. The northeast region is topographical divided into the eastern Himalayas, the northeast hills and Brahmaputra-Barak valley basin (World Bank 2007) [13]. The northeast region shares international boundaries with China in the north and northeast; with Bhutan in between Sikkim and Arunachal Pradesh; with Bangladesh and Burma in the south and southeast. The region is connected with the rest of India through a narrow land which is located in between Nepal and Bangladesh, Siliguri corridor, and it is popularly known as Chicken's Neck (Das 2013) [3].

The northeast region is endowed with rich river resources which have its origination from neighboring countries such as Tibet (Brahmaputra), Myanmar (Irrawaddy) and Barak River from Manipur (India). The Brahmaputra River originates in Chema-Yung-Dung glacier or Angsi of the Tibetan Plateau. The river flows through Tibet, Assam (India), Bangladesh with a stretch of 1800 km. The river joined with Ganges in Bangladesh and it is called Meghna before finally flowing into Bay of Bengal. The Barak River originates in Manipur-Nagaland border passes through Assam as a tributary of Brahmaputra and enter Bay of Bengal. The Irrawaddy River flow the entire stretch in Myanmar and finally flow into Bay of Bengal (Das 2013) [3]. The river basin of Brahmaputra constitutes 68.42% (1, 74,528 km^2) whereas Barak and Irrawaddy occupy 16.36 % (41, 723 km^2) and 7.27 % (18, 539 km^2). These three main rivers in northeast region occupy 92.04% (234790 km^2) of the total river basin. The Brahmaputra-Barak river basin accounted for 84.78% (216251 km^2) which occupy the dominant river catchment in the region. The geographical area of region constitutes of only 8% but the share of surface water resources is 36% of the total India. The availability of water resources per capita and per hectares is highest in this region among all the states of India (Das 2013) [3].

Mineral and Associated Issues

Huge reserve of minerals, natural gas and petroleum are discovered and exploited and many have not exploited yet. Some areas had been leased to companies for mining. Coal, limestone and uranium are the main minerals that are mined in this region. Bhattacharjee (2013) [1] states that mining of coal leased in Assam amounted to 3126.98 acres and the limestone is 2214.14 acres of land. The northeast India as a whole has a coal deposit of 395 million. Sirnate (2009) [12] describes that Meghalya has the highest uranium reserve in the country which is estimated to 2, 75, 000 tons of high grade uranium in the west Khasi Hills district. Bhattacharjee (2013) [1] demonstrates that Meghalaya alone has a limestone deposit of 2,165 million tons.

Scholars have studied the environmental related issues of the region and pointed out the insensitiveness of the authority towards the loss of biodiversity and affected indigenous people of the region. The voice of the people in the process of the development is generally disdained in most of the developmental activities carried out in the region. The following are some of the popular minerals mining issues which are found to be relevant to discuss in this paper.

Uranium Mining

Uranium mining in Meghalaya is one of the most popular issues related to the environment in northeast India. The proposed mining project by Uranium Corporation of India (UCIL) has aroused a lot of hue and cry in the state spearheaded by student's organization. Shimray and Ramana (2007) [11] argued that the indigenous tribals mainly Khasi, Jaintia, Garo and Mikir have a strong traditional system for land use and forest management. The mining will seriously affect the livelihood and unique cultural identities. These indigenous tribals are dependent on forest products for their livelihood. The mining is not merely an attack on economic issue but also an attack on their intrinsic cultural values to land and forest.

Various agitations and protests have been observed in the state spearheaded by Khasi Students Union (KSUs) for leasing 422 hectares of land to UCIL for thirty years (Shimray and Ramana 2007) [11]. Several bandhs and blockades have led to damage and burned of government and private vehicles (Sirnate, 2009) [12]. Besides the impacts on the environment, some organizations such as Hill State People's Democratic Party (HSPDP) and Meghalaya People's Human Rights Council (MPHRC) protests that uranium mining will affect the health of the people (Bhattacharjee, 2013) [1]. Despite stiff resistance from the public and organizations the mining operation was done in a haphazard and destructive manner in the state.

Limestone Mining

The limestone mining in Meghalaya by Lafarge (world's largest cement company based in France) faced a lot of criticism from environmentalists, local organizations, NGOs and local people. Some of the major issues pertaining to mining is a threat to land rights, livelihood, forests and aquatic water. The mining activities include huge deforestation, powerful blasting which affects the rivers fishes and agricultural land of the indigenous people. The protest led to a petition in the Supreme Court in the banner Shella Action Committee stating that the limestone mining by Lafarge does not acquire the environmental clearance (Bhattacharjee, 2013) [1].

The local activists considered the project as a move to alienate Khasi tribals from their won homeland and so the action committee filed a PIL in Meghalaya High Court. In February 2010, the Supreme Court stopped Lafarge from carrying out mining activities. However, the same court lifted the bandh by stating that limestone mining had been going on for centuries and the scientific method by Lafarge would likely not affect the local people (Bhattacharjee, 2013) [1]. The judgment, in this case, has been upheld with the interest of the Lafarge disdaining the consent of people and the impacts on the environment.

Coal Mining

The open cast mining of coal at Patkoi Hill, Assam was done by nexus of mafias, politician and the Police. The unscientific

and haphazard way of coal mining has destroyed a thousand acres of agricultural land rendering them unsuitable for cultivation due to drainage of mine water. The destructive effect of open cast coal mining came to the fore of the public when some students visit to study the environmental conditions of the area in 1980. The initial protest against the coal mining failed to attract the attention of the masses even after several public meetings were organized by the society. The reasons being most of the villagers were directly or indirectly dependent on mining industry. Besides this, the mafias are threatening the villagers from holding a protest against the mining operation. Following a strong pressure from student's organization [1], the Ministry of Forest and Environment were forced to inquire about the mining activity in the Patkoi hill. Nonetheless, the protest failed to last as there was less support from the villagers who are dependent on mining industry, and there was a fear of local mafia reprisal (Bhattacharjee, 2013) [1].

The rat-hole coal mining in Jaintia Hills, Meghalaya was brought to halt by the order of National Green Tribunal (NGT) followed by a petition filed by All Dimasa Students Union and Dima Hazao District Committee. The petitioner complains the alarming situation of the rat-hole mining by criticizing the unscientific and unregulated manner of mining operations. The acid water and transportation emanating from mining activities were polluting the air, water and soil of the region (Down to Earth 2014) [5]. The natural caves in Jaintia hills are also affected by rat-hole mining activities. These caves are rich in biodiversity, teeming fish, salamanders, spiders, millipedes, woodlice, and bats. Rivers and streams flow through the caves which enhance the beauty of the landscape. Unscientific coal mining is a threat to the existence of these life forms and the fragile ecosystem of the caves (Down to Earth, 2008) [6].

Mineral mining in northeast primarily coal mining in Assam, uranium and limestone mining in Meghalaya have been coupled with deforestation, air and water pollution. While environmental pollution is one the major reasons for people's protest towards such project, the other serious problem is the displacement of the tribal people in the region. It was revealed that a genuine and authorized environment impact assessment (EIA) was not done in many of the developmental projects (Bhattacharjee, 2013) [1]. We argue that until and unless, there is a proper investigation of social and environmental impacts, it is not possible to usher social and environmental justice. Many scholars argued the importance of developmental activities going hand in hand with the environment. However, we argue that developmental activities should go hand in hand with society and environment.

Although some initiatives have been taken to reduce the impact of any developmental activities, the government continues to embark on large scale hydropower projects without adequately considering the social and environmental impacts. The government policy generally comes with compensation, rehabilitation and resettlement in the form of homes and lands. However, the implication of these policies is meager and negligible as compared to the loss incurred to tribal's identity, land and homes and loss to biodiversity. For instance, the case of Karanpura village in Jharkhand where 10.18 percent of the 6,265 families were given jobs in mining sector (Bhattacharjee, 2013) [1]. Furthermore, a delay in distribution of compensation and relief for resettlement and rehabilitation is a regular phenomenon in most of the developmental projects in India where the indigenous people are compelled to compromise on their means of livelihood and employment.

Hydropower Projects and Associated Issues

Acknowledging the potential of hydropower in northeast India, many initiatives have taken up in the form of signing a Memorandum of Understanding (MoU) between the central or state government and companies in the past. The World Bank (2007) [13] reports that the region has the potential of generating 60, 000MW energy and only 2004 MW i.e., 3.34% have been harnessed. The status of hydropower development in northeast region is definitely a question of sustainability and lack of interest on the government side to develop the region.

Among the northeast states, Arunachal Pradesh has the highest hydropower potential of 50,328 MW and this constitutes 79.56% of the region and 33.84% of the whole India. The state signed 132 Memorandum of Understanding (MoU) to developed 40, 140.5 M with a potential developer of hydropower projects. Out of the total developers, 120 are private companies. Arunachal Pradesh is inherently a "power house of India" (Das, 2013) [3].

The following table 1 highlights the hydropower potential of the northeast region developed and under construction till October 2013.

Table 1: Hydropower Potential Status in North-Eastern States till Oct 2013

Name of the States	Hydropower potential (MW)	Capacity under Construction		Capacity under Construction		Capacity Yet to be Developed	
		MW	%	MW	%	MW	%
Meghalaya	2394	282	11.8	40	1.67	2072	86.54
Tripura	15	0	0	0	0	15	100
Manipur	1784	105	5.89	0	0	1679	94.11
Assam	680	375	55.14	0	0	305	44.85
Nagaland	1574	75	4.76	0	0	1499	95.23
Arunachal Pradesh	50328	405	0.80	2710	5.38	47213	93.82
Mizoram	2196	0	0	60	2.73	2136	97.26
Sikkim	4286	669	15.60	2322	54.17	1295	30.23
Total	63257	1911	3.02	5132	8.12	56214	88.86

***Source*:** http://www.cea.nic.in/reports/hydro/he_potentialstatus_region.pdf as cited in Das (2013**)** [3]

The northeastern regions of India are able to harness merely 3.02% of the total hydropower potential while the national average is 23.53% till October 2013. It is a pity that after the completion of the various hydropowers project under construction it will be able to harness only 4.84% hydropower potential.

The effort to harness the colossal hydropower potential posed an unprecedented threat to forest and river resources and

social security of the northeast region. The construction of dams involves setting up of infrastructure by clearing forests and disturbing water ecosystems. It also posed a threat to indigenous people who are dependent on water and forests resources. The traditional belief on worshipping of sacred forests and rivers by some of the indigenous people has become a threat to them. Furthermore, the impact on agriculture and environment can lead to loss of livelihood to thousands of indigenous people because of displacement and migration. Most of the hydroelectric project faces fierce resistance from environmentalist, NGOs, student organizations, civil societies, and indigenous people. The disappointment of the people's opinion has turned into a fully-fledged movement between the authorities and companies on one side and the indigenous people supported by student organizations, NGOs, environmentalists and others on the other side.

The following are some of an important dam's related issue, which occurred in Arunachal Pradesh, Assam, Manipur and Sikkim. With regard to this, the major issue includes displacement, livelihoods, ethnicity-culture-sacred forests and rivers, flooding, downstream impacts, seismicity and fragile nature of Himalayas (Joy, Mahanta and Das, 2013) [9].

Tipaimukh Dam

The Tipaimukh hydropower project in Manipur constructed on the confluence of Tuivai and Barak Rivers have the potential of generating 1500 MW with an estimated investment amounted to Rs. 6,800 crores. Apart from generating energy, the other benefits of the project were to irrigate agricultural fields, promote ecotourism and prevent floods in Barak downstream in Assam. However, the project evokes many hue and cries by students, local people, NGOs and others and draws an attention at national and international level (Bhattacharjee, 2013) [1].

This project was signed in October 2011 in the presence of then Power Minister Sushil Kumar Shinde, top National Hydro Power Company (NHPC) officials and the then Manipur Chief Minister Okram Ibobi Singh. The project includes construction of 162.80m high dam with annual estimated generation of 3,805.74 million units in a 90 per cent dependable year with an installed capacity of 6X250 MW, with firm power generation of 434.44 MW (Hydropolitic Academy, 2015) [7].

Tipaimukh Dam was constructed in an ecologically sensitive region of India and one of the high seismic zones of the world. The negative aspects of the dam are that it will submerge more than 275 km^2 of forests and displace 60,000 people of indigenous Zeliangrong and Hmar communities of Manipur and impact 40,000 people of Bangladesh. Lunthulien, a villager from Bangladesh reiterated "The Tuiruong (Barak) flows like the blood that keeps us alive. The endless talk for damming the river has brought us nightmares as we are never told what the structure would be like." There are critics stating that the Indian government officially does not inform the lower riparian neighbour about the construction of the dam built 100 kilometres from its border. The dam will virtually dry up Surma and Kushiara Rivers of Bangladesh and thus choking the northeast region of Bangladesh. Experts predict that the dam will distort the seasonal flow and rhythm of rivers, irrigation, fisheries, agriculture, drinking water supply, navigation and groundwater levels. It will also impact the wildlife and the people living along the banks (International Rivers, 2015).

Apart from ill impacts on the environment, the other major issue concerning this project is a threat to livelihood of indigenous people and several sites held sacred by the communities. Organizations protesting against the project include Committee Against Tipaimukh Dam (CATD), Naga Women's Union, Manipur (NWUM), Naga People's Movement for Humans Right (NPMHR), United Naga Council (UNC), All Naga Student's Association, Manipur (ANSAM), Zaliangrong Union (ZU), Zaliangrong Student's Union, Manipur (ZSUM), Zaliangrong Women's Union (ZWU), and Zaliangrang Youth Front (ZYF). These organizations threatened the Manipur government with stringent actions if the project is not brought to halt. However, even after a memorandum is submitted to Union Power Minister, the government disdained and ignores the rights and disappointment of the indigenous people **(**Bhattacharjee, 2013) [1].

In fact, the application of NEEPCO's to assess the socio-environmental impacts of the project were found be deeply flawed by expert appraisal committee of the Union Ministry of Environment, Forest and Climate Change. Despite this flaw and several petitions, rallies and protests against the project, environmental clearance has been given by the Ministry and Government of Manipur (International Rivers, 2015).

Teesta Projects

The six hydroelectric projects on Teesta river[2], Sikkim faced a vibrant resistance from the indigenous people under the banner Affected Citizens of Teesta (ACT). These projects pose a threat to forests and rivers ecosystem, livelihood, cultural identity, religion, and political rights of the indigenous people. The important cause of the conflict is the fact that the forests and rivers are considered sacred and destruction on sacred landscape which has spiritual and cultural importance causes discontentment to the people. Besides this, the project brought huge number of workers from outside that changes the demography of the area which affects the social, political and economic situation, and exerts a great pressure on scarce resources including land (Joy, Mahanta and Das 2013) [9].

The impacts of these dams have at large effect the quality and quantity of river water and health of the people. The quantity of rivulets, streams and springs has decreased to 35-40% due to construction of series of dams on the river. The people complain of health deterioration due to increase in contamination and pollution of water resources. It is reported that some springs, rivulets and streams of the downstream basin are dried up and disappeared apart from soil erosion, and landslides.

Lower Siang

The Lower Siang Hydroelectric Project (2700 MW) planned in Siang basin is located in east Siang district of Arunachal Pradesh. The proposed project causes huge hue and cry in the region. The people feared that the project would submerge huge tracts of forest and agricultural lands, changes the demography and socio-cultural ethics, destruction of rivers, the impact on the downstream basin and increased seismicity of the region. The protest against the project was led by Adi Students Union (AdiSU), Siang People's Forum, and Forum for Siang Dialogue (Pertin, 2013) [10].

The excess release of water from Kopili Hydel Power Project (KHEP) causing devastating floods and forcing 1,00,000

people to displaced in a temporary shelter camp is another major issue emanating from dams in Assam. The KHEP is owned by North Eastern Electric Power Corporation Limited (NEEPCO). In 2004, the release of excess water from KHEP affects the districts of Nagaon, Kamrup and Morigaon rending a huge loss of property and agricultural land. NEEPCO deny the release of water from KHEP for which the affected people feel discontentment about the accident (Joy, Mahanta and Das, 2013) [9].

Subansiri Project

The Subansiri Lower Project (2,000 MW) constructed on Subansiri, a tributary of Brahmaputra river faced a strong opposition from students, organizations including political parties to shelve the continuation of the project[3]. The mega project is the biggest among the three dams constructed in Arunachal Pradesh but because of the downstream impacts in Assam, the people of the valley resort to protest against the project. The protest was observed when Union Minister for Ministry of Forest and Environment, Jairam Ramesh visits Gauhati to consult the academics, students, activists and politician on the issue of dam's construction in Assam. Akhil Gogoi, the then president of All Assam Students Union (AASU) argued that the dams would affect the livelihood of 500,000 fishermen's who are dependent on Brahmaputra River. He reiterated that they would organize a peaceful protest by blocking the road leading to Arunachal Pradesh (Down to Earth, 2010) [4].

The catastrophic impact on biodiversity, river ecosystem and environment at large owing to construction of large scale hydroelectric projects around the world is a matter of concern that needs to be addressed urgently. For instance, majority of dams in China have resulted in environmental degradation and great loss of associated ecosystem services. Several negative impacts have been reported in many countries which include loss of fauna and flora community downstream in Zambia; loss of wetlands of the river Niger in Mali; increased coastal erosion in Ghana; changes in water tables-higher around the reservoir and lower downstream and frequent landslides in New Zealand; the settling of suspended particles thereby limiting storage capacity and at the same time limits the flow of sediments downstream which hampers the agricultural activities due to limited nutrient-rich sediments; and disruption of species migration along the river (about 5-14% of salmon fish are killed at each of the eight dams they pass while swimming up the Columbia River, Canada.

The northeast region lies in the junction of Himalayan arc to the north and the Burmese arc to the east and it is one of the six most seismically active regions of the world, the other five are (being) Japan, Taiwan, Mexico, California and Turkey. The seismic factor must be in consideration of mega hydroelectric projects in northeast. Many individuals and scholars have a genuine argument on the construction of such projects in high seismic zone of the region (Das, 2013) [3].

Scholars have debated and argued upon the importance of environmentally sustainable, cost-effective small dams in lieu of large dams (Das, 2013) [3]. This will reduce the area of submergence and bring a drastic change in displacement and deforestation. Construction of smaller dams may reduce the generation of power through hydropower projects; however, this can be supplanted through the use of clean energy technologies such as solar, wind energy and so on. For instance, solar energy can be utilized at the maximum to supply power to small cities and villages.

Problems and Challenges

Owing to the rigid and mountainous geographical location of the region, these regions withstand an enormous difficulty for infrastructural development and other developmental activities. The region remains untouched for a long time and the situation become worst after the partition of India because most of the roads and railway links through East Bengal were cut down. Even today, the region is facing the problem of poor infrastructure especially transportation and electrification. Natural calamities especially flood during monsoon is adding to the problem of slow development in the region (Das, 2013) [3].

The developmental activities such as dams and minerals mining in the region are done without the adequate participation and consent of the local people rendering a disappointment to the affected people. Though some of the resources have been exploited without proper assessment of socio-environmental impacts, yet more than 90% of the natural resources are still required to be exploited. The problem and challenges in this context are the transparency in carrying out a scientific assessment (Environmental Impact Assessment) before the commencement of any developmental activities. Since the rights and cultural identity and belief of the indigenous people are inextricably linked with nature; it is not a sustainable approach of development to discern the consent of the indigenous people which is the case in the region. Another important challenge is the geographical location of the region which is located in highest seismic zone of India and that it should take into serious consideration of the impacts of natural calamities before the commencement of any developmental activities.

The central government enlisted several schemes and programs to eliminate poverty and underdevelopment in the region. Ministry of Development of North Eastern India (MDoNER) is one ministry who is responsible for the implementation of such programs across the region. However, looking at the pace of development it is far below average of the rest of India. Vast reserve of natural resources such as minerals and hydropower is unable to exploit at the maximum level due to lack of infrastructure. Many development projects and programs running across the region have not able to develop the infrastructure up to the extent which intends to harness the potential of hydropower and mineral resources.

The transparency of the distribution of financial resources is another major discrepancy which is hindering the development of the region. The rigid structure of the system to undergo various channels of officials before the final disposal of the allocated budget make vulnerable for consistent corruption in northeast region and India. There is a history of politicians and ministers and other descending government official who is misusing the funds and budgets for their personal interest. Until and unless, there is a mechanism to check this structured formal corruption within the system, it would remain a stumbling block for development in the region. The issues of environmental degradation of the region is least discuss at the national and state level.

Conclusion and Recommendations

Owing to colossal potential of natural resources, the developmental activities in northeast region is inevitable. Underdevelopment is one factor, which drives the region to push to develop and enhance the socio-economic

development of the region. However, the saga of minerals mining primarily coal, limestone and uranium are found to be carried out in unscientific and haphazard manner. The study of the impact on environment and society through a model of environmental impact assessment (EIA) has not been carried out in a serious manner. Public consultation and hearing in the entire process of minerals mining and EIA are found to be derelict which implicate the unorganized and haphazard way of minerals excavation.

The following recommendations are crucial for sustainable exploitation of natural resources in the region.

1. The negative impacts of large-scale hydropower projects are well transpiring all around the world. The construction of more sustainable and cost-effective smaller dams is imperative in the region.
2. The construction of large-scale hydropower projects and minerals mining has displaced millions of indigenous people in India. The sustainable approach of any developmental activities should consider the livelihood, cultural and religious identity of the region.
3. Before the start of any developmental activities, a genuine and concrete Environmental Impact Assessment (EIA) by joint task force (social scientist, scientists and engineers) should be made mandatory to assess the socio-environmental impacts owing to such projects.
4. Since the northeast region falls under the high seismic zone, it is imperative to assess the history of accidents due to natural calamities in the region to avoid colossal loss of livelihood, property and natural resources.
5. Lastly, any developmental project is difficult to be successful without the participation of the local people as the truth is it has to acceptable to them. A regular awareness programs is required to enhance more participation of local people in any developmental activities.

Notes

1. The organization that supports the protest includes Students Science Society, All Assam Students Union (AASU) and Yuva Chatra Porisad (YCP).
2. Teesta HEP stages I-IV are located in north Sikkim. Stage V are located in north and east region of Sikkim with a plan to harness 3,635 MW energy within a stretch of 175 km. Stage VI (500 MW) of the project are located in further downstream of east and south region of Sikkim.
3. The protest against the mega project was mainly led by All Assam Students Union (AASU), Krishak Mukti Sangram Samity (KMSS) and the main opposition party of the congress- ruled Assam, Asom Gana Parishad (AGP).

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