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Power and North East: The Hydro Power Scenario of North East

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Abstract: ***The North-East Region (NER) of India which comprises of eight states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and about 4500 km i.e. 98% of its border is with five different countries of South Asia–Nepal, Bhutan, China, Myanmar and Bangladesh. The region stands way below in comparison with the rest of India in terms of socio-economic indicators. The whole region is endowed with various perennial rivers and water bodies, hence, the huge hydro electricity potential. The power generation opportunities especially in the hydro power are there in the states of Arunachal Pradesh, Sikkim and Meghalaya. But it has been seen that hydropower development depends on various factors which include technical difficulties and political opposition, dearth of adequately investigated projects, land acquisition problem, environmental concern, regulatory issue, power evacuation problems, long clearance and approval procedure, the dearth of good contractor, and sometime law and order problem and inter-state issue are the cause for the slow development of hydropower. Exploitation of the large hydro potential in the NER could be used for export to the power deficit Northern and Western regions of the country. The spill-over benefits for the region would be the development of infrastructure such as roads, communications, and electricity supply to remote hilly areas, resulting in better quality of life. The study aims to find out the present power scenario in the north-east region in regard with hydropower. It also highlights the future prospects and challenges ahead in the hydro power sector of this region.***

Keywords: Hydro power, North-East Region, Benefits of Hydropower, Challenges

1. Introduction

North – Eastern region of India is commonly known as 'Seven Sisters' namely Assam, Arunachal Pradesh, Tripura, Meghalaya, Nagaland, Mizoram, Manipur and Sikkim, is considered as the one of the less developed regions of the country and collectively the states are also considered as the member of North East. So, these states can be called as 'Seven Sisters and One Little Brother' facing the problem of shortage of electricity in generation and distribution which leads to unsatisfactory supply in some regions there by also effecting economic growth. In comparison to greater India having 250.256 GW installed capacity by the end of July 2014 as world third largest producer of world with global sharing 4.8% in 2013 (Prem Kumar Chaurasiya ,et al).

For example: The North –Eastern Region with its different language, culture and customs generating resistance for unifications. This region is pre dominated by ethnic conflicts further dividing people of this region and also having a domino effect leading to Under Development. From the general prospects of present scenario it is recognised that socio-political complexities of this region has lead to political autonomy and struggles leading to armed conflicts. To overcome this, the Indian constitution relies on unique administrative nature for North East Region. The Sixth Schedule and other constitutional provisions relevant to the Northeast offer different degrees of autonomy and self-management (including natural resource management) to indigenous communities. Despite this, there seems to be little opportunity for them for participation in decisions related to large developmental projects. Also It is a land locked Region with ninety eight percent of its border being international. The land -locked area which constitutes 8 percent of the total area of the country is connected with the main land through Chicken-neck across West Bengal. Faced with a multitude of challenges, the region is currently charting a course for 'development', and multiple large hydro projects for power export are a part of the government's official development plan.

The North East part covering four percent of total Indian population which covers 17% of the world population and dramatically India's energy use has increased 16 times and the installed electricity capacity by 84 times. In 2008, India's energy use was the fifth highest in the world. In the lieu of P. Garg Ministry of Environment and Forests, CGO Complex that entire country is facing from the problem of selection of energy source in respect to social, environmental and technological benefits secondly cost of producing is more than economical benefit in respect of planning, installed and commissioned (Garg. P., 2012).

In this respect North Eastern region is blessed with bio-diversified natural resources and it is very much enriched. Again strategic location as Gate Way to South East Asia scoping a healthy economic relationship with neighbouring countries prompting as a potential economic regions of India and clearly the Region now considered as India's 'future powerhouse'. In 2001, the Central Electricity Authority (CEA), India has identified 168 large hydroelectric projects with a potential of 63,328 MW in the Brahmaputra river basin. North –Eastern states have enormous Hydro Potentialities. The surface water resource of the region is near to 652.3 billion cubic meters that shares 34% of country's total water wealth (CEA Report, 2009-10). The importance has been lying due to the Brahmaputra-Barak River system having capability to generate huge amount of hydro power for the rest of the country including North East Region also.
In the geographic positioning Regional Power Grids of India, the North Eastern Regional Grid includes namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim is belongs to Eastern Regional Power

Grid. As per the data given by the "Working Group on Power for 12th Plan" on the base of "Mid Term Appraisal, Planning Commission" institutions set the target of 663 MW in North East Region and 1209 MW in the state of Sikkim additionally out of which 21 MW in North East Region and 510 MW in Sikkim has been achieved by the date 30.09.2011 by the same date assessment we get the distribution as:-

Table 1: Distribution of Power Projects in terms of Target and Achievement

State	*Target*	*Achievement as on 30.09.2011*
Assam	537	0
Arunachal Pradesh	0	0
Meghalaya	126	0
Tripura	0	21
Manipur	0	0
Nagaland	0	0
Mizoram	0	0
Sikkim	1209	510

(Source: - Working Group on Power for 12th Plan)

The 3rd North East and East Power Summit 2010 has clearly identify that reasons for dissatisfactory power scenario are due to the existence of poor physical infrastructure, weather trouble, Not availability of accurate hydrological data and efficiency, and soil strength which also generate opportunities of more hydrological projects, export potentiality of power to greater India and knowledge awareness if these are strengthen by the policy level of govt. Though the North Eastern region harbours colossal water resources, the ongoing efforts to harness this vast hydropower potential through a series of dams has posed an unprecedented threat to the water, social and ecological security of the region. Hydropower dams involve the setting up of large infrastructure, which in turn leads to deforestation and disruption of forest ecosystems and reduction of biodiversity. The indigenous people at the dam sites who are largely dependent on forests and rivers for livelihoods are feeling threatened. Further, the widespread detrimental impacts on the downstream flood plains, the river regime, aquatic biodiversity, ground water domain, wetlands and consequent effects on agriculture and environment can lead to loss of livelihoods and out migration, thus increasing the possibility of conflicts. The study aims to find out the present power scenario in the north-east region. It also highlights the future prospects and challenges ahead in the power sector of this region.

2. Current scenario of Power in the North East Region:

The consumption pattern of electricity in the North-Eastern region is mainly dominated in the domestic and commercial sectors. The consumption pattern of electricity are being highlighted in the following tables

Table 2: Rural Electrification in the North East Region

	Number of Village	*Electrification*	*National Average*
Total(NER)	29,696	76.6%	84.3%
Assam		77.3%	84.3%
Arunachal Pradesh		63.5 %	84.3%
Manipur		95.5	84.3%
Meghalaya		63.5 percent	84.3%
Mizoram		99.6	84.3%
Nagaland		100	84.3%
Sikkim		100	84.3%
Tripura		95.9	84.3%

(Source: CEA Annual Report 2009-10)

Table 3: Industrial Consumption of Electricity in the North East:

		North East	*National Consumption*
Industrial Consumption		1,200 giga-watt /hours (less than 1 percent of national consumption)	124,573 giga-watt/ hours

(Source: CEA Annual Report 2009-10)

Table 4: Annual per capita consumption in the region

		North East	*National Average*
annual per capita consumption		119 kilo-watt/hours	390 kilo-watt/hours.

(Source: CEA Annual Report 2009-10)

From the potentiality of hydropower among the states of northeast, Arunachal has been ranked first with 79.56% of the region which is 33.84% of the country. Sikkim stands second with 6.77% and Meghalaya stands third with 3.78%. In this direction, As of October 2010, there were 132 memoranda of understanding (MOU) signed between the Government of Arunachal Pradesh and potential developers of hydropower projects with a total capacity of 40,140.5 MW. 120 of those memoranda are with private companies.

The North East Region with inclusion of completed projects from different North East states able to receive only 3.02% bench mark up to October 2013 of its' hydro potentiality in comparison to average is 23.53% of nation-wide. In the context the other under-going projects helps only for 4.84 % bench mark. Estimates predict to produce littlie far from total production of 60 years from Independence for whole country. Sikkim has bench marked with 6.77% as second and third one scored by Meghalaya with 3.78%.

Assam is enjoying harnessed maximum hydro potentiality 55.14% followed by Sikkim 15.6% and Meghalaya 11.78%. After completion Sikkim benefited by 69.77 % contrasting Arunachal Pradesh with 6.18% of it's' potentiality changing present operations to Sikkim and Assam are in advance stage in term of hydro potentiality.

3. Hydro Power in Northeast

According to the International Energy Agency (IEA), net installed capacity of hydro electricity globally is 999 GW, with ten countries accounting for 66% of the capacity. India ranks seventh in the list. In terms of using hydro sources in total domestic electricity generation where as our neighbour

country china as highest rank. India have the potentiality around 1,45,000 MW and at 60% load factor out of which exploited only around 26% of its hydropower potential with installed capacity of 39,896.40 MW and additional 14,502 MW as under construction and also projects with a capacity of 25,165 MW approved by the Central Electricity Authority of India (CEA) showing overall increase of 3.96% from 2011-12 to 2013-14 as per the report of CEA (DTA, Your India Advisor).

India's hydropower system is divided into five major provinces namely, the Northern region, Western region, Southern region, Eastern region and North-Eastern region, with each region facing separate issues. While the Eastern and North-Eastern regions are power abundant, the Northern and Western regions have greater power demands. The hydropower potential is largest in North East Region with 98% of it still untapped. Northern, Eastern, Western and Southern regions have 79%, 77%, 23% and 33% unexploited hydropower potential respectively. Northeast Region possesses immense potential for development of the power sector based on hydro power. North-Eastern region, hydro provides 42.7% of total electricity, while in the Northern region, 25.4% of electricity comes from hydro. Among the states, the two Himalayan states of Uttarakhand and Himachal Pradesh have the most hydro electric generation capacity as a percentage of total electricity produced. Brahmaputra basin surrounded by Himalayas and Patkari range with extends over an area of 580000 sq.km touching Tibet (China), Bhutan, India, Bangladesh. Assam-Burma border, by the Assam range of hills on the south, on the west by the Himalayas and the ridge separating it from Ganga sub-basin. This basin lies in the state of Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal. This sub-basin has a abundant hydropower potential.

Table 6: In short the strength of installed capacity up to 31st September 2013 as

(All figures in MW)

		Thermal				Renewable Energy Sources	Total
State	Hydro	Coal	Gas	Diesel	Total		
Assam	430	60	441	21	522	27	979
Ar. Pradesh	98	0	21	16	37	79	214
Meghalaya	231	0	26	2	28	31	290
Tripura	62	0	182	5	187	16	265
Manipur	81	0	26	45	71	5	157
Nagaland	53	0	19	2	21	29	103
Mizoram	34	0	16	52	68	36	138
Central Unallocated	127	-	56	-	56	-	183
Total(NER)	**1116**	**60**	**787**	**143**	**990**	**223**	**2329**
Sikkim	75	74	0	5	79	47	201
NER+ Sikkim	**1191**	**134**	**787**	**148**	**1069**	**270**	**2530**

(Source:-Working Group on Power for 12th Plan)

And taking into consideration only about hydro powers with other states according to the regions as follows:-

Table 7: Hydro Power Projects with Installed and Total installing capacity

Region	State	Hydro - Installed capacity (in MW)	Total Installed capacity (in MW)	Hydro as %age of total installed capacity in State
Northern Region	Himachal Pradesh	2950.94	3785.11	77.96
	Punjab	3024.65	7658.73	39.49
	Uttar Pradesh	1846.77	14079.34	13.11
	Uttrakhand	2003.4	2565.78	78.08
	Jammu & Kashmir	1600.83	2424.95	66.01
Western Region	Madhya Pradesh	3223.66	11229.15	28.70
	Maharashtra	3331.84	31934.15	10.43
Southern Region	Andhra Pradesh	3734.53	17174.88	21.74
	Karnataka	3599.8	13818.11	26.05
	Kerala	1881.5	3856.44	48.78
	Tamil Nadu	2182.2	20111.64	10.85
Eastern Region	West Bengal	1248.3	8654.29	14.42
	Odisha	2166.93	7296.33	29.69
North-Eastern Region	Assam	429.72	1140.04	37.69
	Meghalaya	356.58	455.27	78.32

(*Source: DTA, Your India Advisor*)

The Brahmaputra with 2880 length it receives 22 tributaries in Tibet and 33 tributaries in India having origin of Himalayan from the glaciers recognizing the Subansiri, the Jia Bharali (Kameng), and the Manas. In addition to these the Dibang, the Lohit from the extreme eastern flank of the Himalayas, the Jiadhal, the Ranganadi, the Puthimari, and the Pagladiya are from sub-Himalaya, to prove the intricately link with the floodplain ecology of wetlands (beels). For example, these linkages are evident in the world-renowned ecosystems such as the Kaziranga National Park in Assam. Due to the colliding Eurasian (Chinese) and Indian tectonic plates, the Brahmaputra valley and its adjoining hill ranges are seismically very unstable and the region has seen some major earthquakes.

The Barak River has started from Manipur and the upper Barak catchment area extends over almost the entire north, north western, western and south western portion of the state. The middle course of the river lies in the plains of Cachar in southern Assam. In 2001, the Central Electricity Authority (CEA) did a highest benching and identified 168 projection spots with possible installed capacity of 63,328 MW at the Brahmaputra basin for hydroelectric potential among the various river basins in the country. On that fact and figures a large amount of Memorandum of Understandings were prepared and signed for different rivers public private participations.

In May 2008, the then Union Minister of State for Power, Jairam Ramesh, clearly raising the topic raised concern about the 'MoU virus' which was affecting states like Arunachal Pradesh and Sikkim. He was referring to the very rapid pace at which agreements (MoUs/MoAs) were being signed by these State Governments with hydropower companies,

particularly in the private sector. The upstream-downstream linkages within the region and the contiguous Himalayan areas are also engendering conflicts. The issue of large scale hydropower development in the eastern Himalaya has already caused a simmering tension between China, India and Bangladesh. There is widespread concern over the observed and probable social and environmental impacts of these hydropower projects in the region. Protests against the detrimental downstream impacts of large dams in Assam have assumed the proportions of a mass movement.

Table 8: Large projects (above 25 MW) already in operation in Northeast

State	Projects in operation (above 25 MW)
Sikkim	60 MW Rangit III, 510 MW Teesta V
Assam	225 MW Kopili, 50 MW Khangdong, 100 MW Karbi Langpi
Manipur	105 MW Loktak
Meghalaya	36 MW Umiam Stage I, 36 MW, 60 5MW Umiam Stage III, 60 MW Umiam Stage IV
Arunachal Pradesh	405 MW Ranganadi Stage I
Nagaland	75 MW Doyang

4. Benefits of Hydropower

Pollution Free Source of fuel - a clean fuel source because hydropower utilizes water to generate electricity, it doesn't produce air pollution or create toxic by-products like power plants that burn fossil fuels such as coal or natural gas (*Bureau of Reclamation, Power Resources Office, Hydroelectric Power, (July 2005)*

Renewable - Hydropower is renewable because it relies on the hydrological (water) cycle driven by the sun which provides a renewable supply of water. Hydropower facilities harness the natural energy of flowing and falling water to generate electricity *(Bureau of Reclamation, Power Resources Office, Hydroelectric Power, (July 2005)*

Reliable - Hydropower can meet changing demands because it can go from zero power to maximum output rapidly and predictably (*National Association of Hydropower (www.hydro.org/Hydro_Facts/Facts_Sheets/716.cfm)*

Efficient - Today's hydropower turbines are capable of converting more than 90 percent of available energy into electricity which is more efficient than any other form of generation (the best fossil fuel power plant is only about 50 percent efficient). *(National Association of Hydropower (www.hydro.org/Hydro_Facts/Facts_Sheets/716.cfm)*

Flexibility - Hydropower output can be changed quickly in response to changes in electrical demand because of the ability to control the flow of water. Hydropower is generally available as needed; the flow of water can be controlled through the turbines to produce electricity on demand *Bureau of Reclamation, Power Resources Office, Hydroelectric Power, (July 2005)*

Domestic and Secure - Hydropower is a secure source of energy because it comes from water in domestic rivers and is not subject to disruptions from foreign suppliers, cost fluctuations, and transportation issues that are associated with other fuel sources. *(National Association of Hydropower (www.hydro.org/Hydro_Facts/Facts_Sheets/716.cfm)*

Cost-Effective - Hydropower generation has low operating costs and a long power plant life compared with other large scale power-generating options. Once the initial investment is made, power plant life can be extended economically and remain in service for many years. Typically a hydropower plant in service for 40-50 years can have its operating life doubled (*International Hydropower Association, Hydropower and the Worlds Energy Future, (November 2000)*

Stored Energy Source - Because hydropower is most often generated by water stored in a reservoir behind a dam, a vast amount of potential energy exists in the reservoir which is available over a long period of time.

Black Start Capability - Hydropower facilities have the ability to start generation without an outside source of power. This service allows system operators to provide auxiliary power to more complex generation sources that could take hours or even days to start *(International Hydropower Association, Hydropower and the Worlds Energy Future, (November 2000)*

Growth and Development - Hydropower has played in important role in the growth and development of the

5. Challenges regarding Hydropower in Northeast

The conflicts around hydropower development in the region cover a wide range of issues including displacement, loss of livelihoods, various types of ecological impacts – especially seismicity and the fragile nature of the Himalayas, downstream impacts, flooding, ethnicity, culture- sacred landscapes, environmental impact assessments, and so on.

5.1. Social Impact

The North East regions' Population is diversity in respecting with unique socio-cultural, agro-ecological and land-holding systems (such as different forms of community control over forests in various parts of the region) for the communities blocks, and natural resource-based livelihoods. By seeing the geographical diversifications the proposal to 'sell' large hydroelectric projects in this North East Region, is for propagated in 'small displacement' by submergence as compared to that in other parts of the country. In Northeast where most of states are hilly, there is very little land where permanent cultivation is possible. For example virtually all the available arable lands will be submerged by the 2700 MW Lower Siang project in the affected area in the Siang Valley. The magnitude of impact has to be understood keeping this context in mind. It is misleading to argue that the land being lost is a small percentage of the total area of the district or state and wrongly assume that the project is benign.

As per the Census 199, 8% tribal people amounted 85 lakhs of total displaced population amounted 55% of total population were effected for the hydro power projects as

because the projects are usually undertaken in the remote areas of the country, which are inhabited by the tribal people according to the data given by Ministry of Tribal Affairs for mega development projects. In India dams are the single cause for displacing around 75% of total number of displaced people. (Fernandes and Paranjpye , 1997).

The impacts of dams on resources under common use (e.g. pasture lands), vital to livelihoods of local communities, is also a major missing link in impact assessment of projects (Qinglong et al. 2007). Shifting agriculture (jhum) is a dominant traditional land use in the hills of Northeast India and plays a critical role in the livelihoods of people, maintaining agricultural biodiversity and providing food security. Increasing pressures on land have resulted in the shortening of jhum cycles (the length of the fallow period between two cropping phases), thus impacting the ecological viability of this farming system. The submergence of land by hydel projects will further shorten the jhum cycle and enhance the pressure on the surrounding areas, thus affecting the environment and the livelihoods of jhum-dependent communities over a much larger landscape (Vagholikar and Das, 2010).

The impact on local communities is well beyond just the submergence area. These hydropower projects have detrimental impact on the ecosystem, livelihoods, religion, cultural identity and political rights of the people. The heavy influx of outside workers seems to be changing the demography of the place, and these workers continue to reside in the state, affecting the social, economic and political situation, and also exerting great pressure on its sparse resources including land. Several areas that have been brought under hydropower projects are sacred, and are spiritually and culturally important for indigenous communities. Violation of the sacred landscape has been an important cause of discontentment among the people (Tseten, 2013; Sharma and Pandey, 2013). In Sikkim the Lepcha tribe is opposing the construction on Dzongu, a sacred site. Tipaimukh hydroelectric dam in Manipur, where the Zeliangrong Nagas inhabit, also stand to lose their sacred spots and half of their fertile hills.(Chakraborty, 2003). The hydropower driven development paradigm coupled with disregard for traditional institutions and community opinion seems to have prepared the ground for conflicts.

5.2. Technical Issues

For any Hydroelectric Project irrespective of the location, there are many technical issues which are to be addressed on top priority. To expedite early execution of hydroelectric projects in India, feasibility and detailed Reports based on survey to be prepared for any geological uncertainties. Survey & investigation for geological and Geotechnical parameters and analysis of geological, geo-morphological, geo-electrical, hydrological data etc. should be done at the time of preparation of a Project feasibility report itself in order to minimize the impact of risks. Most of the hydroelectric projects spend less money towards the technical reports prior to construction stage. Geological hazards to be predicted and analyzed based on the preliminary investigations to avoid delay and disruption during the construction stage. Technical constraints due to intricate geological nature of the project sites, Dam safety and security is a matter of utmost importance., failure of which can cause grave environmental disaster and loss of human life and property. Therefore proper scrutiny, inspection, operation and maintenance of structures are essential to ensure for safe functioning. Though a series of dams is being constructed in the Lohit river basin, no cumulative impact study has been conducted yet. Since the location of the project is situated at the boundary of Arunachal Pradesh and Assam, the major downstream impact of the project will be in the Assam valley, and no efforts have been made to study the likely downstream impact of the project. It is expected to have serious downstream impacts in Assam owing to high population density. Apart from negative impacts on ecology and livelihoods, it would jeopardise the livelihoods of different tribes on both the upper and lower ridges (Subrahmanyam D. S. 2013).

The next set of major problems in hydropower development involves creation of infrastructure, ensuring adequate investigations to minimize geological surprises, land acquisition, rehabilitation and resettlement of project-affected populations, clearance of forest and other environmental features, and potential law and order problems (as exist in many parts of the Northeast).[Rao, V.V.K, (2006)]

5.3 Ecological and Environmental Issues

The Himalaya, Indo-Burma, and Western Ghats and Sri Lanka – cover parts of India are selected as biodiversity among 34 hot spot for the wildlife species such as the rhino, elephant, tiger, wild water buffalo, pygmy hog and gangetic river dolphin covering 8% country's geographical area and 21% important Bird Areas (Vagholikar, Niraj and P.J. Das (2010)). Not it is the end, in recent researches also have discovered new species and extended known ranges of existing ones covering also large mammals such as primates and others. An extremely dominant monsoon interacting with a unique physiographic setting, fragile geological base and active seismo-tectonic instability, together with anthropogenic factors, have moulded the Brahmaputra into one of the world's most intriguing and gigantic river systems. The river system is intricately linked with the floodplain ecology of wetlands (beels) and grasslands in the Brahmaputra valley making evident for the world-renowned ecosystems such as the Kaziranga National Park in Assam, lok tak lake in Manipur. The geophysical nature of the Brahmaputra river basin is fragile and dynamic. The scientific knowledge on the river system is proofing poor to say as hydrology power as a new issue for operates which definitely link to economic sustainability of the project. To improve this threat is to be availability of comprehensive information which in turn returns long term viability of projects. This Economic viability can cost mega-projects plant tremendous ecological and social costs.

5.4 Climate Change

Hydro projects are considered as Green Energy as low-carbon energy which leads a motivation to climate mitigation strategy. The claim that hydropower is green power has

always been contested (Rudd et al 1993, Lima et al 2007, International Rivers 2008b, DelSontro et al 2010). The scientific evidence impacting the Himalayan region by growing climate change with serious ramifications which can be controlling chances by discharge pattern, sediment load, snowmelt run off and intensity and frequency of flooding in Himalayan Rivers. The Brahmaputra river basin is particularly sensitive by charecter and responded to climate change impacts.

Since dams are designed around known of rivers and local geology, it is natural that changes in the hydrological regime triggered by climate change will affect the existence, operation and management of these projects considerably. Experts acknowledge that the present knowledge base about hydrology, climate, ecology and geology of the Himalayan region is inadequate to support large scale interventions on the Himalayan rivers (Das.Partha J. 2013). Climate change introduces an additional layer of uncertainty to this evolving knowledge base. As a result, the present development paradigm that envisages a massive expansion in large dams in the northeast is full of risk (Das.Partha J. 2005).

5.5 Downstream Impact

A major catalyst to trigger the larger debate on downstream impacts of dams in Assam, has been the repeated incidents of dam-induced floods across the state from upstream projects (e.g. 405 MW Ranganadi in Arunachal Pradesh) in recent years. The Kopili Hydel Power Project (KHEP), owned by the North Eastern Electric Power Corporation Limited (NEEPCO) and located at Umrangshu in the Dima Hasao district (earlier known as the North Cachar District) of Assam, is primarily about the conflict around the devastating floods caused by the project (Das Partha J., Chandan Mahanta, K. J. Joy, Suhas Paranjape, Shruti Vispute ,2013). In 2004, the excess water released from the Kopili Hydel Project devastated a vast area of the three districts of Nagaon, Morigaon and Kamrup, forcing nearly 100,000 people to flee from their homes and escape to the temporary shelters set up by the community or the administration. In fact, the issue of the flood induced by the Kopili Hydel Project became a rallying point in the general agitation against dam induced floods in the state (Patowary, Ajit, 2013). Incidents in the past have shown us how ineffective dams are for controlling floods. (Goldsmith and Hyldyard, 1984). The disastrous floods of MahanadiRiver in Orissa have been caused due to Hirakund dam in 2008.

Downstream impact concerns raised in the Northeast include: loss of fisheries; changes in beel (wetland) ecology in the flood plains; impacts on agriculture on the chapories (riverine islands and tracts); impacts on various other livelihoods due to blockage of rivers by dams (e.g. driftwood collection, sand and gravel mining); increased flood vulnerability due to massive boulder extraction from river beds for dam construction and sudden water releases from reservoirs in the monsoons; dam safety and associated risks in this geologically fragile and seismically active region (Vagholikar, Niraj and P.J. Das 2010). The Brahmaputra valley, a thickly populated narrow strip of land with hills surrounding it, has awoken to the fact that it is going to be increasingly vulnerable to risks from existing and proposed large dams upstream. This realization has been significant for a civilisation whose cultural identity – customs, food habits, music, religious beliefs – is inextricably linked to its river systems (DelSontro, T.; McGinnis, D. F.; Sobek, S.; Ostrovsky, I. and Wehrli, B., 2010).

5.6 Water Dispute with Neighbouring Countries

The upstream-downstream linkages within the region and the contiguous Himalayan areas are already engendering conflicts. The issue of large scale hydropower development in the eastern Himalaya has already caused a simmering tension between China, India and Bangladesh. Similarly, India's talk of interlinking of rivers to transfer water from the "surplus" basins to the "deficit" ones has also created anxiety and tensions amongst the neighbouring countries like Nepal and Bangladesh. The perceived threat felt by Bangladesh due to India's Tipaimukh Dam in Manipur and China's alleged plan to divert the Brahmaputra elucidates the potential of transboundary conflicts over the use of water resource. The unwarranted release of water to rivers from dams both in Bhutan and within the region has caused devastating flash floods. A lack of coordination between countries sharing the river basins is a major obstacle in resolving these problems [Das, 2013].

5.7 People and Politics

The region's historical experience of exploitation of natural resources like land and oil, has led to apprehensions amongst a large section of people about the possible detrimental role of this capital - in the form of 'hydro dollars' as it has often been described by its votaries - towards the larger well being of the region. Civil society has pointed out that the colonial capital inflow into the region in the form of tea-plantations could hardly generate enough economic space where the local people could have participated, besides locking off huge land resources out of their reach. The same appears to be now being done with the region's water. The compelling argument being made is that the sudden rush of capital for multiple mega hydropower projects is another attempt to siphon off resources from the region which itself has a small power demand. An important element of protests in the region has been the strong involvement of youth from the Northeast. These young people certainly want development and economic progress, but they oppose the kind of development they feel will destroy their cultural and natural heritage (Vagholikar, Niraj and P.J. Das, 2010). "Meaningful development, not destructive development" is required. According to Akhil Gogoi, of the Krishak Mukti Sangram Samiti, technical issues are important. But the dams' debate in the region cannot be restricted to these issues alone. It is a matter of rights over natural resources. These resources are being handed over to power companies and our rivers transformed dramatically by political decisions taken in New Delhi and within the State Governments of the region. This requires a political response from people of the region and that will be our focus in the coming days.

Also According to Amelie Huber and Deepa Joshi the new hydropower development discourse in the region is couched in ostensible win-win scenarios: securing energy for the rapidly developing national economy; accelerating

development in hitherto 'backward' but hydro potent areas; and generating 'clean' energy and thus taking the discourse away from the earlier dam-related critiques. The entire environmental/water governance gets "depoliticised" by transferring environmental governance from the public to the state or state-backed private technological-managerial control in the specific context of Sikkim. This is all the more serious as critical dissent from state policy is against the grain where state citizen relationships are skewed and characteristic of a process of eroding democracy and of an 'imposed…benevolent despotism' (Huber and Joshi, 2013).

6. Observations

- Impact of one dam may not impacting a huge changes on the environment, society, power generation and distribution related issue and also it cannot be possible to pictured the entire scenario for treating one region specially as "Future Power House" as compared to the cumulative impact of a number of dams in one region or as a cascade of dams on one river.
- The bodies of getting benefit by the different installing capacity of hydro power projects may not be generated solely by projects them self as because there are related with economic power players and also participation of Private bodies may make the conclusion reverse who will benefit most by the proposed large number of hydro projects are the project developers, but the consumers and the local people will face all the hydrological risks and economic difficulties.
- The past record of relocation and rehabilitation, adequate legal protection against displacement, exclusion of social and environmental criteria in the detailed project report (DPR), exclusion of all the stake holders from the planning and implementation process will lead to massive social and economic disruptions. A leading social activist has linked the increase in number of slums in Jabbalpur (Madhya Pradesh) to the increase in the height of Dams in Narmada project.
- The hydro dams are not renewable in a true sense, because the dam and other hydro structures have a finite life of say 50-75 years after which they will need decommissioning (Ref.2). Even though storing of water may be done away with after decommissioning, the forest wealth, which was destroyed at the time of dam building, would be lost forever (Shahi. R. V., 2008).

7. Conclusion

All projects is carried out, taking into account the various objections raised by academics, activists and affected people, and made available in the public domain. The manner in which the environmental impact assessments of various projects have been carried out has attracted serious criticism. There are several areas of action which need immediate attention, but the seriousness of the situation demands that there is a moratorium on dams in the region till fundamental issues are sorted out. These include:

Ensuring transparency and accountability in decision-making and governance processes related to these dams at all levels – whether related to signing MoUs, conducting impact assessment studies or addressing trans-national issues in these river basins; building in mechanisms to get the free, prior and informed consent of local indigenous communities; learning lessons from old projects in the region such as Ranganadi, Gumti and Loktak; alternative power planning approaches at the national level; planning for genuine options-assessment and appropriate development in the ecologically and geologically fragile, seismically active, politically and culturally sensitive river basins of the Northeast.

The hydro power projects should be taken as a medium to bring development of power scenario in the north eastern region contributing towards the development in the country but not at the destruction of the natural resources of the region. The entire stakeholder should be taken in the participative mode in the implementation of the projects. The Central government as well as the state government should not try to impose the projects to the people of the region, there should be participation from the representatives of the local society specially from the villages which are directly affected, local organisation or body, technical experts from the state, the academicians etc. All should have the consensus view regarding the feasibility of such project. The projects should try to always carry a message the projects are made by the people of the region and for the people of the region.

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